

Endogenous Partitions*

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Abstract

We develop a new method to endogenously partition society into groups based on homophily in values, without reference to predefined identity markers. We explore the nature and evolution of endogenous values-based partitions using the European Values Survey – World Values Survey over the period 1980-2020 for 81 countries, with a particular focus on the US. We document three main facts. First, the degree of heterogeneity in values is an order of magnitude smaller in values-based partitions compared to partitions based on exogenous identity traits, such as gender, income or ethnicity. Second, values-based polarization in the US has been stable over time, and the key dimensions that divide society have been unchanged for forty years. Third, differences in values between political parties have grown in the US, reflecting the fact that political divisions have become increasingly aligned with the underlying values-based clusters.

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1 Introduction

There is growing concern that disagreement on socioeconomic and moral issues undermines the functioning of modern societies. In the United States, many scholars and commentators have argued that differences in values are growing, leading to social conflict, political polarization, and personal animosity. The rise of populist movements around the world has similarly created concerns over conflict between groups separated by differences in a broad range of values – including those related to religion, nationalism, redistribution, and democracy. The usual approach to societal divisions is to define them based on exogenous identity traits – such as gender, race, ethnicity or language. However, identity traits are not very predictive of values, and there is a lot of cultural diversity within identity groups (Desmet, Ortuño-Ortín & Wacziarg, 2017, Desmet & Wacziarg, 2021).

In this paper, we depart from the usual approach: we consider values and norms of individuals as primitives for the construction of social divisions. We do so because values, norms and attitudes are the building blocks of social and political preferences. In that sense, heterogeneity in values reflects the degree of social disagreement, and the evolution of values can lead to changes in the degree of observed societal antagonism and polarization. Clusters of individuals formed on the basis of differences in values may also shape visible social partitions, such as interest groups and political parties.

We aim to shed light on questions such as: Are countries becoming more polarized on values? What is the cost of forming groups based on exogenous identity traits if people have a preference for interacting with like-minded individuals? Are social divides shifting from an economic dimension to a cultural dimension? Are political parties becoming more aligned with people’s values? In tackling these questions, we consider the four decades spanning 1980 to 2020, and analyze a broad cross-section of countries, with a more specific focus on the US.

Our approach consists of a novel methodology to create endogenous partitions between individuals, based on their answers to survey questions on values, norms and attitudes. Partitions are obtained by assuming that individuals prefer to interact with others who share similar values (homophily). The greater the difference in the vector of values of two individuals, the more antagonism they experience when interacting. Individuals then choose the group that minimizes their expected antagonism. An equilibrium is a partition such that no agent prefers to join another group. There is usually more than one such equilibrium and we focus on the one that minimizes within-group antagonism. The level of between-group differentiation that results from an endogenous partition based on homophily in values provides a novel measure of polarization. Indeed, the equilibrium that minimizes within-group antagonism is also the one that maximizes between-group antagonism (i.e. values-based polarization): by making groups as homogeneous as possible in terms of values, we are also making groups as different as possible from each other.

We implement our method using data from the seven waves of the integrated European Values Survey - World Values Survey (EVS-WVS), for a cross-section of 81 countries (focusing in particular on the United States). We consider a set of about 200 questions reflecting respondents’ values. To avoid the repetition of certain questions, our analysis focuses on the main principal components of these questions. Using a k-means clustering algorithm, we create endogenous partitions, and compute how

efficient these groupings are in terms of reducing the within-group antagonism faced by individuals. A pronounced reduction in antagonism corresponds to a high degree of between-group values polarization.

A first main finding is that the reduction in antagonism resulting from the creation of values-based partitions is an order of magnitude larger than the reduction in antagonism stemming from creating groups based on identity traits, such as gender or ethnicity. For instance, in the most recent wave of the WVS, the average reduction in antagonism is 41.51% when partitioning society in two values-based clusters. In contrast, the average reduction from creating gender partitions is 1.26% and the average reduction from creating groups that differ by ethnicity is 3.36%. The average drop in antagonism is larger for partitions based on religious groups (13.36%) or political party affiliation (9.03%), though still much lower than for values-based partitions. We are, of course, not claiming that gender, ethnicity or religion are not socially relevant, but rather that creating partitions based on identity yields groups that are internally very heterogeneous.

A second main finding is that, in the US, values-based polarization has been stable over time and the key dimensions that divide society have been unchanged. Over the last four decades, the reduction in antagonism that results from forming two-values based clusters has remained stable around 40%. There is thus no evidence of an upward trend in the degree of values-based polarization. In addition, the main cleavages in the US have not changed. In 1981, the first two principal components of the WVS captured religiosity and social capital; in 2017, this was still the case. In that sense, we do not see a shift in people’s preferences from focusing on socioeconomic issues to focusing on cultural issues. This finding is not an artifact of the WVS, which includes many questions related to economic issues. Our results suggest that the culture war in the US has been latent for decades.

A third main finding is that polarization between the voters of the two main political parties in the US has increased, reflecting the fact that political parties have become more aligned with underlying values-based clusters. Before 2000, polarization between political affiliations, measured as the share of overall antagonism that is due to between-party differences, was consistently below 5%. Around 2000, it started to increase, reaching 10% by the mid-2000s, and further increasing to around 15% in the last decade. In contrast, when considering values-based polarization between other identity groups (ethnicity, gender, religion and income), there is no such trend. We observe the same political divergence in values when comparing the mean positions of Democratic and Republican voters. In the 1980s there was almost no difference in the average positions of both groups. Since then, they have gradually diverged from each other, and become much more aligned with the means of the values-based clusters. In fact, by 2017, the mean position of Republican voters coincided exactly with that of one of the two main values-based clusters identified by our algorithm. As such, the realignment of political parties in the US and the concurrent increasing political polarization correspond to a simple narrative: it is not that people’s preferences have changed, or that society has become more divided and polarized, it is simply that political parties are now more representative of the main values-based clusters.

