Measuring the Divide: A Multi-Metric Comparison of Opinion Polarization in Europe, Germany, and Hungary.

Msc in Data Science for Society and Business

School of Business, Social & Decision Sciences

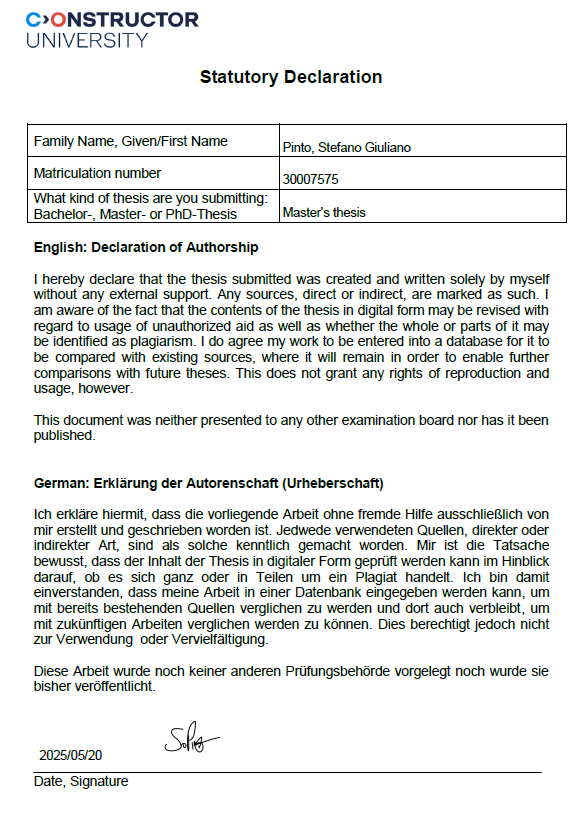
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# **Abstract**

This thesis investigates opinion polarization concerning immigration in Europe. Employing longitudinal data from the European Social Survey (ESS) and an exploratory web application, it addresses the question of increasing polarization across the continent. Seven polarization metrics, alongside one opinion-assessment metric, including a novel measure derived from Principal Component Analysis incorporating Likert-scale survey values, are utilized. A comparative analysis contrasts European averages with Germany and Hungary. The 2015 refugee crisis is identified as a key factor influencing polarization trends, with findings indicating increased polarization across nearly all metrics post-2015. Novel insights from this study reveal the role of economic factors in shaping immigration opinion polarization in Germany and highlight significant fluctuations in polarization levels within Hungary, challenging previously established knowledge.

**Keywords**: Computational Social Science, Immigration Opinion Polarization, European Social Survey (ESS), Germany, Hungary, Refugee Crisis, R, Shiny

# **Introduction**

The global number of international migrants has grown significantly from 75 million in 1965 to around 272 million in 2019 (World Migration Report, 2020), where Europe has emerged as one of the primary global destinations (Haas et al., 2019). Economic inequality, demographic pressures, and environmental crises are just some of the drivers of migration (Richmond, 2002). In Europe, opinions about immigration are heterogeneous. In Western Europe, short-term increases in immigration can lead to more negative attitudes, particularly when immigrants are from non-EU countries. However, regions with a higher share of foreign-born populations tend to be less anti-immigrant (Dražanová & Gonnot, 2023). Differences between countries often reflect economic conditions, for example the severity of a current recession (Hatton, 2016).

In the context of opinion dynamics, polarization refers to the divergence of attitudes within a society, often leading to the formation of distinct and opposing groups (Williams, 2018). In the context of immigration, polarization can manifest as stark differences or subtle distinctions in attitudes towards migrants, ranging from acceptance and support to scepticism and opposition. In the academic literature, several definitions of political or attitudinal polarization exist. For example, social psychology provides the concept of group polarization, which is a phenomenon where ‘members of a deliberating group move toward a more extreme point in whatever direction is indicated by the members’ predeliberation tendency’ (Sunstein, 2003). In politics, polarization describes a phenomenon of accentuated differences in larger groups or societies. Political scientists distinguish between elite and mass polarization. Whereas elite polarization looks at the polarization of parties or elected officials (Druckman et al., 2013), mass polarization refers to polarization of the general public (although the pertinent literature disagrees on the exact definition of the concept, Silva, 2018). Another distinction is made between affective polarization and opinion polarization (sometimes called attitude polarization). Affective polarization refers to ‘a tendency among party supporters (partisans) to view other party / parties as a disliked outgroup(s) while holding positive ingroup feelings for one’s own party’ (Reiljan, 2020). Opinion polarization investigates the ‘distributional properties of public opinion’ (DiMaggio et al, 1996) regarding certain socio-political topics. This thesis investigated opinion polarization on three migration-related issues.

Researchers studying opinion dynamics have been employing a diverse array of quantitative methodologies. This methodological pluralism encompasses various survey designs, scaling techniques, and statistical modelling approaches, each with its own strengths and limitations. Examples include approaches using nonlinear modelling (Amelkin, Bullo & Singh, 2017), correlational studies (Nordio et al., 2019), Boltzmann equations originating from kinetic theory (Düring & Wolfram, 2015), stochastic modelling (Acemoglu et al., 2010) and more. While this variety allows for the exploration of the topic from different analytical angles, it also presents challenges in comparability across studies. Despite the richness of quantitative approaches, there seems to be a need for a more streamlined set of metrics to effectively capture different facets of opinion polarization regarding immigration in Europe. This current landscape, while offering detailed insights, can hinder comparative analysis and the identification of overarching trends. Using a few simpler, yet robust, metrics grounded in established theoretical frameworks and previous empirical research could offer a more accessible and consistent way to assess key dimensions of polarization. Such a focused set of indicators would facilitate clearer communication of research findings, enable more meaningful cross-national comparisons, and ultimately contribute to a more unified understanding of the evolving patterns of polarization surrounding immigration in Europe.

One additional aspect of polarization is issue alignment. Issue alignment refers to the process by which people's attitudes, beliefs, or preferences on one set of issues become correlated or aligned with their attitudes on other issues, often due to shared ideological, partisan, or social factors. This concept is commonly studied in political science, sociology, and psychology to understand how individuals or groups develop cohesive worldviews or political identities. Issue alignment is associated with increased negative political affect, particularly towards out-groups. This alignment of issue attitudes can exacerbate political hostility, as individuals perceive others with differing issue alignments as more ideologically distant (Bougher, 2017). Investigating issue alignment regarding immigration opinions in Europe is an important topic as it sheds light on how attitudes toward immigration are connected to broader political, social, and cultural dynamics, with significant implications for understanding public opinion, policy-making, and social cohesion.

Prior publications in this domain often adopted a singular methodology to quantify polarization, sometimes using just one very simple metric such as the standard deviation (e.g., Musco et al, 2021; Koudenburg, Kiers & Kashima, 2021). In contrast, this thesis advances the field by integrating multiple established metrics, each capturing distinct facets of polarization, to provide a more comprehensive and nuanced understanding of immigration-related opinion dynamics across Europe. Furthermore, an innovative approach to quantifying issue alignment is introduced. Departing from conventional single-variable measures, the methodology of this thesis incorporates three attitudinal variables simultaneously, offering a richer and potentially more accurate assessment of how opinions on different aspects of immigration cohere within individuals using data provided by the European Social Survey (ESS).

The ESS is a large, academically driven, cross-national survey conducted every two years across Europe. Its main purpose is to measure and compare the attitudes, beliefs, values, and behaviours of people in over 30 European countries, providing high-quality data for researchers, policymakers, and the public, and is considered a key resource for understanding social change and differences across European societies (Eikemo et al., 2016).

Currently, to my knowledge, no Europe-wide study systematically and comprehensively analyses opinion polarization by simultaneously examining overall and country-specific trends over time with multiple polarization metrics and a multi-variable approach to issue alignment using data provided by the ESS. Therefore, an analysis integrating multiple polarization metrics, differentiating overall and country-level trends across the entire ESS timeframe, and applying a novel multi-variable approach to issue alignment would significantly advance computational social science, offering a more nuanced understanding of European immigration opinion dynamics.

This leads to the leading research question of this thesis: **Has there been an ongoing trend of several aspects of polarization, including issue alignment, in Europe regarding opinions about immigration?** Drawing upon data provided by the ESS, this investigation delved into the multifaceted nature of opinion polarization across Europe. To achieve this, eight distinct metrics were computed, informed by existing literature, to quantify various trends and aspects of polarization and general opinion dynamics, examining both overall patterns and country-specific variations. Furthermore, a novel multi-variable approach to assess issue alignment was introduced, employing principal component analysis (PCA) to capture underlying structures in attitudinal data. The analysis utilized weighted survey data provided by ESS, spanning the period from its inception in 2002 up to the most recent available wave in 2022. Including weights ensured that the findings were representative of the national populations surveyed across this twenty-year timeframe. By analysing these measures over successive ESS waves, significant temporal patterns in opinion dynamics could be identified and characterized, shedding light on the evolution of public sentiment on opinions regarding immigration.