Our paper relates to a vast literature conceptualizing and measuring social heterogeneity. One strand of this literature focuses on measuring heterogeneity based on identity markers, such as ethnicity (Alesina et al., 2003). As noted earlier, a limitation of this approach is that there is considerable

heterogeneity in cultural values within ethnic groups, so identity-based partitions may not be the most relevant dimensions of heterogeneity (Desmet, Ortuño-Ortín and Wacziarg, 2017). In fact, there is considerable within-group heterogeneity in values whatever the identity metric under considerations, be it gender, race, ethnicity, education levels, income quintiles, etc. (see Desmet and Wacziarg, 2021, for the US case). This motivates a direct focus on values as a foundation for measuring cultural heterogeneity, an approach that we adopted in our own past work, that was pursued in Alesina, Tabellini and Trebbi (2017) and that we continue to follow here. Our approach to deriving endogenous social partitions is also related to the literature on endogenous country formation (Alesina and Spolaore, 1997), as well as to the literature on voting with your feet in public finance (Tiebout, 1956). Here we do not consider secession *per se* but the division of each society into cultural groups based on value-based affinity between individuals. This paper is also related to the vast literature on the changing nature of political cleavages around the world (salient recent examples include Gethin, Martinez-Toledano and Piketty, 2021 and Bonomi, Gennaioli and Tabellini, 2021). This literature pays a lot of attention to recent changes in voting behavior, party platforms and politically salient cleavages, but devotes less attention to the nature and evolution of the individual values that underlie these changes. The latter is our main focus here. Finally, our paper is related to the literature on endogenous party formation, where party platforms reflect voter preferences over policy (Baron, 1993, Ortuño-Ortín and Roemer, 2000, Gomberg, Marhuenda and Ortuño-Ortín, 2004).

2 Conceptual Framework

In this section, we propose a micro-founded framework of the endogenous formation of values-based partitions. We relate the reduction in antagonism resulting from these endogenous partitions to the notion of polarization. We also compare values-based partitions to partitions based on identity traits.

2.1 Partitions Based on Values

There is a set P of N individuals in society. Each individual j is characterized by a "values" vector $x_j \in R^Q$. Each individual is also characterized by a socio-demographic or "identity" vector $f_j \in R^S$, containing information about her gender, race, education, religious denomination, political affiliation, income, and so on.

A large literature on homophily argues that individuals tend to associate disproportionately with others who are similar to them (Verbrugge, 1977; McPherson, Smith-Lovin and Cook, 2001; Jackson, 2021). In our context, similarity could be defined in terms of values or identity. In what follows, we focus on the case of individuals preferring to interact with other individuals who have similar values. More specifically, an individual j experiences a disutility from interacting with individual k that is increasing in the distance between the vector of values x_j and the vector of values x_k :

$$u(x_j, x_k) = u(d(x_j, x_k)) \tag{1}$$

where $d(x_j, x_k)$ is a distance metric between x_j and x_k .

Values Identification Equilibrium (VIE). Rather than each individual interacting with different, possibly overlapping, groups, we assume that society is made up of a small number of non-overlapping groups. For now, we set this number to two, and each individual associates or identifies with one of the two groups.¹ These groups are not exogenously defined, but are endogenously formed by individuals aiming to minimize their expected disutility from interacting or identifying with other members of their group.

Consider a partition A of the population set P into two groups, group A_1 and group A_2 , with $P = A_1 \cup A_2$ and $A_1 \cap A_2 = \emptyset$. Let \mathcal{P} denote the set of all possible partitions of P into two groups, so that $A \in \mathcal{P}$. The expected disutility experienced by an individual with values x_j , when identifying with group A_i and interacting with each individual of that group with equal probability, is:

$$E(A_i, x_j) = \frac{1}{N_i} \sum_{k \in A_i} u(x_k, x_j) \quad (2)$$

where N_i is the number of people in group A_i . We refer to this expected disutility as the *antagonism* individual j experiences by identifying with group A_i . When deciding which group to identify with, individual j chooses group A_i over group A_{-i} if $E(A_i, x_j) \leq E(A_{-i}, x_j)$. We denote the group agent j belongs to by $A_{i(j)}$.

Definition of a Values Identification Equilibrium (VIE). A partition $A \in \mathcal{P}$ is a Values Identification Equilibrium (VIE) if for each agent j we have $E(A_{i(j)}, x_j) \leq E(A_{-i(j)}, x_j)$.

Thus, a VIE is a Nash equilibrium: taking as given the group identification of all other individuals, no agent wants to change her group identification. One can easily prove the existence of an equilibrium, because there is a finite number of individuals.² However, there may be multiple VIEs. We denote the set of possible VIEs by \mathcal{V} .

For any VIE $A \in \mathcal{V}$, we define *values antagonism* as average within-group antagonism in society:

$$E(A) = \frac{1}{N} \sum_{j \in P} E(A_{i(j)}, x_j) \quad (3)$$

Within the set of possible VIEs, we refer to the one that minimizes values antagonism as the Global VIE, and denote that VIE by A^* . We denote the level of values antagonism in the Global VIE by $E^* = E(A^*)$.

Definition of the Global VIE. A^* is the Global Values Identification Equilibrium if for each $A \in \mathcal{V}$, $E(A) \geq E(A^*)$.

Reduction in values antagonism. How much does values antagonism decline when partitioning individuals into groups? We define a society's potential antagonism as the values antagonism that

¹In the empirical section, we also analyze the case of more than two groups. Another conceptually straightforward extension would be to consider individuals probabilistically identifying with more than one group.