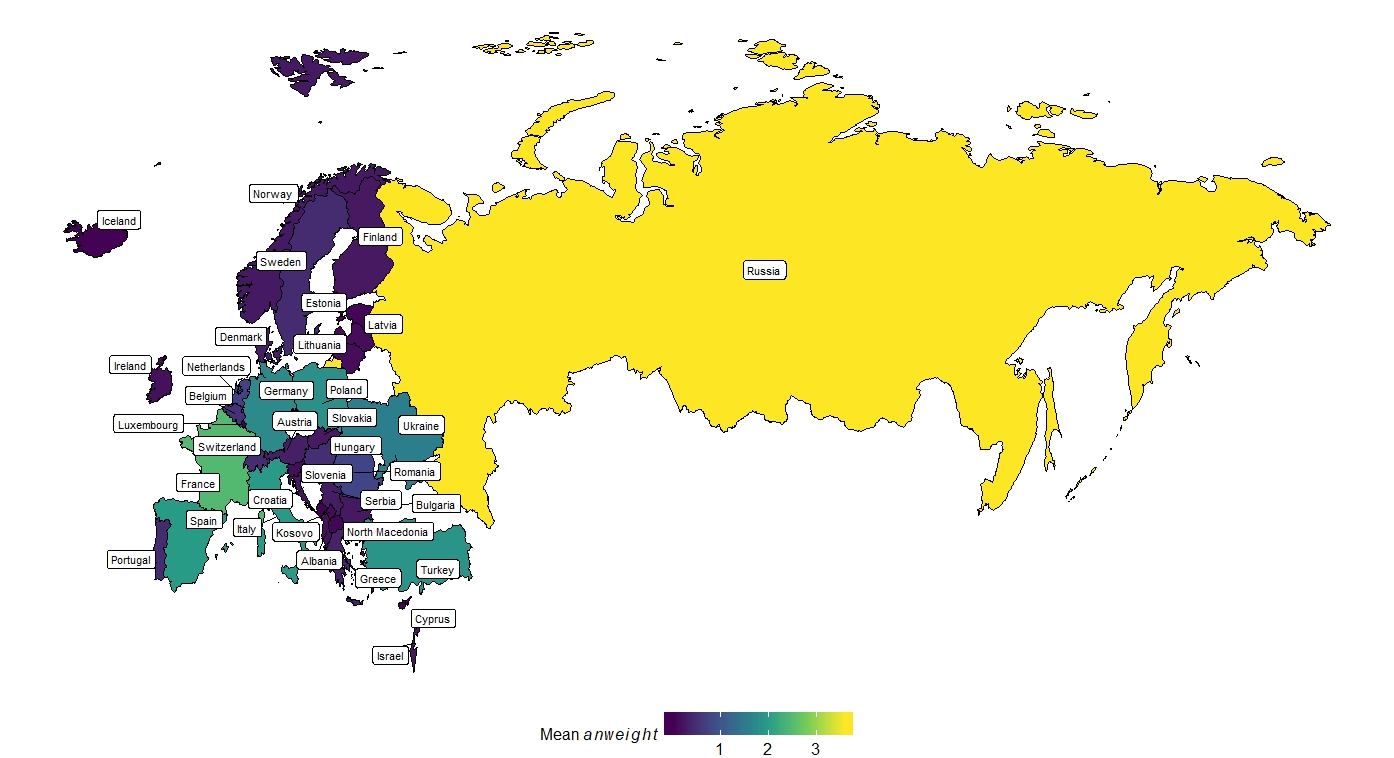
# **Methods**

The data were acquired from the ESS. Then, the relevant variables were selected and cleaned, including removal of missing values and transformation of round to corresponding year. The working data set consisted of 403,837 respondents from 39 countries across ten survey waves. After the data cleaning, the seven established polarization metrics were calculated for each round and country along with a distinct PCA in order to quantify issue alignment. The loadings and explained variance metrics derived from the first principal component were then considered for further interpretation.

## ESS data

The data were obtained from the website of the ESS (ESS Data Portal, 2024) using the inbuilt datafile builder wizard tool which allows to specific selection of the variables, rounds, and countries of interest and extracts the resulting data set as a CSV file. The data for our analysis comprised the following 39 European countries Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and The United Kingdom. The data surveyed by the ESS are on a typical Likert scale. This type of scale is often used in social science in order to quantify subjective data such as attitudes and satisfaction levels (Journal of Social Sciences, 2022). It measures opinions and provides a range of options for respondents to choose from, and usually ranges from strongly disagree (0) to neutral (5) to strongly agree (10), with shades in between (e.g., Jamieson, 2004). The three relevant variables were *imwbcnt*(‘Immigrants make country worse (0) or better (10) place to live’), *imueclt* (‘Country's cultural life is undermined (0) or enriched (10) by immigrants’), and *imgbeco*(‘Immigration is bad (0) or good (10) for country's economy’). Other values encoding questionnaire answers such as 77 = ‘Refusal’, 88 = ‘Don’t know’ and 99 = ‘No answer’ were present in the data as well. Those values were re-labeled as missing data points and subsequently removed them from the data set.

Weights are crucial in survey data as they help to ensure that the survey results accurately reflect the population being studied. Surveys aim to gather information from a sample of the population, but it is often difficult to get a perfectly representative sample. Some groups within the population may be over-represented or under-represented in the sample due to factors like sampling design and responsiveness. Weights adjust the data to compensate for these imbalances, giving more influence to the responses of under-represented groups and less influence to the responses of over-represented groups (Pfeffermann, 1996; Ciol et al., 2006). For a Europe-wide study, for example, Germany's values would be weighted more than Luxembourg's to reflect their significantly different population sizes and thus their varying contributions to the overall European trend. The ESS provides several survey weight variables. The analysis weight (*anweight*)corrects for differential selection probabilities within each country as specified by sample design, for nonresponse, for noncoverage, and for sampling error related to the four post-stratification variables, and takes into account differences in population size across countries. It is constructed by first deriving the design weight, then applying a post-stratification adjustment, and then a population size adjustment. Starting from Round 9, *anweight* is provided in the integrated data file (ESS weighting variables, 2024). For data from earlier ESS rounds, *anweight* was derived by multiplying *pspwght* (post-stratification weight) with *pweight* (population weight) in accordance with instructions provided by the ESS (Guide to Using Weights and Sample Design Indicators with ESS Data, 2024). Averaging across the 2002-2022 period, central and western European countries (excluding very small ones like Luxembourg) generally had higher weights compared to northern and eastern Europe. However, Russia got the largest average weights due to its sheer size (Fig. 2.1).



**Fig 2.1** The mean analysis weight (*anweight*) values for ESS countries averaged across all survey rounds. Brighter colors indicate larger *anweight* values, signifying a greater contribution to subsequent calculations.

## Software and packages

The data were analysed using the R programming language in version 4.3.2 (R Core Team, 2023). PCA was done using the inbuilt stats (R Core Team, 2023) package. Data manipulation was done using the dplyr (Wickham et al., 2023) and the glue (Hester & Bryan, 2024) packages. The 2-letter country codes were transformed to the full country names and vice versa using the countrycode (Arel-Bundock, Enevoldsen & Yetman, 2018) package. Missing data were handled using the naniar package (Tierney & Cook, 2023). Visualizations were created using the ggplot2 (Wickham, 2016) and the ggrepel (Slowikowsi, 2024) packages and composed using the Patchwork (Pedersen, 2024) package. A complementary web application was created in order to create a visual interface for data exploration using the shiny (Chang et al., 2023), shinyWidgets (Perrier et al., 2025) and shinydashboard (Chang & Borges Ribeiro, 2021) packages. The complete implementation and related materials for this thesis are publicly available. The GitHub repository containing the source code can be accessed at https://github.com/StefanoPinto/MA\_repo, whereas the exploratory web application can be found at https://stefanopinto.shinyapps.io/shiny\_app/. Lastly, the Consensus web application was used for literature research, and Google Gemini 2.0 Flash was used for spellchecking and rephrasing.

## Polarization metrics

As in the work of DiMaggio et al. (1996), of Evans et al. (2001), and of Bramson et al. (2016), opinion polarization was assessed using representative survey data, which was in this case provided by the ESS.

*imbgeco* (‘Immigrants make country worse (0) or better (10) place to live’), *imueclt* (‘Country's cultural life is undermined (0) or enriched (10) by immigrants’) and *imwbcnt* (‘Immigration is bad (0) or good (10) for country's economy’) all ranged from 0 (extremely negative) to 10 (extremely positive), with 5 being a neutral stance. However, for many of the following metrics, the fractions denoted as had to be calculated first as the relative proportions of valid answers for the options zero to ten regarding the survey variable in question. A proportion compares a part to the whole. It indicates what fraction of the total a particular part represents, and thus ranges from 0 to 1. The weighted proportions of each level of *imbgeco*, *imueclt* and *imwbcnt* were calculated for each round and country, taking into account the aforementioned weighting variable *anweight*.

Following Bauer’s (2019) concept of dimensionality, a unidimensional approach was employed here, except for the final metric. The polarization metrics were calculated for each of the three variables individually, based on the distribution of valid answers within each country and round, excluding 'Don’t know', 'Refusal', and 'No answer' responses. The assessment of polarization was grounded in principles (DiMaggio et al., 1996) and axioms (Esteban and Ray, 1994; Duclos et al., 2004) for polarization measures identified in prior research, with Bramson et al. (2016) providing an overview and formal measures. Inspired by these works, six distinct and unidimensional aspects of polarization were used, alongside a newly introduced multidimensional metric for issue alignment and another general one for average opinion, resulting in a total of eight metrics, seven of which quantified polarization, and one quantified the general state of immigration sentiment.

### Non-neutrality

(1)

Non-neutrality (not choosing 5 on a 0 - 10 scale) indicates polarization by measuring the proportion of individuals with non-impartial views. Increased non-neutrality on immigration implies fewer neutral opinions, with more people leaning towards acceptance or objection. A completely polarized society lacks any neutral stances, aligning with Esteban and Ray's (1994) axiom that polarization increases when population mass moves away from the centre. Ademmer and Stöhr (2018) also use a low fraction of central responses as a polarization measure (cf. Abramowitz and Saunders, 2008; Fiorina and Abrams, 2008 in the US). The reversed measure reflected Draca and Schwarz's (2021) ‘disappearing centre’ effect.

### Average deviation from neutrality

(2)

where

Average deviation from neutrality is calculated as the absolute difference between the mean opinion and the neutral point (5). While distinct, high average deviation can paradoxically indicate consensus at an extreme, contrasting with the typical view of polarization as the opposite of consensus. The measure is normalized by for a maximum value of 1. Regarding public opinion on immigration, a rising average deviation from neutrality indicates increasingly accepting or rejecting individual views. Maximum polarization in this sense occurs when everyone holds an extreme opinion (0 or 10). This aligns with Esteban and Ray's (1994) third axiom regarding shifting population mass from the central mass’ and relates to social psychology's group polarization concept, capturing opinion shifts ‘toward a more extreme point’ (cf. Sunstein, 2003). However, maximal polarization here implies extremity-based consensus, contrasting with the subsequent polarization notion.

### Dispersion

(3)

The dispersion principle of polarization was introduced by DiMaggio et al. (1996): ‘Other things being equal, the more dispersed opinion becomes, the more difficult it will be for the political system to establish and maintain centrist political consensus’. **Dispersion is** measured by the mean absolute deviation of an opinion distribution. This measure aligns precisely with **Bramson et al. (2016).** The measure's maximal value is again normalized to 1 by a factor of . Regarding public opinion on immigration, increased dispersion signifies greater individual deviation from the average attitude. Note that average deviation from neutrality thus measures the deviation of the mean from a fixed value (5), whereas dispersion measures the average spread of individual data points around the mean of a given distribution. Maximum polarization with dispersion thus occurs in a society split equally between total acceptance and total objection. Prior studies using dispersion as a polarization measure include Adams et al (2011), Bramson et al. (2016), Duffy et al. (2019), and Rapp (2016).

### Moderate divergence

(4)

with

and

and

and

As Bramson et al. (2016) note, the preceding three aspects don't fully encompass polarization. They propose measures considering group divergence, internal consensus, and size parity, assuming group existence. While US research often uses self-identified partisans as exogenous groups (suitable for the two-party system), this doesn't readily apply to Europe. Bramson et al. (2016) suggest endogenous group formation based on distribution. Lorenz (2017) identifies five endogenous groups in ESS opinion distributions: extreme left, moderate left, neutrals, moderate right, and extreme right. Analogous groups are operationalized per variable: 0 (full acceptors), 1-4 (moderate acceptors), 5 (neutrals), 6-9 (moderate opponents), and 10 (full opponents). Separating scale mid- and endpoints acknowledges their distinct treatment by respondents, with midpoints as neutral and endpoints representing ‘the most extreme instances’ (Tourangeau, 2018). To define the group-based polarization aspects described by Bramson et al. (2016) two endogenous groups are used: The moderate accepting group and the moderate opposing group , as well as the corresponding mean attitudes and

Moderate divergence is then assessed by the absolute difference of group means of the moderate accepting group and the moderate opposing group, as described in Bramson et al. (2016). The factor normalizes the measure. Regarding public opinion on immigration, increased moderate divergence signifies a greater gap between the average views of moderately accepting and moderately opposing individuals. Maximum polarization in this sense occurs when these positions are furthest apart. Prior studies using this measure include DiMaggio et al. (1996) and Fiorina and Abrams (2008). It reflects DiMaggio et al.'s (1996) bimodality principle: ‘the greater the extent to which opinions move toward separate modes (and the more separate those modes become), the more likely it is that social conflict will ensue’.

### Moderate group consensus

(5)

where

and

**Moderate group consensus** is measured by the mean absolute deviation (MAD) within the two moderate groups. Unlike with the dispersion metric, higher group consensus corresponds to lower MAD within these groups. For public opinion on immigration, increasing moderate group consensus means greater agreement among members of each moderate group. Maximum polarization in this sense occurs when each group perfectly agrees on a single opinion. This aspect was introduced by **Bramson et al. (2016)** and relates to the identification aspect in **Duclos et al.'s (2004)** identification-alienation framework, indicating the coherence of moderate stances.

### Moderate size parity

(6)

}

**Moderate size parity** is the ratio of the smaller to the larger moderate group's size. A parity of 1 signifies equally sized groups, indicating maximum polarization in terms of parity. This is a simplified version of **Bramson et al.'s (2016)** measure. For public opinion on immigration, increasing moderate size parity means the number of moderately accepting and opposing individuals becomes more balanced. Maximum polarization occurs when both groups are equal in size. This aspect, introduced by **Bramson et al. (2016)**, conceptually relates to **DiMaggio et al.'s (1996)** bimodality principle and the alienation effect in **Duclos et al.'s (2004)** identification-alienation framework, where equal group size enhances alienation.

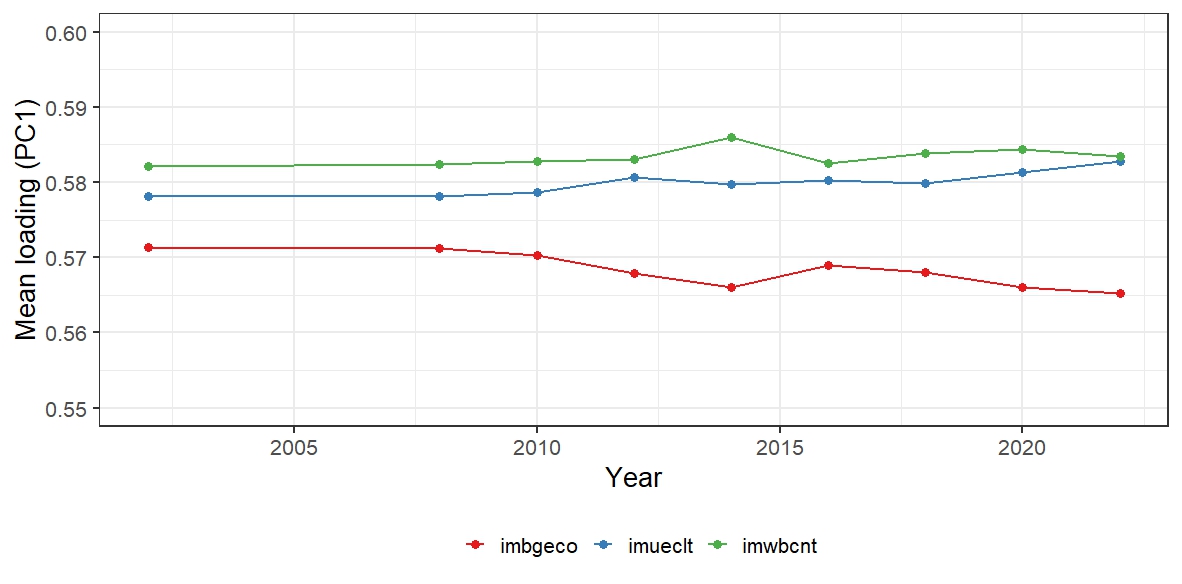
### Explained variance of the first principal component

While the previous six metrics are unidimensional in Bauer’s (2019) classification, this seventh metrics follows a multi-dimensional approach by considering *imbgeco*, *imueclt* and *imwbcnt* simultaneously using PCA.

PCA transforms a dataset with potentially correlated variables into a new set of uncorrelated variables, the so-called principal components (PCs). These PCs are ordered so that the first few retain most of the variation present in all of the original variables, allowing to simplify complex datasets while preserving crucial information. As the first step of performing PCA, the covariance matrix is calculated to understand the relationships between the considered variables. That is, by which amount and direction the variables vary by themselves and together. Then, the correlation matrix is derived from the covariance matrix by standardization. Here, the weights were incorporated by creating the correlation matrix using the analysis weight variable (*anweight*), resulting in the weighted correlation matrix based on which the following steps of the PCA were performed. Next, the eigenvectors and eigenvalues of the covariance matrix are computed using methods from linear algebra. The eigenvectors become the directions of the principal components, and the eigenvalues indicate the amount of variance explained by each component. By selecting only the top few principal components - those with the highest explained variance -, it is possible to reduce the dimensionality of the original data (e.g., Abdi & Williams, 2010; Gewers et al., 2018). In essence, PCA is a way to find the most important patterns in a complex dataset by finding the directions of greatest variance, and then using those directions to represent the data in a simpler way. To use an analogy, one could think of a shadow shining a light on a cloud of dots representing data points. The shadow on the wall is a simplified version of the cloud. PCA is like finding the best angle to shine the light, so the shadow captures as much of the original shape as possible. Now, one could imagine stretching the cloud along its longest stretch and squeezing it along its shortest stretch. PCA is like finding the right stretches and squeezes to simplify the cloud.

As mentioned before, each PC has a certain amount of explained variance. Based on the insights of a previous project done in the course of the ‘Capstone Project’ module, we found that the first principal component (PC1) is sufficient to capture and reflect a general migration attitude. Crucially, all loadings were positive. In contrast to the results of the ‘Capstone Project’, which observed alternating positive and negative loadings across years, this ‘flipping’ did not occur here. This difference can likely be attributed to the use of the princomp() function in R instead of the more common prcomp() function, as princomp() more readily facilitated the use of the weighted correlation matrix.

Furthermore, ensuring the consistency of PC1 variable loadings over time, at least when averaged across Europe, was crucial to guarantee its consistent capture of the general attitude toward immigration. This consistency was confirmed (Fig. 2.2)



**Fig 2.2** Mean PC1 Loadings of *imbgeco*, *imueclt* & *imwbcnt* across all countries over time. The corresponding loading values of the three variables have been consistently between 0.55 and 0.60 over all rounds.

On the country level, the loadings of PC1 for the three considered migration variables ranged similarly stable between 0.54 and 0.60, with some smaller and larger differences between the countries (see appendix). The consistency of the loading values of PC1 ensured that there was no between-year variation of the meaning of PC1. The seventh metric was thus the explained variance of the first PC for a given year and country. The previously performed steps now allowed to visually identify trends by assessing the explained variance of PC1 over time.

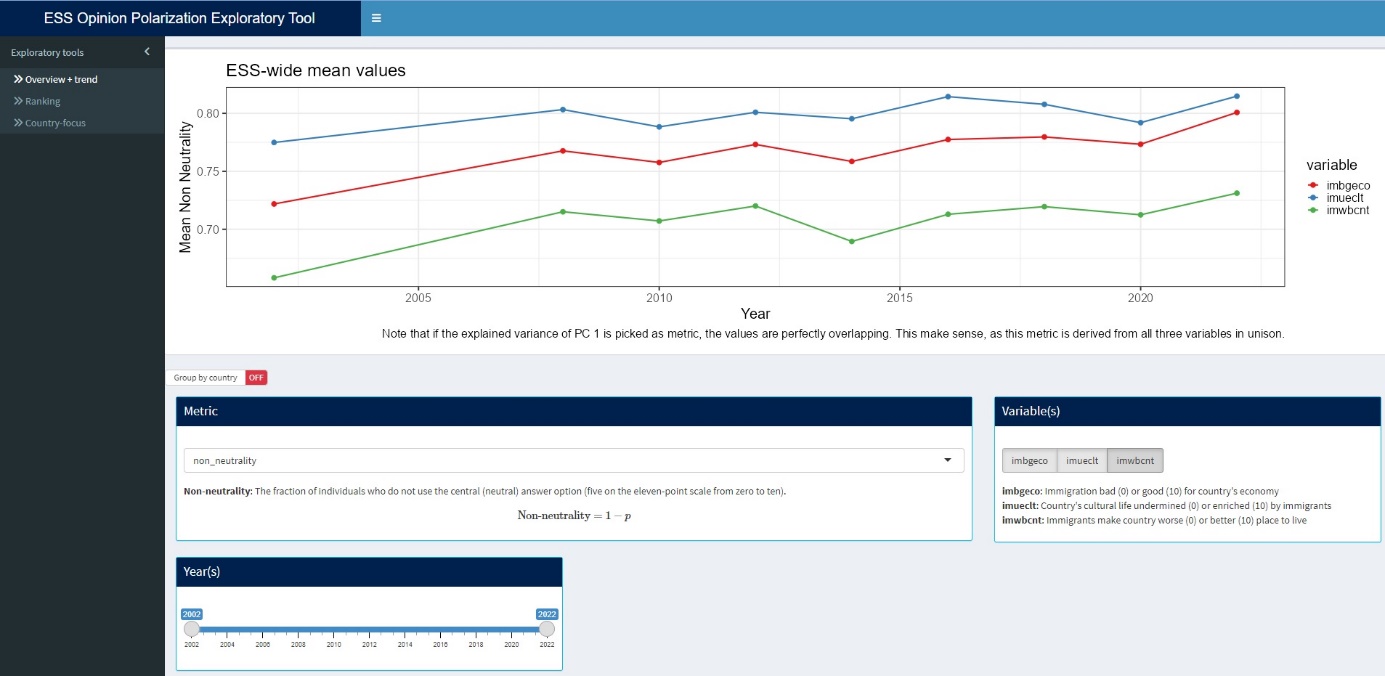
### Average opinion

(6)