²Gomberg, Marhuenda and Ortuño-Ortín (2004) provide conditions for the existence of an equilibrium in the case of a continuum of agents.

results when everyone belongs to the same group (i.e., society consists of one group P), and everyone interacts with everyone else with equal probability:

$$E(P) = \frac{1}{N} \sum_{j \in P} E(P, x_j) \quad (4)$$

Potential antagonism $E(P)$ is the expected distance between the vectors of values of two randomly chosen individuals in society. It is the same as the Greenberg B index of diversity.

To measure the reduction in values antagonism when society is optimally partitioned into two groups, we use the ratio

$$r = \frac{E(P) - E^*}{E(P)} \quad (5)$$

That is, when individuals go from interacting with everyone else in society to interacting only with individuals of their group, values antagonism drops by a proportion r . If r is high, there is a way to divide individuals into relatively homogeneous groups. This achieves a large reduction in the extent of values antagonism that individuals experience.

Values polarization. The reduction in values antagonism r is equivalent to the well-known Φ_{ST} index of between-group differentiation:

$$\Phi_{ST} = \frac{E(P) - \sum_{i=1}^2 \frac{N_i}{N} E(A_i)}{E(P)} \equiv r \quad (6)$$

where $E(A_i) = 1/N_i \sum_{j \in A_i} E(A_i, x_j)$ denotes values antagonism within group A_i . This result is proven in Appendix A1A. We interpret between-group differentiation in values as a measure of values polarization.

Definition of values polarization. *Values polarization is equal to between-group differentiation Φ_{ST} in (6): the share of overall values antagonism that is between groups. Equivalently, it is the reduction in values antagonism r when partitioning society into more than one group.*

The partition that maximizes the reduction in within-group values antagonism is also the partition that maximizes between-group differentiation Φ_{ST} . We can therefore interpret the level of r in the Global VIE as the maximum attainable values polarization. We can think of such values polarization as a by-product of individuals forming groups based on homophily. By creating groups that are relatively homogeneous, this process leads to polarization between groups.

Differences in identity and values across groups. Given a VIE, we can analyze to what extent the identity traits of individuals belonging to each group differ. For example, we can compare the share of women in A_1 and the share of women in A_2 . Similar shares would suggest that the values that most contribute to the partition in a given VIE are not strongly associated with gender. Similarly, given a VIE, we can analyze differences in values across groups. For example, we can compare whether there is a large or a small difference between groups in the share of individuals who believe in God. This tells us which values contribute most to partitioning society into groups.

2.2 Partitions Based on Identity

Instead of partitions that minimize values antagonism, suppose that partitions are based purely on identity traits. Take, for instance, the case of a partition $A^g \in \mathcal{P}$ based on gender, with a first group A_1^g containing only men, and a second group A_2^g containing only women. More generally, g can refer to any identity trait, including ethnicity, income, religion, or political party. We keep the utility function of an individual unchanged. That is, an individual's utility continues to depend on the distance between his values and those of the individuals of his group. In other words, gender or any other identity trait does not enter the utility function, and values antagonism is still solely based on differences in values across individuals. In general, the gender-based partition A^g is not a VIE.

Antagonism between identity groups. The degree of values antagonism between identity-based groups is:

$$E(A^g) = \frac{1}{N} \sum_{j \in P} E(A_{i(j)}^g, x_j) \quad (7)$$

Thus, $E(A^g)$ measures values antagonism in the case where individuals still only care about values, but where individuals are partitioned into identity-based groups. As before, we can measure by how much values antagonism decreases when partitioning society into identity clusters:

$$r^g = \frac{E(P) - E(A^g)}{E(P)} \quad (8)$$

That is, when individuals go from interacting with everyone else in society to interacting only with individuals of their identity group, values antagonism drops by a proportion r^g . This is related to the intensity of identity cleavages, as measured in Desmet and Wacziarg (2021), because in both cases the measures capture between-group differentiation, where groups are defined according to identity traits.

Identity-based values polarization. Using our previous definition, we can interpret r^g as the degree of values polarization between identity groups (rather than between endogenous clusters). Indeed, the reduction in values antagonism from partitioning society into identity clusters, r^g , is equivalent to the degree of between-group values differentiation, Φ_{ST}^g .³ In general, the reduction in values antagonism based on identity groups, r^g , will be smaller than the reduction in values antagonism based on values-based partitions, r . As such, group membership based on identity would imply more within-group antagonism but less polarization, compared to group membership based on values.

Opportunity cost of identity-based partitions. How much larger is values antagonism under an identity-based partition compared to a values-based partition? Correspondingly, how much lower is polarization when society is partitioned based on identity, rather than on values? We define the opportunity cost of an identity-based partition as

$$OC^g = \frac{E(A^g) - E^*}{E^*} \quad (9)$$

³This metric of between-group differentiation is closely related to the measure of cultural divides between identity groups, F_{ST} , used in Desmet and Wacziarg (2021).

To illustrate how to interpret this measure, suppose the opportunity cost of a gender-based partition is high. One interpretation is that individuals who care about values would be unlikely to socially identify based on their gender. Indeed, interacting with people of the same gender would imply interacting with individuals who hold very different values, compared to the alternative of choosing one’s group based on values. Another interpretation is that instrumentalizing gender to form coalitions would be costly, because it would result in forming groups of individuals with very heterogeneous cultural values. Compared to grouping individuals based on their values, coalitions based on gender would be much more heterogeneous in their underlying views. Of course, if gender-based partitions have a high opportunity cost, it also means that between-group values polarization would be much lower than in values-based partitions.