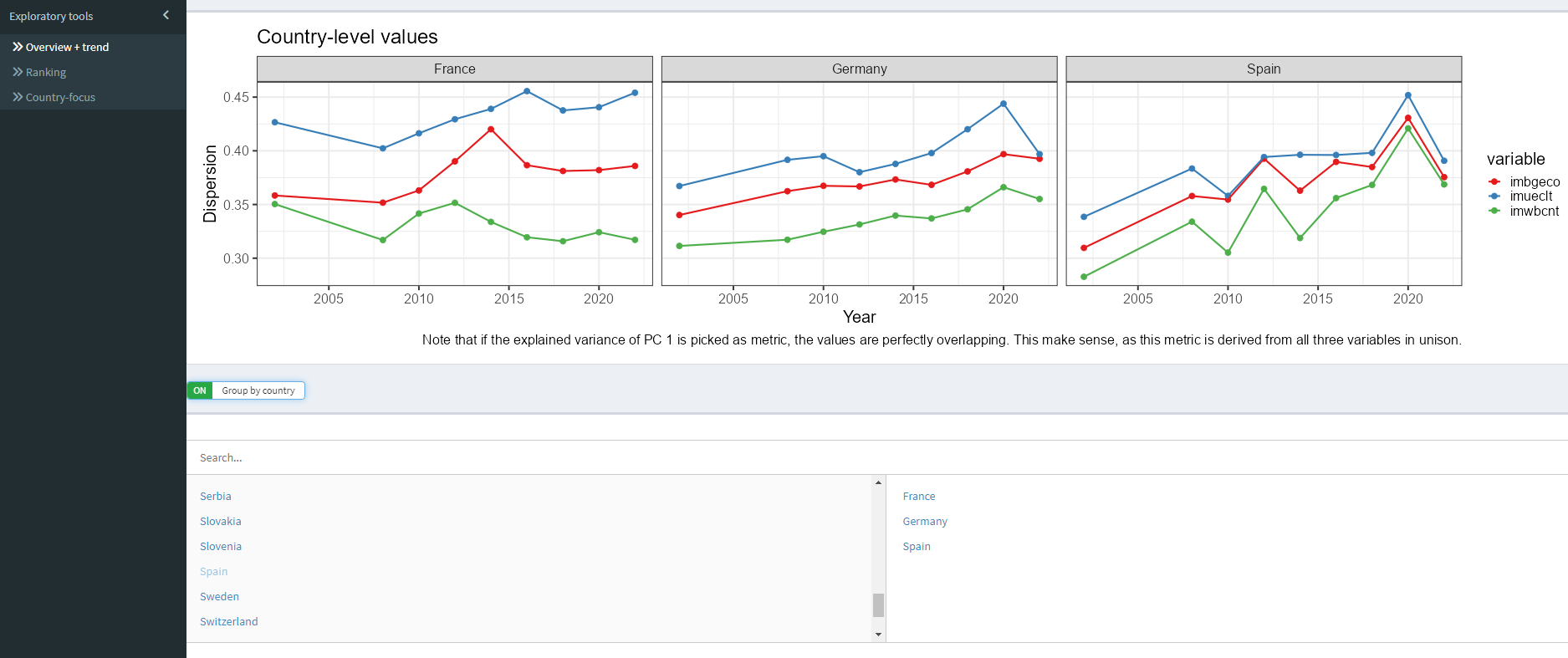
Finally, although not a direct measure of polarization, the weighted mean opinion values were calculated from the raw Likert values for each variable, year, and country. This was done to track the general direction of sentiment change (up or down the Likert scale) within countries over time, providing a more comprehensive understanding alongside the polarization metrics.

## Web app for data exploration

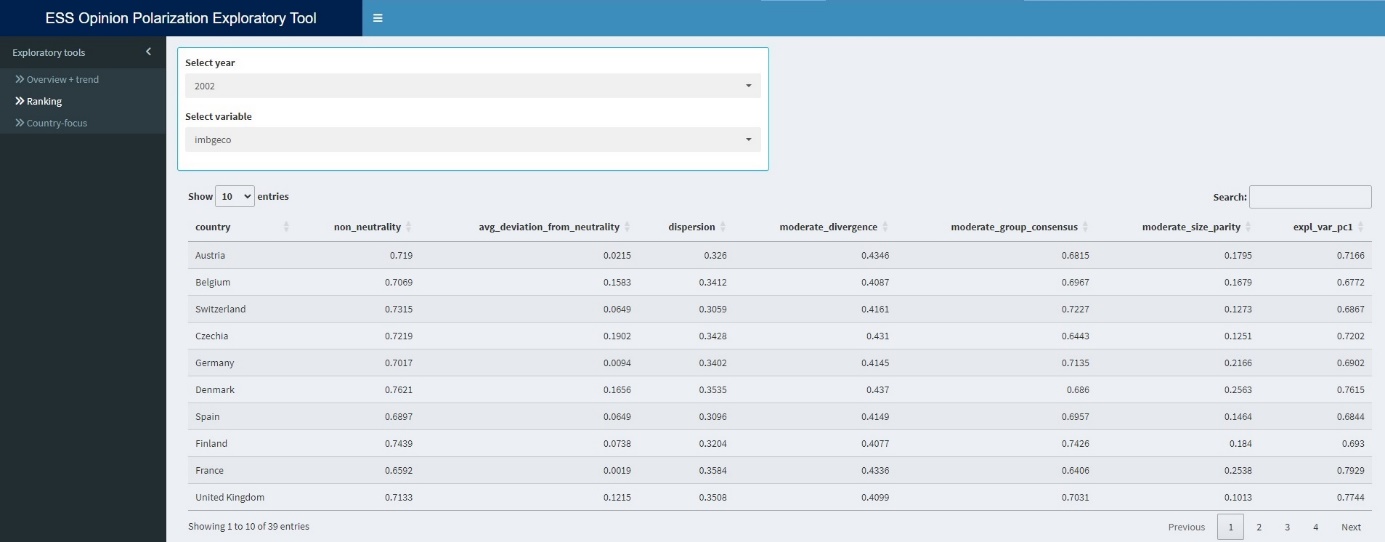
Investigating polarization dynamics across seven distinct metrics observed over ten time points spanning two decades (2002-2022) for three key variables presented a substantial analytical challenge, particularly when conducted at both continental and individual country levels. Consequently, a dedicated tool with the ability to facilitate effective data exploration, filtering, and visualization was built prior to the main analysis. With the data obtained from the ESS, this web application allowed to assess the temporal development of each metric and variable on both the continental and country levels. Additionally, it made it possible to rank the data using any of the metrics and variables for a given year. Lastly, it allowed to focus on a given country-year-variable combination, yielding insights into all metrics in comparison to the European average along with a view into the distribution of opinions (0 to 10 Likert values) for the same time frame (Figs. 2.3 to 2.6).

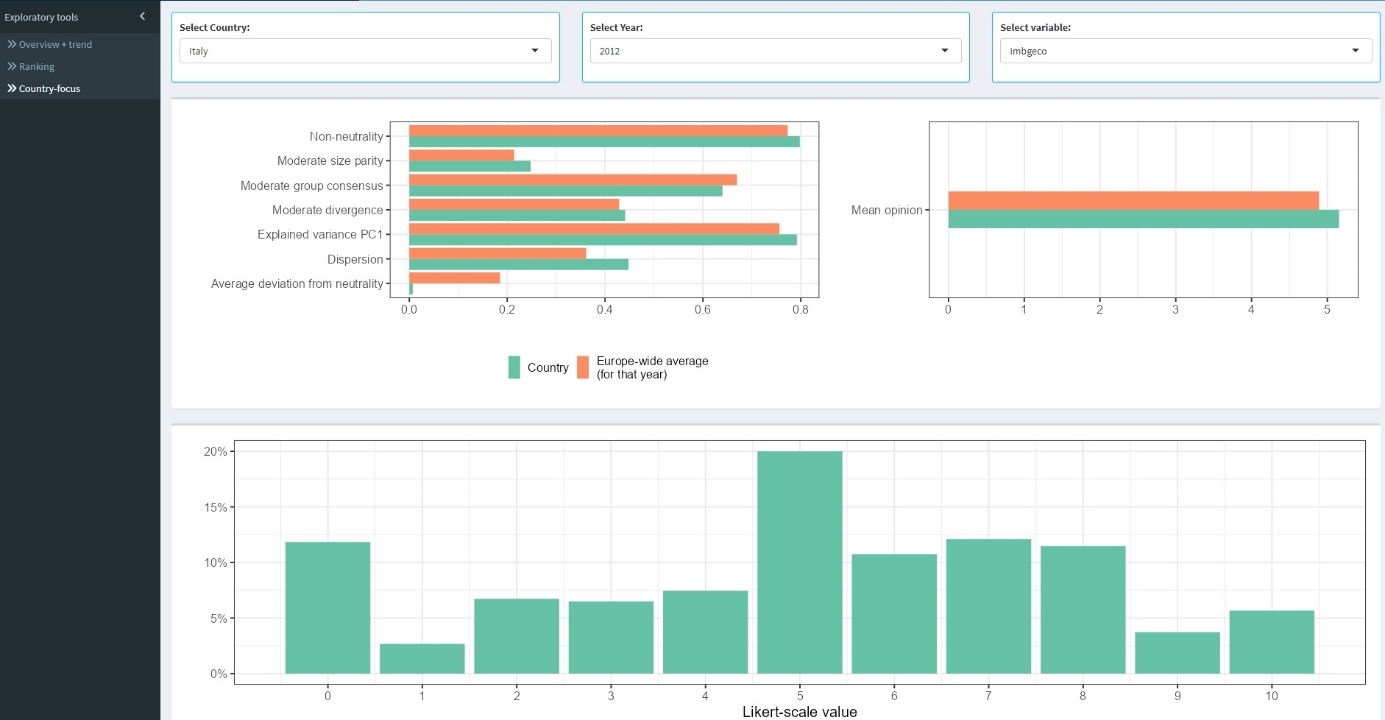


**Fig 2.3** The ‘Overview + trend’ page of the exploratory web app, showing the development of the non-neutrality metric for the three opinion variables between 2002 and 2022 using the Europe-wide average.



**Fig 2.4** The ‘Overview + trend’ page of the exploratory web app, showing the development of the dispersion metric for the three opinion variables between 2002 and 2022 separately for France, Germany and Spain.

**Fig 2.5** The ‘Ranking’ page of the exploratory web app, showing all metrics for *imbgeco* in 2022. This table could now be sorted based on any of the metric, resulting in a corresponding country-ranking.