2.3 Squared Euclidean Distance and Interpretation of Values Identification

Squared Euclidean distance. So far, we have not assumed a functional form for $u(d(x_j, x_k))$. Here, we assume that the disutility function (1) is given by:

$$u(x_j, x_k) = \|x_j, x_k\|^2 \tag{10}$$

where $\|x_j, x_k\|$ is the Euclidian distance between vector of values x_j and vector of values x_k .⁴ This is the distance metric used in our empirical application, but our framework can accommodate other distance metrics.

Using the squared Euclidean distance has several advantages. First, it allows us to use the standard k-means clustering method in order to create endogenous partitions. Second, adopting squared Euclidean distance implies an additive preference structure (the distance between two vectors can be computed by adding up distances in each of the Q dimensions). Third, the antagonism individual j experiences by identifying with group A_i as given by (2) can be written as her distance to the mean values of the group:

$$E(A_i, x_j) = \frac{1}{N_i} \sum_{k \in A_i} \|x_k, x_j\|^2 = 2 \|x_j - \mu_i\|^2 \tag{11}$$

where $\mu_i = (\sum_{k \in A_i} x_k) / N_i$. Thus, in any VIE, an individual in group A_i is closer to the mean position of her group than to the mean position of any other group. In this case, the Global VIE A^* is the partition that minimizes within-group variance. This is equivalent to the partition that maximizes between-group variance, as we prove in Appendix A1B. The between-group variance corresponding to partition A^* captures the maximum possible values polarization in society.

Alternative interpretation of values identification. Under the squared Euclidean distance assumption, an individual chooses the group that minimizes her distance to the group’s mean position. As such, identification does not require an individual to know all bilateral distances to all other individuals, but only her distances to the mean positions of the groups. We can thus view the mean value

⁴This approach is related to that in Alesina, Tabellini and Trebbi (2017), p. 183. They compute bilateral distances between all respondents to the European Values Survey (among other surveys) using the squared Euclidian distance between vectors of individual answers. They then plot the densities of a monotonic function of these distances.

μ_i as the representative culture of group i , with the cost for an individual with values x_j to identify with group i given by the distance $\|x_j - \mu_i\|^2$. This type of identification is closer to the one typically considered by economists (Akerlof and Kranton, 2000; Shayo, 2009; Bonomi, Gennaioli and Tabellini, 2019).

This interpretation of a VIE is akin to the way we might think about the formation of political platforms. In the realm of politics, μ_i could be viewed as the policy position of political party i . That position, or platform, depends on the political positions of its supporters. While there is no good general theory explaining how political parties aggregate or represent the preferences of their supporters, a reasonable assumption is that parties adopt the mean position of their supporters as their policy position, and conversely, that supporters pick the party whose platform is closest to their own values. This sort of political equilibrium is explored in Gomberg, Marhuenda and Ortuño-Ortín (2004).

3 Empirical Methodology

In this section, we describe the data and algorithm used to find endogenous values-based partitions. We also conduct several exercises to validate our methodology.

3.1 Data

We use data from all waves and all countries of the integrated World Values Survey-European Values Survey. Vector x_j is given by agent j 's answers to questions on values. We first focus mostly on the set of 81 countries included in the latest wave of the integrated WVS-EVS dataset, paying particular attention to the United States. We find the VIE that minimizes values antagonism, A^* , and describe its properties. In a second step, we examine previous waves and characterize the evolution of endogenous partitions and their properties across time and countries, again with a particular focus on the US.

Sample of questions and respondents. For a given country and a given wave of the WVS-EVS, we focus on all questions that are about values and attitudes, disregarding those that concern respondents' identity and demographic characteristics. Among that set, we keep those with answers that can be ordered. These are either binary or ordered on a scale. For the latest wave of the WVS, this gives us an average of 210 questions by country. We apply some filters in order to obtain a sample that has the same questions for all respondents in each country: to reduce the issue of missing answers, we drop, for each country, any question that is answered by less than 30 percent of the respondents. This eliminates on average only 17 questions, leaving us with an average of 193 questions, with a minimum of 163 in the case of Egypt (the US features 198 questions, only dropping one). The resulting set of questions is very balanced across the countries in the sample, an attractive feature of the WVS. We further alleviate the issue of missing answers by dropping all respondents who do not answer at least 70 percent of the questions. This only results in dropping 0.7 percent of respondents. For the latest wave of the WVS, the average number of remaining respondents is 1,558, with a range of 987 to 4,018. To improve comparability across questions, we rescale answers so that they are always in the interval $[0, 1]$.

These different steps still leave us with a small number of missing answers: in wave 7, the average number of remaining missing answers per country is 2.3 percent (in the US, it is only 1 percent). To deal with this issue, we use a machine learning algorithm to impute their values. Let T be the set of respondents without missing answers, and let $X_T = \{x_j : j \in T\}$ be a matrix whose columns correspond to the vectors of values of those respondents. Using X_T as the training sample, the machine learning algorithm yields a data matrix $X = \{x_1, x_2, \dots, x_N\}$ with no missing values.⁵ In practice, in most countries the set T contains a very high proportion of all respondents, another nice property of the WVS.⁶

Principal components analysis. Next, we reduce the dimensionality of the question space by using principal component analysis (PCA). There are multiple advantages to doing so. First, using PCA avoids the possible duplication of questions that capture similar values and are likely to be answered similarly by a given respondent. For example, there are separate questions on belief in Heaven and belief in Hell, with highly correlated answers. Second, to the extent that there is measurement error in the way individuals answer WVS questions, the use of principal components helps mitigate the problem. Third, by construction, PCA produces dimensions that are orthogonal to each other, allowing an interpretation of the resulting measures of values antagonism as minimizing within-group variance in values (as captured by principal component positions - see Appendix A1B). Fourth, with fewer dimensions, finding a VIE is computationally less costly.⁷