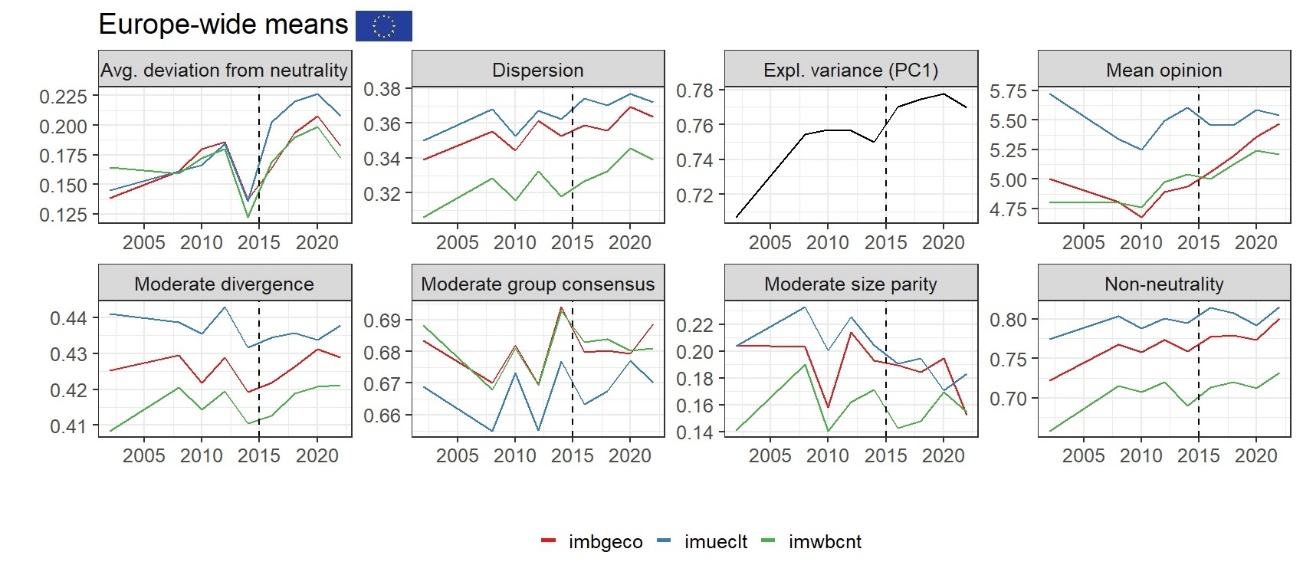
**Fig 2.6** The ‘Country-focus’ page of the exploratory web app, showing the development of all polarization metrics for *imbgeco* in 2012 for Italy in comparison with the Europe-wide averages. The bottom plot shows the distribution of the Likert values for the same time frame.

# **Results**

Based on insights from the web application, a comparison of European average polarization metrics with those of Germany and Hungary was conducted, as these two countries potentially represented contrasting public sentiments, while the aggregated European data offered a valuable overview and reference point.

## Europe

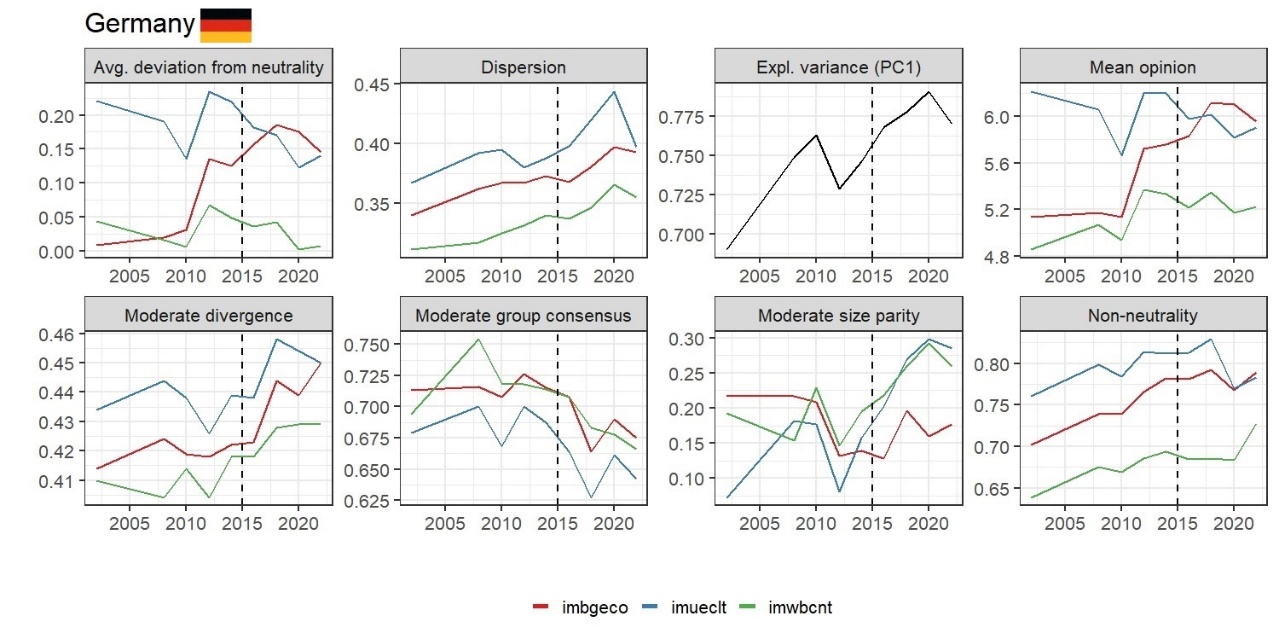
Considering Europe as a whole by averaging across all countries, ongoing trends were found in the form of increases in polarization for almost all metrics and variables. Especially visible for the timeframe around 2015, increases in average deviation from neutrality, increases in dispersion, increases in the explained variance of the first principal component, increases in moderate divergence and thus corresponding decreases in moderate group consensus, a strongly decreasing moderate size parity, and a very clear upward trend in non-neutrality were identified. Paired with these results, a tendency for an increase of the mean opinions towards a more slightly approving sentiment was discovered (Fig 3.1).



**Fig 3.1** The seven aspects of polarization and the mean opinion over time on the European continental level averaged across all available countries between 2002 and 2022. Avg. deviation from neutrality: Shows the average extent to which opinions deviate from a neutral stance, i.e., an increase of acceptance **or** rejection. Higher values suggest stronger opinions, indicating increasing polarization. The trends for the three variables seem to show a general increase in deviation from neutrality, suggesting that opinions on immigration have become less neutral and more shifted towards the extremes, particularly since 2015. **Dispersion:** Measures the deviation from the average opinion. Higher dispersion indicates a shift towards a more extreme opinion (in both directions), and can thus be a sign of polarization. The trends here show an upward tendency, again implying that the range of opinions on immigration have shifted towards the extreme ends on the individual level, again especially visible after 2015. **Expl. variance (PC1):** Refers to the explained variance of the first principal component of the PCA based on the three migration variables. A higher value suggests that a single underlying dimension (the general sentiment towards immigration) explains a larger proportion of the variance in opinions. The upward trend in this graph suggests that opinions on immigration have become increasingly structured, indicating an increase in polarization in the form of issue alignment, with a notable spike after 2015. Mean opinion: Shows the average opinion for each variable on the original Likert scale. Small values indicate resentment, five indicates a neutral stance, and large values indicate approval. All three variables a tendency to increase in mean opinion towards the later part of the observed period. The period around 2010 seems to have been a turning point for all three variables, with opinions generally having started to improve towards a mildly positive stance after that year. **Moderate divergence:** Captures the extent to which the average views of the moderately accepting and moderately opposing individuals diverge. The trends have been somewhat fluctuating, but there appears to be an overall increase in moderate divergence, indicating an ongoing increase in polarization between the two moderate groups, again more visibly after 2015. **Moderate group consensus:** Assesses the level of agreement within the two moderate groups. Over the years, the values have been fluctuating, but again, results show see a decrease in consensus right after 2015, indicating an ongoing increase in opinion polarization. Moderate size parity: Captures the ratio of the smaller to the larger group holding moderate opinions. Here, results have been fluctuating, but a decrease in group size parity is visible for *imbgeco* (economic factors) and *imueclt* (cultural factors) after 2015, again indicating an increase in polarization since that time. **Non-neutrality: M**easures the prevalence of non-neutral opinions. Higher values indicate a larger proportion of the population holding either positive or negative views on immigration. All three variables show a clear upward trend, especially after 2015, suggesting an ongoing and significant increase in the proportion of Europeans holding non-neutral opinions on immigration.

## Germany

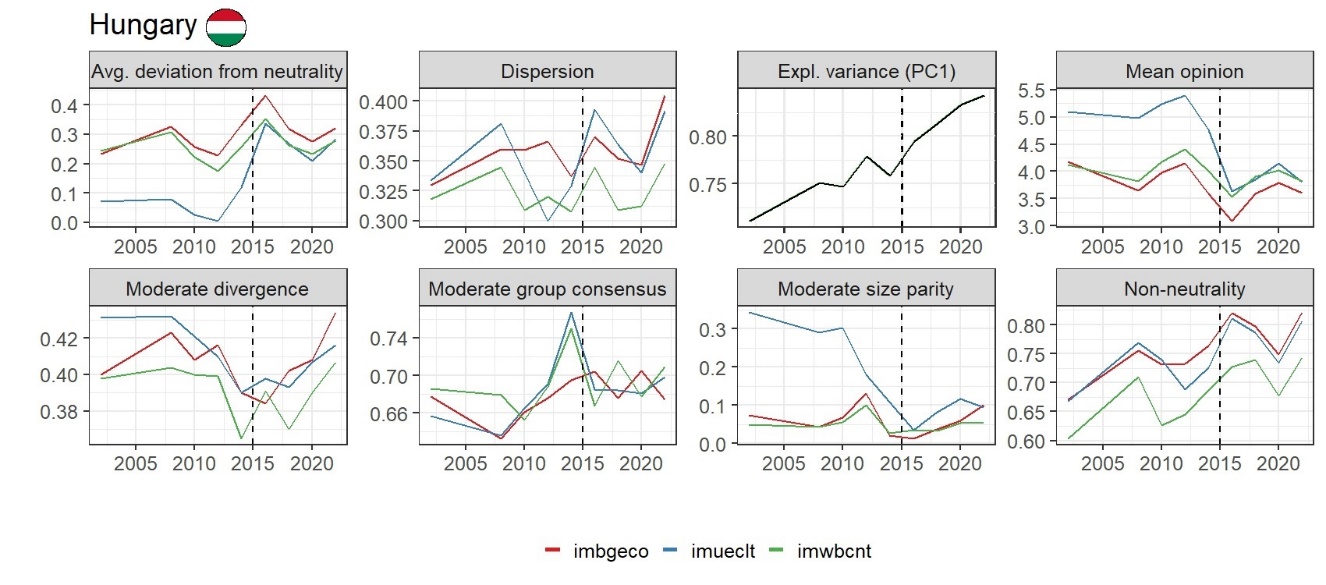
Similar to the Europe-wide results, the polarization metrics focussed on Germany showed the year 2015 to have been a crucial turning point in regards to immigration opinions. The average deviation from neutrality increased for economic considerations, and decreased for overall and cultural variables. Dispersion increased, indicating a greater diversity of views. The explained variance of the first principal component increased, indicating that opinions on different variables of immigration became more aligned in a process otherwise known as issue alignment. The mean opinion decreased for cultural and general views, but again increased for economic considerations. Moderate divergence increased, and thus moderate group consensus decreased, indicating greater polarization even among those not holding extreme views. Moderate size parity increased, suggesting polarization for all three variables. Lastly, non-neutrality clearly increased (Fig. 3.2).