For each country and wave, we compute the principal components of matrix $X = \{x_1, x_2, \dots, x_N\}$. For each individual j we write the vector of her position on the different PC dimensions as $p_j = \{p_{j1}, p_{j2}, \dots, p_{jQ}\}$, where Q is the number of questions.⁸ We can use either the answers themselves or any number of principal components to find VIEs. In practice, we do the latter, and consider alternatively the first, first two, first three, and first 75 principal components to create the endogenous partitions.⁹ When using the first PC, the distance between individual j and individual k is given by:

$$u(p_{j1}, p_{k1}) = \|p_{j1}, p_{k1}\|^2 = (p_{j1} - p_{k1})^2 \quad (12)$$

⁵More specifically, we use the Mathematica (version 13.0.1) command "SynthesizeMissingValues" to replace missing values. The training sample used was formed by the answers given by the set individuals with no missing answers (T). We set the level of performance to "Quality" to maximize the synthesis quality. For each country and wave, Mathematica chooses the best machine learning algorithm from among "Multinomial", "Kernel Density Estimation", "Decision Tree", and "Gaussian Mixture". In wave 7, the average number of individuals in the training sample was 582 (a minimum of 47 individuals in the case of New Zealand and a maximum of 2,723 for Canada). In rare cases, the algorithm can replace a missing value with a value that lies outside the $[0, 1]$ interval. In such cases, we assign a value of 0 or 1, depending on which is closest.

⁶If we impute these missing answers using the median value of answers instead, our results do not change materially. We did so for the US in wave 7, finding results that are extremely close to those obtained using machine-learning imputation.

⁷We have verified that for Wave 7 and the United States, the results obtained *without* first reducing the question dimensionality using PCA are very similar to those obtained using PCA, in the sense that we obtain very similar clusters in both cases.

⁸In all cases, the number of questions is less than the number of individuals, so matrix $P = \{p_1, \dots, p_N\}$ has Q columns.

⁹The case of 75 PCs is basically equivalent to considering all PCs.

When using the first two PCs, the corresponding distance is:

$$u(\{p_{j1}, p_{j2}\}, \{p_{k1}, p_{k2}\}) = (p_{j1} - p_{k1})^2 + (p_{j2} - p_{k2})^2 \quad (13)$$

and so on for more dimensions.

3.2 Finding Values-Based Partitions

To find a VIE, we use the k-means clustering algorithm, implemented using *Mathematica*. The distance metric is squared Euclidian distance, implying that in a VIE each individual is at a smaller distance from the mean answers of her own group than from the mean answers of any other group. We use the sampling weights of the WVS-EVS to ensure that our underlying samples are nationally representative.¹⁰ We also check that the partitions obtained constitute a VIE and that no individual prefers to be in a different group.

We have 81 countries, we consider four different numbers of groups (2, 3, 4 and 5), and we analyze four different numbers of principal components (1, 2, 3 and 75). For each of these 1,296 combinations, and for each wave, we need to find the best VIE (A^*). To do so, we run the algorithm 1,000 times, using different random starting points, and then select the partition with the lowest antagonism, and we claim this partition is A^* . While we cannot be absolutely certain that this is the global minimum, it is our best candidate for a global minimum. In practice, the multiple VIEs we find for a given country are very similar in the sense that there tend to be only minor differences in the sets of individuals that belong to the different groups.

To describe the endogenous partitions, we compute, for each country and wave, E^* , P and r . We also examine the demographic characteristics of each cluster - we consider gender, age, income deciles, years of education, political ideology, whether the respondent belongs to a religious denomination, and self-reported social class. We also characterize the cultural make-up of each cluster by examining the mean of a selection of cultural values for each partition.

3.3 Validation

To see whether our methodology is likely to produce sensible results, we conduct two validation exercises.

The first exercise focuses on three countries on three different continents: the United States, China and Zimbabwe. We pool the respondents from wave 7 of the WVS for these three countries. We then run principal components analysis on this joint sample, finding that the first PC explains 13 percent of the variance in answers, while the first 10 PCs explain 40 percent. Plotting individuals along the first two PCs makes the three countries appear distinctly (Figure 1, Panel A). We next run our algorithm on the pooled data (Figure 1, Panel B), allowing for three clusters. Our goal is to see whether our algorithm recovers the three countries that underlie the pooled data. The results are telling: 96.5 percent of the individuals from China are classified in cluster 1 (in blue in the figure), 98.2 percent

¹⁰52 of the 81 countries in our sample have WVS-EVS sample weights (this refers to wave 7 of WVS and wave 5 of EVS).

of the individuals from Zimbabwe are classified as belonging to cluster 3 (in green in the figure) and 79.5 percent of the individuals from the US belong to cluster 2 (in orange in the figure). Most of the remaining US respondents (18.2 percent) are assigned to cluster 3 (the "Zimbabwe cluster").¹¹ Overall, our algorithm does a remarkable job at recovering the three underlying countries. Moreover, using common methods from cluster analysis to assess the optimal number of partitions in the pooled data, we find that the optimal number of partitions tends to be equal to either three or four (a fourth cluster typically divides the US sample into two groups).¹²

The second exercise exploits WVS data from reunified Germany. Focusing on wave 3, corresponding to 1997, we analyze whether our clustering algorithm is able to detect respondents from East and West Germany. Our hypothesis is that the decades-long separation under very different political regimes would have increased the degree of distinctiveness between the two areas, and that the 1991 reunification would not have entirely blunted this distinctiveness. Figure 2 plots all respondents from Germany in the dimensions of the first two PCs for Wave 3. Red dots represent residents of the former GDR/DDR, and blue dots are residents of the former FRG/BRD. We find a significant overlap between the two clusters and the two regions of Germany: 65.2 percent of the individuals in group 2 live in East Germany, while only 27.9 percent of the individuals in group 1 live in East Germany. Of the respondents from East Germany, 76.7 percent belong to cluster 2. We also notice that East and West Germans differ mostly along the dimensions of the second PC, which contains many questions on politics and institutions.