**Fig 3.2** The seven aspects of polarization and the average opinion over time for Germany. Avg. deviation from neutrality: Shows how far, on average, opinions deviate from the neutral point. For *imueclt* (cultural), and *imwbcnt* (overall quality of life), the average deviation from neutrality has been decreasing after 2015, whereas *imbgeco* (economic) has been increasing, suggesting that economic considerations have become more important and thus a more polarizing factor. Dispersion: Measures the deviation from the average opinion. Higher dispersion indicates a shift towards a more extreme opinion (in both directions), and can thus be a sign of polarization on the individual level. For all three variables, the dispersion generally has been increasing after 2015, indicating a greater diversity of opinions about immigration. Expl. variance (PC1): Represents the amount of variance in the combined data of the three immigration variables that is explained by the first principal component of a PCA. A higher explained variance suggests that the opinions on these three variables tend to move together. The plot shows a general increase in explained variance of PC1 after 2015. This suggests that since that period, opinions on whether immigration is good for the economy, enriches culture, or makes the country a better place have become more aligned, which is a process known as issue alignment. Mean opinion: Shows the average opinion on the original Likert scale. For *imueclt* and *imwbcnt*, the mean opinions have been decreasing after 2015, indicating a shift towards more negative views on the cultural and overall impact of immigration at that point, whereas *imbgeco* has been increasing, indicating a growing believe that immigrants might boost the economy. Moderate divergence: Measures the difference in average opinion between those moderately accepting and those moderately opposing immigration. An increase indicates greater polarization between these moderate groups. The plot shows a clear increase in moderate divergence for all three variables after 2015, signifying that the gap between moderately accepting and moderately opposing individuals has widened considerably following that year. Moderate group consensus: Measures the agreement within the moderately accepting and moderately opposing groups. For all three variables, there has been a general decrease in moderate group consensus after 2015. This suggests that within both the moderately accepting and moderately opposing groups, opinions have become more varied around that time. Moderate size parity: The ratio of the smaller to the larger moderate group. The plot shows that the parity increased has been increasing after 2015 for all three variables. This suggests that the size of the two moderate groups have become more equal in size, indicating an increase in polarization among the members of the moderate groups during that period. Non-neutrality: Shows the proportion of individuals holding non-neutral views. For all three variables, there have been weak increase in non-neutrality after 2015, suggesting only a mild shift towards both more extreme ends of the opinion spectrum.

## Hungary

Considering Hungary, results strongly suggest yet again that the period around 2015 has been a critical turning point for public opinion on immigration. Before this time, average opinions tended to be slightly positive to neutral. The timeframe around 2015 appears to have triggered a significant shift: Average opinions turned sharply negative across all three dimensions (economic, cultural, and general impact). Opinions became more polarized, with individuals holding stronger views, both positive and negative, leading to higher average deviation from neutrality and increased dispersion. Views on the different variables of immigration became more aligned, as indicated by the increasing explained variance of the first principal component. Additionally, we found a growing divergence between moderate groups: The gap between those with moderately accepting and moderately opposing views widened. Also, the relative size of the moderately opposing group appears to have increased. Opinions became more extreme, with a larger proportion of the population holding non-neutral views, indicating polarization. In summary, the refugee crisis seems to have acted as a polarizing event in Hungary, leading to more negative, less neutral, and more divergent opinions on the various facets of immigration. However, many of the polarization metrics exhibited much more fluctuations for Hungary than their counterparts for the European averages and Germany (Fig. 3.3).



**Fig 3.3** The seven aspects of polarization and the average opinion over time for Hungary. Avg. deviation from neutrality: Shows how far, on average, opinions are from the neutral midpoint. Results indicate a general trend of increasing deviation from neutrality across all three variables after directly 2015, with a quickly following decrease. This suggests that opinions have become less neutral and more strongly held in either the positive or negative direction during that time, but also indicate a certain volatility of opinions stances. Dispersion: Measures the deviation from the average opinion on the individual level. The plot shows that there was a spike of increasing dispersion levels after 2015 for all three variables, suggesting an average shift towards more extreme opinions in both directions during that period. But again that spike was rather quickly followed by a decrease, which, in turn, has been followed by an ongoing increase, again indicating fluctuating opinions. Expl. variance (PC1): The explained variance of the first principal component from a PCA combining the three immigration variables shows a clear and ongoing upward trend, especially after 2015. This suggests that a single underlying dimension - the general attitude towards immigration – has become increasingly dominant in explaining the variation in opinions across the three measured variables. Opinions on the economic, cultural, and societal impacts of immigration have become more aligned during that timeframe, indicating ongoing issue alignment. Mean opinion: This displays the average opinion. For all three variables, the mean opinion generally decreased after 2015, indicating a shift towards more negative average perceptions of immigration. Followed by a slight increase thereafter, but still way below the neutral value of 5. Moderate divergence: Measures the gap between the average opinions of moderately accepting and moderately opposing groups. Results show an ongoing increase in moderate divergence after 2015 for all three variables after ten years of decrease, suggesting that the views of those with somewhat positive and somewhat negative initial stances on immigration have been drifting further apart at that time, albeit with quite the fluctuations. Moderate group consensus: Shows the internal agreement within the moderately accepting and moderately opposing groups. The plot shows varying trends, but there isn't a clear consistent pattern of increasing or decreasing consensus within these moderate groups across all three variables since 2015 due to strong fluctuations. Moderate size parity: The ratio of the smaller to the larger moderate group. The plot shows an increase in moderate size parity around and after 2015. This suggests that the size of the two moderate groups have become more equal in size, indicating an increase in polarization among the members of the moderate groups during that period. Non-neutrality: Represents the proportion of individuals holding non-neutral views. There was an increase in non-neutrality across all three variables as of 2015, indicating that more people moved away from a neutral stance and adopted a more definite positive or negative opinion on immigration at that time. However, shortly after that increases, a decrease followed until 2020, which, in turn has been followed by another increase, once more pointing at the presence of more strongly fluctuating opinions in Hungary.

## Europe vs. Hungary vs. Germany

For both the European averages and the Germany and Hungary individually, 2015 was found to be a turning point in immigration opinion dynamics. Treating the European averages as an overall central point of reference made it easier to spot differences and deviations on the country-levels of Germany and Hungary. Comparing the Europe-wide results, starting at 2015, several similarities, but also striking differences were discovered.

Regarding non-neutrality, increases were observed in the European averages, Germany, and Hungary. This indicates an overall trend of deviation from the neutral midpoint of 5 across Europe. However, initial non-neutrality values in 2015 were already high for Europe overall, Germany, and Hungary, ranging from 0.70 to 0.80. A more fluctuating pattern was again noted for Hungary. Across Europe, an increase in the average deviation from neutrality was detected for all three variables. A similar increase, albeit with greater fluctuations, was observed for Hungary. In contrast, for Germany, only *imbgeco* exhibited an increase, while the other two variables showed a decreasing trend. This suggests that among German citizens, economic considerations are more divisive than those related to culture or general life quality. Increasing trends in dispersion were observed both across Europe and individually in Germany and Hungary. However, dispersion values fluctuated more strongly in Hungary. This suggests that patterns of increasing individual deviation from the average attitude are not limited to a few individual countries but are prevalent across Europe. Similar to the dispersion metric, an increase in the proportion of explained variance of the first principal component was observed across Europe, as well as at the country level in Germany and Hungary. This suggests issue alignment not only at the continental level but also within individual countries. For moderate groups (individuals with ESS survey responses of 1-4, termed ‘moderate acceptors", or 6-9, termed ‘moderate opponents’), an increase in moderate divergence was observed in European averages and individually in Germany and Hungary. This reveals a continuous widening of the gap between the average views of moderately accepting and moderately opposing individuals, leading to more polarized positions. Stronger fluctuations were again evident in Hungary. Regarding moderate group consensus, European averages showed no significant change after 2015 for *imbgeco* and *imwbcnt*, whereas *imueclt* visibly increased. This indicates that overall in Europe, the distribution of opinions on economic and overall life-quality impacts remained relatively stable among moderate groups, while in-group consensus regarding the cultural impact of immigrants increased. In contrast, Germany experienced a drop in moderate consensus for all three variables, demonstrating an ongoing heterogenization of opinions among moderate groups concerning the economic, cultural, and overall life-quality impacts of immigration. Compared to the European average and Germany, Hungary displayed strongly fluctuating patterns of moderate consensus for *imbgeco* and *imwbcnt*, suggesting instability with short-lived phases of agreement and disagreement after 2015. Regarding moderate size parity, European averages showed a decrease from 0.20 to 0.16 for *imbgeco* and *imueclt*, while *imwbcnt* remained relatively stable. This indicates a trend of decreasing moderate size parity, suggesting a growing imbalance in the number of moderately accepting versus moderately opposing individuals regarding immigration. This decrease in moderate size parity actually signifies reduced polarization among moderate voters, as maximum polarization occurs when both groups are of equal size. In Germany, moderate size parity increased for all three variables: *imueclt* and *imwbcnt* rose from 0.20 to 0.30, and *imbgeco* increased from 0.15 to 0.18 (2015-2020). This indicates strong increases in polarization concerning cultural and overall life-quality impacts, and a weaker but substantial increase in polarization regarding the economic impacts of immigration among moderate voters in Germany. In Hungary, weaker increases were observed for *imbgeco* and *imueclt*, rising from 0.05 to 0.1, suggesting a slight increase in polarization among moderate voters concerning economic and cultural considerations of immigration. Notably, the initial moderate size parity values in Hungary in 2015 (0.05) were considerably smaller than in Germany (0.20) and Europe overall (0.20), indicating a much greater imbalance in moderate-sized groups in Hungary at the beginning of the period. Finally, regarding the average opinion value, increases were observed in all three variables across Europe, indicating a general trend toward a pro-immigrant attitude. In Germany, a positive trend was seen for *imbgeco*, a decreasing trend for *imueclt*, and no discernible trend for *imwbcnt*. This suggests a growing sentiment in Germany that immigrants may benefit the economy, coupled with a concurrent belief that immigrants may negatively impact cultural life. In stark contrast to the generally pro-immigrant trend in Europe and the mixed trends in Germany, Hungary exhibited a clear decrease in opinions regarding all three variables, indicating an overall trend of increasing resentment toward immigration.