4 Endogenous Partitions across Countries

4.1 The Reduction in Values Antagonism from Values-Based Partitions

This subsection analyzes how values-based partitions reduce antagonism. It takes a cross-sectional approach, comparing 81 countries and focusing on wave 7 of the WVS. It documents three key findings. First, there is a meaningful reduction in antagonism when partitioning society into two or three groups. Second, there is substantial heterogeneity across countries in the magnitude of this decline. Third, the US is close to the average, compared to other countries. As such, there is no evidence of the US being particularly polarized when considering values-based partitions of society.

4.1.1 Partitions into Two Clusters

Visual representation of partitions into two clusters. Figure 3 presents plots of the endogenous partitions of individuals into two clusters, based on the first two principal components of answers, for a selection of seven countries among our sample of 81.¹³ Each dot in the plot represents an individual's

¹¹This 18.2 percent of the Americans sample of respondents consists of 246 Whites, 58 Blacks, and 74 Hispanics. As a percentage of the total of each group in the US they are: 14 percent of White respondents, 27.6 percent of Black respondents, and 16 percent of Hispanic respondents.

¹²The optimality criteria we checked for include Silhouette, Calinski-Harabasz, Davies-Bouldin, Dunn, R2-Elbow, and Standard Deviation-Elbow. All yield either 3 or 4 as the optimal number of clusters.

¹³Appendix A3 lists the WVS questions that receive the highest weights in the first two principal components for wave 7, for a selection of seven illustrative countries. These are the questions that play the most important role in setting

position along the two principal components, the colors indicate the cluster to which they belong, and the solid line represents the hyperplane separating the two clusters. Solid black dots represent the mean of each cluster along the two dimensions.

In some countries, like the US, the clusters are formed mostly along a single dimension (the hyperplane is almost a vertical line). When looking at the underlying questions that have large weights in this component for the US, they tend to be questions related to religious values and morality.¹⁴ For other countries, such as Germany, Nigeria or Ethiopia, both dimensions are needed to separate individuals into clusters (the hyperplane is tilted). Naturally, since the first principal component, by definition, accounts for the greatest share of the variance in answers, groups tend to be formed mostly along this component.

Reduction in antagonism. Table 1 reports for each country the reduction in antagonism achieved by creating two clusters (r). It also reports the size of the largest cluster. We consider partitions based on successively larger numbers of principal components (1, 2, and 75). When partitioning based on the first principal component, values antagonism is reduced by 68.49 percent on average.

The reduction that is achieved with more principal components becomes progressively smaller, because more dimensions of heterogeneity make it more difficult to efficiently group individuals: two individuals can share an affinity along one dimension but not the other, and if they end up in the same cluster, they will differ along this second dimension, leading to greater within-group antagonism. When using the first two principal components to form clusters, the average reduction in antagonism from going to two clusters is 41.51 percent, with a standard deviation of 6.24 percent.

The reduction in antagonism, r , is a measure of between-group differentiation, and hence of values polarization. Countries with a large reduction in antagonism, such as Thailand (69.01 percent), Colombia (57.82 percent) and Spain (50.04 percent), are more polarized on values. Countries with a small reduction in antagonism, such as Argentina (31.38 percent) and Jordan (33.85 percent), are less polarized on values. The US is close to the average, featuring a reduction of 41.10 percent. In that sense, there is no evidence that the US is particularly polarized in terms of the values people hold, compared to other countries. Group sizes are relatively balanced, with the average share of the largest cluster standing at 62 percent. The US is about one standard deviation above this, with the largest group containing 67.5 percent of respondents. This observation will become relevant when we discuss how well political parties are aligned with values-based clusters.

4.1.2 Partitions into Three or More Clusters

Visual representation of partitions into more than two clusters. For a selection of seven countries, Figures 4 and 5 plot the endogenous partitions of individuals into three and four clusters, based on the first two principal components of answers. In the US, the partition into two groups occurs mostly along the first principal component, with the group on the right scoring higher on

apart the endogenous partitions discussed in this subsection.

¹⁴Specifically, the 5 questions with the largest weight in the first principal component for the US are: Believe in: hell; Believe in: heaven; How important is God in your life; Important child qualities: religious faith; Believe in: God..

religiosity (as captured by questions such as belief in Heaven and the importance of God). When allowing for a third group, Figure 4 shows the more religious group splitting into two groups, mostly along the second principal component, capturing questions on social capital (including questions on trust, political participation, and church attendance). When allowing for a fourth group, the two US clusters on the right (corresponding to religious individuals, with either high or low levels of social capital) get subdivided into three clusters, while the group of largely secular respondents on the left side of the figure remains largely unaffected.

This suggests that the main cleavage in the US is between a minority of less religious liberals and a majority of more religious conservatives. The finding that the secular group does not further split into smaller groups when we allow for more clusters reflects both their smaller size and their degree of distinctiveness. Another notable finding in the US refers to the ideological difference between groups. On a left-right scale from 1 to 10, the ideological distance between the mean of the secular cluster and the average position farthest to the right is equal to 3.04, when considering four clusters. To put this in context, the sample mean ideological distance between the most distant clusters for all other countries is 1.41, so the US stands out in terms of ideological distance between the two farthest clusters.