In summary, our results indicate that 2015 marked a pivotal point for immigration opinions in Europe. Post-2015, deviations from a neutral stance were observed at both continental and national levels for Germany and Hungary, with economic factors exhibiting the most divisive influence in Germany. Concurrently, an increasing proportion of variance was explained by the first principal component. Furthermore, evidence suggested a growing polarization and size imbalance within moderate groups. However, an increase in average Likert opinion values was also found in European averages. In Germany, a divergence emerged, with increasing belief in the economic benefits of immigration alongside growing concerns about negative cultural impacts. The trend of increasing resentment toward immigration in Hungary aligns with expectations. More notably, however, stronger fluctuations were observed in Hungary for five out of eight metrics, suggesting greater opinion volatility compared to Germany and the European average.

# **Discussion**

Several results indicated 2015 as a pivotal year for immigration dynamics across Europe, Germany, and Hungary, leading to increases in various aspects of opinion polarization regarding immigration. This can be attributed to the peak of the European refugee crisis in that year. During this period, over one million individuals arrived in Europe by sea, primarily fleeing conflicts in the Middle East, Africa, and South Asia, particularly Syria (Almustafa, 2021; Piguet, 2024). Prior research suggests that the 2015 refugee crisis strained European institutions and politics, resulting in heightened party competition and polarization. Political elites and parties adjusted their stances, with right-wing and populist movements gaining influence by emphasizing national sovereignty and stricter immigration controls. The crisis acted as a catalyst for movements and parties challenging the existing political order, often employing xenophobic rhetoric (e.g., Izak, 2021; Hutter & Kriesi, 2021; Yaseen et al., 2025). However, regional differences emerged, with Eastern and Western Europe exhibiting varied responses, where trust in domestic and EU institutions played a significant role in shaping attitudes (Peshkopia, Bllaca & Lika, 2018).

## Interpretation of results

Clear evidence of increased polarization, in the form of increasing non-neutrality, was found across Europe and in Hungary after 2015, although this increase was very weak for Germany. This indicates an ongoing trend of shifting away from a neutral stance across Europe, albeit with varying degrees. Indeed, following 2015, many European countries experienced a departure from neutral positions, with public opinion becoming more divided and, in some instances, more negative toward immigration, particularly in countries where the discourse centered on security concerns (e.g., Cichocki & Jabkowski, 2019; Torres, 2019). Regarding Germany, only very weak evidence for increasing non-neutrality after the 2015 refugee crisis was observed. Prior research suggests that specific events, such as the 2015-16 New Year’s Eve sexual assaults and the 2016 Berlin terror attack in Germany, may have led to temporary negative (i.e., non-neutral) shifts in attitudes toward refugees. However, these changes were often short-lived and did not typically translate into long-term trends (Vollmer & Karakayali, 2018; Schmidt-Cantra & Czymara, 2020). For Hungary, a clearer increase in non-neutrality was observed after 2015, likely due to governmental anti-immigration campaigns. However, this was followed by a period of decreasing non-neutrality between 2016 and 2020, indicating a move towards a more neutral stance. After 2020, a sharp increase in non-neutrality was again evident. This volatility, also seen in other metrics, suggests that opinions on immigration among many Hungarians tend to change relatively quickly. This contradicts research indicating stable and strongly anti-immigration views in Hungary during this period (e.g., Bajomi-Lázár, 2019; Bíró-Nagy, 2021). In addition to increased non-neutrality in Hungary, a general shift away from a neutral opinion stance on immigration across Europe was observed on average from 2015, as indicated by increases in the average deviation from neutrality. The way political actors and the media frame immigration can contribute to the differentiation and polarization of public opinion (Lahav, 2004; Kehrberg, 2007). Notably, the distinction between "immigrant" and "refugee" can lead to more nuanced, and sometimes more polarized, attitudes. Generally, more positive views are held toward refugees than immigrants, with attitudes varying further based on the ethnicity, country of origin, and economic background of newcomers (Kehrberg, 2007). However, while some countries exhibited more restrictive opinions in response to increased immigration flows and political framing, overall shifts in public opinion across Europe have been relatively mild, with significant variation between countries (Hatton, 2016). For instance, in Germany, increased polarization was only observed regarding economic considerations, as indicated by an increasing average deviation from neutrality for the "imbgeco" variable. Indeed, the sentiment of Germans toward immigration can be shaped by economic self-interest, such as concerns about personal finances and job security (Van Hauwaert & Vegetti, 2025). Germans with neoliberal economic views are more likely to perceive immigrants as a burden on the welfare state, whereas those with left-leaning economic views are more inclined to see immigrants as beneficial (Grdešić, 2019). While our metric identified economic factors as the divisive force shaping immigration opinion in Germany, other research suggests a more complex interplay of factors. According to Fetzer (2000), cultural marginality and ethnocentrism are often stronger predictors of anti-immigration sentiment than economic self-interest, particularly in Western Germany.

Unlike non-neutrality and average deviation from neutrality, dispersion quantifies the average spread of individual data points around the mean of a distribution, rather than a fixed value like the neutral "5." Thus, dispersion measures an individual's deviation from the average opinion; higher dispersion indicates a wider range of opinions. For Europe overall, weak increases in dispersion were observed for "imbgeco" and "imueclt" as of 2015, with "imwbcnt" showing a slightly stronger increase in a pattern that began in 2002. This aligns with existing research reporting only mild shifts in public opinion on immigration between 2002 and 2012, attributing this partly to the severity of economic recessions (Kehrberg, 2007). A similar pattern was evident for Germany. However, Hungary again exhibited much stronger fluctuations in dispersion following an increase immediately after 2015, suggesting greater volatility of opinions at the individual level during that period.

Based on Lorenz (2017), two moderate groups, moderate acceptors and moderate opponents, were identified. An increase in moderate divergence across Europe, particularly in Germany and Hungary, was observed. In Germany, internal divisions and conflicting messages on immigration policy within moderate parties, such as the Christian Democratic Union (CDU), resulting from the presence of both pro- and anti-immigration stances, reflected broader divergences among moderate voters (Schmidtke, 2024). A clear antagonism between supporters and opponents of immigration within the German electorate, including moderates and centrists, has been shown in studies, with this divide being particularly visible on the issue of immigration (Hebenstreit, 2022). In Hungary, the government’s intensive anti-immigration campaigns, especially during and after the 2015 migration wave, significantly influenced public opinion. Consequently, widespread anti-immigration sentiment across the political spectrum, including among moderates (Bocskor, 2018), was generated. Prior to the crisis, minor differences in anti-immigrant attitudes existed between political groups, including moderates. However, following the crisis and the government’s campaign, these differences became more pronounced, with party preference playing a larger role in shaping attitude (Barna & Koltai, 2019).

With increasing moderate divergence, a logical decrease in moderate consensus should occur, a finding supported by observations in Germany and Hungary post-2015. Notably, the moderate group consensus for Hungary exhibited greater fluctuation compared to Germany, suggesting higher volatility in Hungarian moderate voters' opinions on immigration relative to Germany and the European average. This observation contrasts with research indicating the temporal stability of public immigration preferences. However, fluctuations in the salience of immigration as a political issue, potentially driving temporary increases in support for far-right parties during periods of high public visibility (Magistro & Wittstock, 2021; Cools, Finseraas & Røgeberg, 2021), could be a confounding factor.

Across Europe, a decrease in moderate size parity for *imbgeco* and *imueclt* was found, indicating reduced polarization among moderate voters regarding economic and cultural factors. This contradicts research reporting attitude stability across Europe with limited evidence of significant divergence or convergence between pro- and anti-immigration groups, including moderates (Hatton, 2016). Nevertheless, significant spatial clustering of anti-immigrant attitudes has been reported (Di Lillo, 2018). While such clustering exists, it does not necessarily reflect a Europe-wide shift in the balance between moderate pro- and anti-immigrant groups. Indeed, substantial evidence indicates Hungary as an anti-immigration hotspot, as evidenced by decreasing Likert-scale opinion values (see below).

In Germany, increases in moderate size parity were observed for all three variables after 2015, indicating a trend toward more equal group sizes of moderate acceptors and moderate opponents, and consequently, increased polarization among moderately opinionated individuals. Current research lacks clear evidence of a sustained trend toward parity between these groups post-2015, suggesting this finding offers a novel insight. While less pronounced than in Germany, similar increases in moderate size parity across all three variables were found in Hungary after 2015, following years of decreasing size parity (i.e., decreasing polarization among moderate groups). This suggests the susceptibility of even moderate group members to state-driven anti-immigrant propaganda in either direction. Notably, for all variables, the moderate size parity reached values below 0.1, indicating highly imbalanced group sizes at this point. Prior research does not clearly suggest such extreme inequality in the group sizes of moderate pro- and anti-immigrant opinionated citizens in Hungary. Indeed, available research and survey data do not indicate a dramatic imbalance between these groups before the 2015 migration crisis (e.g., Schneider, 2007), implying that these findings may provide another novel insight.

Analysis of raw Likert-scale opinion values revealed positive trends for the average opinion across Europe, moving slightly above the neutral 5 since 2010. This increase was particularly evident for *imbgeco*" and *imwbcnt*, while *imueclt* remained relatively stable post-2015. This suggests that despite media coverage and government campaigns in certain countries fostering anti-immigrant sentiment, the average European maintains a slightly positive view on immigration, especially concerning its economic potential and impact on overall quality of life. Prior research indicates a gradual shift toward more positive attitudes about immigrants in Western EU countries since the 2000s, largely attributed to the greater openness of younger generations. However, this positive trend appears to be decelerating, with newer cohorts not exhibiting significantly more positive attitudes than preceding ones (Schmidt, 2021). Our findings, however, show stagnation only for *imueclt* while *imbgeco* and *imwbcnt* continue to show an upward trend. Examination of raw Likert-scale opinion values in Germany suggests a growing segment of the population perceives immigrants as potentially beneficial for the economy, while simultaneously, another segment believes immigrants may negatively impact cultural life after 2015. Indeed, in Germany, immigration is widely acknowledged for its positive economic contributions, particularly in addressing labor shortages and supporting economic growth. Historically, immigration has aided Germany in mitigating demographic challenges, such as an aging population and labor shortages, by supplying both high- and low-skilled workers, thereby enhancing productivity, innovation, and overall economic growth (Higgins & Klitgaard, 2019; Grajdeanu, 2023). Despite common concerns, most studies indicate minimal to no negative impact of immigration on native employment or wages (Prantl & Spitz-Oener, 2020). While immigrants can contribute to cultural diversity (Giovanis, Akede & Ozdamar, 2021), debates and concerns persist among some groups in Germany regarding potential cultural change or loss of traditional values. Diminished support for welfare programs among some native-born Germans has been observed with increasing proportions of immigrants, particularly during periods of high unemployment. This reflects concerns about social cohesion and resource allocation, especially in the initial stages of immigration waves (Schmidt-Catran & Spies, 2016). In contrast to the mixed trends in Germany, Hungary exhibits an overall trend of increasing resentment towards immigration. The Hungarian government, particularly under Viktor Orbán, has implemented intensive anti-immigration campaigns since 2015, framing immigration as both an economic and security threat. These campaigns have conflated migrants with terrorists and criminals and presented the government as the protector of Hungarian and Christian values (Bocskor, 2018; Bajomi-Lázár, 2019). The highly politicized media environment in Hungary, characterized by limited pluralism and critical voices, has amplified government messaging and reduced the visibility of alternative perspectives on immigration (Farkas, 2021). Consequently, this trend is largely attributable to deliberate political strategies portraying immigration as a danger to Hungarian values and identity, especially since 2015. However, it is important to note that several of our polarization metrics indicate strong fluctuations for Hungary.

A novel polarization metric, the explained variance of the first principal component (PC1) from a PCA using the three immigration variables, was introduced. An increase in the proportion of explained variance of PC1 was interpreted as an increase in issue alignment – the synchronization of opinions toward immigration. For instance, with increasing issue alignment, an individual agreeing that immigrants benefit a country's cultural life would be increasingly likely to also consider them beneficial for the economy. This pattern was observed both when averaged across Europe before and after 2015, and at the country level for Germany and Hungary. Indeed, individuals holding positive views of immigrants in one domain, such as cultural life, are often more likely to hold positive views in other domains, such as economic contributions (Van Hauwaert, S., & Vegetti, F., 2025). Our findings indicate that the rates of increasing issue alignment have been roughly comparable for both Germany and Hungary after 2015. Germany generally exhibits more positive opinions about immigration than Hungary (see below; Bocskor, 2018; Heath & Richards, 2019; Bíró-Nagy, 2021). However, other research suggests that the alignment of positive opinions is more probable among individuals with higher political tolerance, stronger European identity, and better information about immigration (Lahav, 2004; De Coninck, 2020; Van Hauwaert & Vegetti, 2025), leading to an expectation of a faster rate of alignment in Germany than in Hungary.

While the 2015 immigration crisis is a recognized turning point in shaping opinions on immigration, its significant reflection in our polarization results is notable. Several indicators suggest that opinion polarization has occurred at both the European continental and national levels (at least for Germany and Hungary), affecting both moderate and more extreme groups since 2015. Particularly striking are the substantial fluctuations observed in five out of eight metrics for Hungary in that year, indicating a higher degree of change and volatility in opinions than previously understood, potentially even at the individual level. This finding is surprising given (or perhaps precisely because of) the country's autocratic, anti-immigrant leadership.

Our results suggest a nuanced and multifaceted nature of opinion polarization. In Germany, economic considerations appear to be the primary driver of polarized stances, with cultural concerns seemingly secondary. Conversely, the strong fluctuations in Hungary's metrics make it challenging to definitively determine whether economic, cultural, general quality-of-life factors, or a combination thereof, have been driving opinion polarization since 2015. Nevertheless, a concurrent trend of a unifying "overall immigration opinion" appears to be emerging across Europe, as well as in Germany and Hungary. Our analysis also illuminates the less frequently examined moderate group, demonstrating that polarization has also occurred within this group at both continental and national levels.

This thesis provides a novel understanding of European immigration opinion dynamics through a robust, large-scale empirical approach. By employing established polarization metrics alongside a newly introduced metric—the explained variance of the first principal component (also serving as a measure of issue alignment)—this study elucidates both continental and national complexities in economic, cultural, and quality-of-life considerations shaping opinions on immigration. Partially challenging assumptions from existing research, this thesis offers a valuable contribution to the field. Moreover, the development of an extensible exploratory web application furnishes a practical tool for future research and analysis in this domain.

## Limitations

Despite the novel insights offered by this study, certain limitations should be acknowledged. The analysis primarily focused on two specific countries, Germany and Hungary, in addition to European averages. While these selections provided valuable contrasting cases, the inclusion of additional countries, such as a Scandinavian nation known for its progressive policies, could have yielded further nuanced and contrasting perspectives. However, time constraints necessitated a focus on Germany and Hungary alongside the European average. Furthermore, the temporal analysis of the time series data relied predominantly on visual assessment rather than the application of specific trend identification methods. Although visual assessment facilitated the identification of salient patterns, future research could benefit from employing formal time series methodologies to quantify trends with greater statistical rigor. Finally, some interpretations were based on trends commencing shortly after 2015, despite the availability of data up to 2022. It is worth noting, however, that many of these trends did extend into 2022 and potentially beyond.

While frequently corroborating existing research, our study also yielded several novel insights. For Germany, an unreported trend of increasing size parity was observed starting in 2015, along with a stronger influence of economic factors compared to cultural ones. Another previously undocumented finding is the extremely unequal moderate group sizes in Hungary, also commencing around 2015. Contrary to prior research suggesting a faster rate of issue alignment in Germany than in Hungary, our findings indicate a similar pace of "issue alignment" between the two countries. This could imply a closer ideological alignment regarding immigration than previously assumed, or that factors like political tolerance, European identity, and information access are less influential on the speed of issue alignment than other variables. Furthermore, while previous research suggests consistent immigration opinions in Hungary, our results indicate greater volatility than previously recognized, suggesting that significant portions of the Hungarian population may not be as entrenched in government-driven anti-immigration narratives as commonly believed. Lastly, our research reveals a decreasing trend in moderate group size equality across Europe since 2015 for "imbgeco" and "imueclt," indicating depolarization, which contrasts with previous research reporting more stable patterns.

## Future prospects

The continuous increase in the explained variance of PC1 across Europe suggests a trend toward a more binary perception of "the immigrant," consolidating concerns about the economy, culture, and overall quality of life into a singular overarching concern. This merging of previously distinct dimensions could potentially erode the nuances identified in our research, thereby increasing the risk of further polarization.

Our research has demonstrated the necessity of nuanced perspectives to pinpoint the underlying factors and geographical locations of immigration opinion polarization hotspots, also suggesting that the Hungarian population may not be the monolithic bastion of anti-immigrant sentiment it is sometimes portrayed as. However, our results also indicate that these nuances might be overshadowed by a more generalized perception of "the immigrant," at least concerning economic, cultural, and overall quality-of-life considerations. This process could be amplified by the increasing prominence of (far-)right parties across Europe. As of May 2025, Germany has a conservative leader in Friedrich Merz (CDU), while the AFD is gaining influence. Viktor Orbán also remains in power in Hungary. Nevertheless, a positive aspect is the continuing improvement in the average opinion about immigration across Europe, and the presence of a new Pope who may advocate for pro-immigration worldviews.

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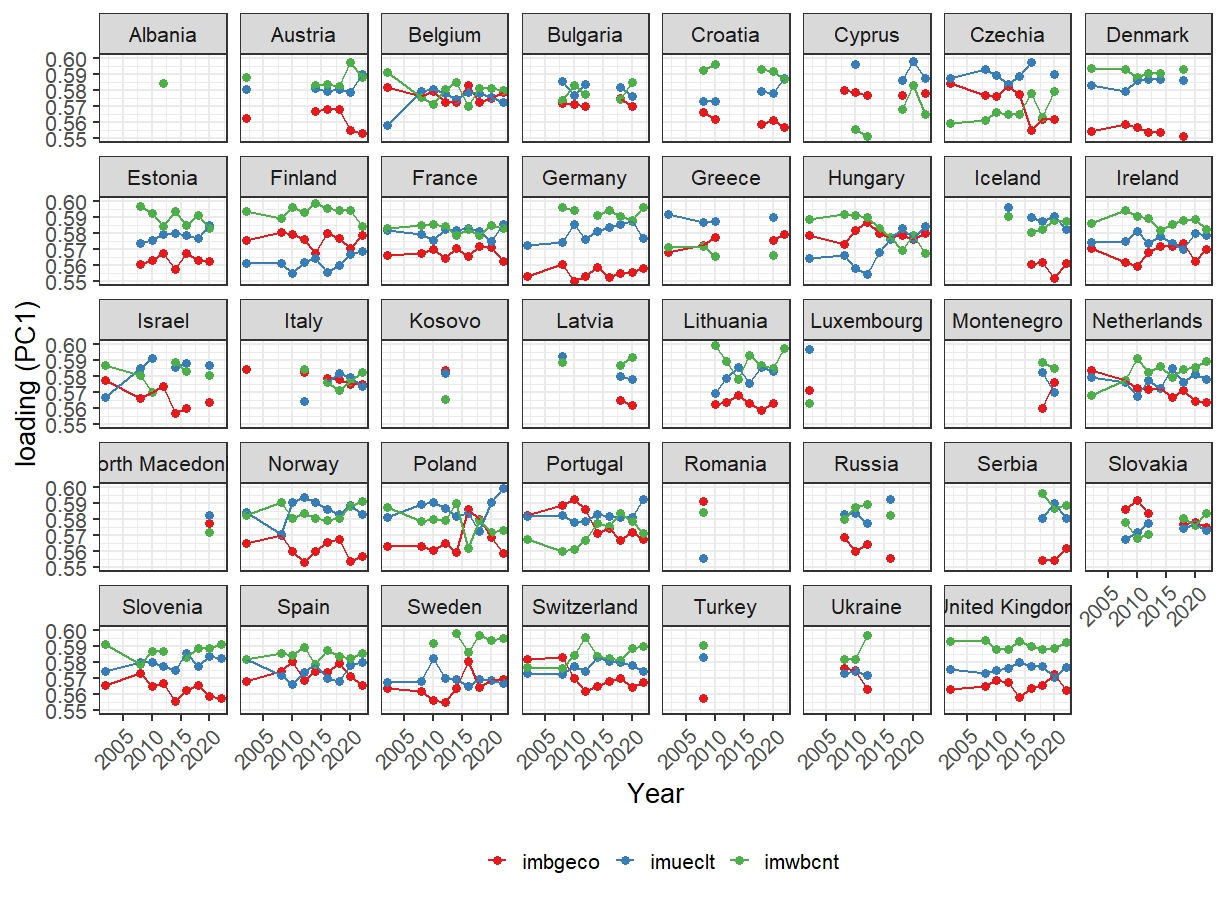
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# **Appendix**



**Fig 6.1** The loadings of PC1 for all countries and years. The plot shows how for several countries, not all rounds were available. Some countries, for example Albania, Kosovo and Romania, only participated once, meaning for those countries, no trend analysis would have been possible. However, even those countries could be included when calculating the European averages. More importantly is, that Germany and Hungary participated in enough rounds to conduct meaningful trend analyses.