Other countries also exhibit interesting patterns. For example, in the case of Ethiopia, there is a distinct group on the left side of the diagram (Figure 5, Panel B). Two-thirds of this group belongs to the Oromo ethnic group, and almost 60 percent are Muslims. Most of them live in the Oromia region and the group is very right-winged, with almost half of individuals reporting an ideology score of 10 on a 1-10 left-right scale. This example shows that our clustering method is able to detect a very culturally distinct group. In fact, this group is already set apart when allowing for only three clusters (Figure 4, Panel B).

Reduction in antagonism from partitions into more than two clusters. It is obvious that values antagonism declines as we allow for more clusters (by construction antagonism is zero if each individual is its own cluster). But how much of a further reduction in values antagonism do we achieve by going to three, four and five clusters? Table 2 shows that most of the decline in values antagonism occurs when splitting up society into two or three groups.¹⁵ Recall that the average reduction in antagonism from going to two clusters is 41.51 percent. An additional 20 percent or so of antagonism is eliminated by going to three clusters, and these gains diminish to about 9 percent and 6 percent, respectively, when allowing for four and five clusters.

Figure 6 gives a graphical representation of the reduction in antagonism for a select number of countries as the number of clusters increases. Once again, the US coincides with the average. Polarization in terms of values is neither particularly high nor particularly low in the US. Countries that achieve large reductions from going from one to five clusters include South Korea, Mexico and Thailand. In some of these, such as Thailand, most of the reduction happens when allowing for two

¹⁵Table 2 is based on two principal components. Results based on different numbers of principal components are also available and do not differ materially - except of course that the level of societal antagonism left over after partitioning is larger the greater the number of principal components under consideration.

clusters, with limited additional gains when adding more clusters. Other countries, such as Bangladesh and Ethiopia, achieve high reductions going from two to three clusters.

4.2 Identity and Values Differences between Clusters

In this subsection, we analyze how well aligned values-based partitions are with identity traits, and we also explore the differences in specific values across clusters. The analysis focuses on the case of two groups and two principal components. We document three stylized facts. First, most identity traits, such as income and education, do not differ greatly across groups. An exception is religiosity. Second, ideological differences between groups tend to be small, with the US being the most notable exception. Third, differences in values across groups tend to be larger than identity differences, with substantial heterogeneity both across values and across countries.

4.2.1 Identity Differences across Partitions

Table 3 Panel A displays the mean differences in various identity traits across clusters, in the case of two clusters, for the 81 countries in our sample. In general, the average between-group differences are small. For example, the average difference in income is 0.376 (on a scale of 1 to 10) and the average difference in years of education is 0.488. This is not what we would expect if the most relevant dimension of social heterogeneity had to do with preferences for redistribution and taxation. One notable exception to these relatively small cross-group differences in identity traits is the proportion of respondents who do not belong to any religious denomination. There, the average difference is 20.74 percentage points.

To get a sense of cross-country heterogeneity, Panel B shows these differences for the seven baseline countries. Differences in the proportion of the non-religious are particularly pronounced in South Korea (74.70 percentage points) and Germany (46.56 percentage points), compared to Nigeria (0.27 percentage points). Differences in the proportion of men are also relatively high in South Korea (22.37 percentage points) and the US (14.61 percentage points). Overall, there is substantial heterogeneity across countries. Figure 7 shows this in more detail, by displaying the distributions of differences in six identity traits across all 81 countries of our sample. The mode of these distributions tends to occur at levels of identity trait differences between groups that are relatively low, but the tail of the distributions is generally long. As discussed before, one finding that stands out is the large ideological difference between groups in the US: on a 1 to 10 left-right scale of ideology, the difference between the two groups in the US is 2.14 points – higher than in any other country in the sample (the sample mean is 0.65).

In spite of cross-group identity differences being large for some identity traits in some countries, the fact that these differences tend to be small on average suggests that values-based partitions are not too strongly aligned with identity traits. We will return to this issue in Section 4.3, when comparing values-based partitions and identity-based partitions.

4.2.2 Values Differences across Partitions

Figure 8 contains information on the distribution of differences in values between clusters. For tractability, we selected a set of 18 questions from wave 7 of the WVS (about 10 percent of the total), which are roughly representative of the span of issues covered by the survey. Table 4 Panels A and B shows summary statistics for 9 of these 18 questions, and the data for seven countries. Not surprisingly, the difference in values between clusters tends to be larger than the difference in identity traits: after all, clusters are formed on the basis of differences in cultural values. What is interesting here is the heterogeneity across values and across countries.

Some values do not seem to be very divisive, whereas others are. For instance, views on whether the family is important do not differ much between clusters in most countries (on a scale from 0 to 1, the mean absolute difference between clusters is about 0.024 with a standard deviation of 0.024, across 81 countries). The same is true for the question whether success is due to hard work or luck (the mean difference is 0.065). In contrast, questions on religion and associated values (homosexuality, abortion) tend to display higher mean differences between clusters.

Turning to heterogeneity across countries, we also uncover interesting patterns. In the US, questions on religion, homosexuality, abortion, as well as government versus individual responsibility, and immigration policy, are the most divisive. In Korea, questions on the importance of religion, belief in Heaven and religious attendance are particularly divisive, but the clusters are very similar on all other questions. In Germany, questions on religion and associated moral issues seem paramount. In Nigeria, the question on confidence in government shows large between-cluster differences, while in Ethiopia questions on homosexuality and abortion display large between-cluster differences. China shows relatively small differences on many dimensions, except when it comes to questions on generalized trust, abortion and homosexuality.

4.3 The Reduction in Values Antagonism from Identity-Based Partitions

In this subsection, we explore the reduction in values antagonism when partitions are based on identity. We focus on the case of two principal components. We consider five types of identity partitions, based on gender, political party, income, religion, and ethnicity.¹⁶

Reduction in antagonism. Table 5 reports the reduction in values antagonism when society is partitioned into identity groups (left panels). The average drop in antagonism ranges from an average of 1.26 percent for gender-based partitions to 13.36 percent for religion-based partitions. Partitioning by political party also leads to relatively large average declines in antagonism (9.03 percent), whereas grouping people based on their income or ethnicity lowers antagonism by less than 5 percent.

¹⁶For each of the identity traits, we consider all the groups that appear in the WVS. For example, in the case of politics, we take all the political parties that are mentioned in each country as different groups, and we consider those who do not say which party they would vote for as a different group. In the case of income, we group individuals according to their declared decile. In a few countries, ethnicity or religion is not asked, most often because there is only one group. In that case, we assign everyone as belonging to the same group.

Compare this to partitioning society based on people’s values for the case of two groups and two principal components: the average decline in antagonism is 41.51 percent. This reduction is an order of magnitude larger compared to partitioning based on gender, ethnicity, or income. This suggests that if individuals have a preference for associating with others that hold similar values, then using identity traits to determine group memberships is not particularly effective. When interpreting the reduction in antagonism as a measure of polarization, this implies that identity-based partitions lead to substantially lower levels of polarization than values-based partitions.

With the exception of grouping based on political party, the US looks average in terms of the reduction of antagonism for the different identity-based partitions. The share of overall antagonism that can be assigned to differences between political party affiliation in the US is 14.66 percent, almost one standard deviation above the average of 81 countries. This suggests that the US is a highly polarized country in terms of differences in values between voters of different political parties. Although religion and politics tend to be the most divisive identity traits, in some countries other identity traits matter too. For example, Nigeria is ethnically polarized, as reflected by a reduction in antagonism by 22.52 percent when groups are based on ethnicity, and Chile is polarized along the income dimension, with a reduction in antagonism for an income-based partition of 19.85 percent.

Opportunity cost of identity-based partitions. To further explore how much larger values antagonism is in different identity-based partitions compared to in a values-based partition, we use the notion of the opportunity cost of forming identity-based partitions, as explained in (9). Table 5 (right panels) reports the results. We document three facts, in line with our previous findings. First, the opportunity cost of identity-based partitions is high, with values antagonism being more than 50 percent higher than in values-based partitions. Second, partitions based on either politics or religion tend to have lower opportunity costs, though in some countries partitioning on income or ethnicity is relatively efficient. Third, in the US the opportunity cost of partitions based on political party is almost one standard deviation below the average, suggesting again that political parties are relatively well aligned with values.

On average, values antagonism under identity-based partitions is between 50 percent and 71 percent higher than under values-based partitions. If people care about values, then socially identifying based on one of these identity traits is costly. In over 80 percent of countries the lowest opportunity cost is for partitions based on either politics or religion. However, in a few countries, partitioning on income is relatively efficient (e.g., Bangladesh, Romania, Jordan), and in others partitioning on ethnicity has a relatively low opportunity cost (e.g., Ethiopia, Nigeria, Pakistan).¹⁷ In the US, partitioning on politics is relatively efficient: its opportunity cost of 44.89 percent is below the average of 57.53 percent. This suggests that, in relative terms, political parties in the US are relatively well aligned with people’s values.

¹⁷This is consistent with results in Desmet et al, (2017), where we documented that in many Sub-Saharan African and South Asian countries, ethnicity and language is more predictive of WVS values than elsewhere.

5 Endogenous Partitions over Time

In this section, we explore time variation in within-group antagonism and polarization across successive waves of the WVS. We focus on the case of two clusters, obtained using two principal components computed separately wave by wave. We document four facts. First, in most countries, within-group values antagonism has been relatively stable over the past four decades, implying that values polarization has not changed much. Second, in the few countries where values polarization has changed in a significant way, it has mostly been declining. Third, identity-based values polarization has also been quite stable, though in some countries political and religious polarization has increased, while gender polarization has decreased. Fourth, in the specific case of the US, values polarization between endogenous clusters has been stable over the last decades, in contrast to rising polarization between groups based on political affiliation.

5.1 Evolution of Values Antagonism and Polarization

For each of the 63 countries for which we have data on the reduction in within-group values antagonism (r) for at least four waves, we regress r on a time trend that corresponds to the years of the different waves. If the coefficient on the time trend is statistically significant at the 10 percent level, we say that values polarization has declined if the coefficient is negative, and that values polarization has increased if the coefficient is positive. For around 80 percent of countries, values polarization shows no clear trend. Another 15 percent exhibit declining values polarization. This includes countries such as France, India and Egypt. Only 5 percent of countries display rising values polarization. This includes Bulgaria, Poland and South Korea.

Figure 9 depicts the evolution of r for a sample of six countries (we replaced Ethiopia with South Africa because the former does not appear in enough WVS waves). With the exception of Korea, none of them shows a clear trend. The overall picture is one of stable values polarization. This is also true for the specific case of the US, as seen in Figure 10. Whether we use two or ten principal components to create values-based partitions (top panel), values polarization in the US has not changed significantly over time, with the exception of a slight increase in the 1980s. We reach the same conclusion when it comes to the evolution of values polarization across different numbers of clusters (bottom panel).

5.2 Evolution of Identity-Based Antagonism and Polarization

Rather than considering endogenous partitions, we now focus on partitions based on identity traits. In the previous subsection, we documented that when considering values-based partitions, values polarization has been fairly stable in most countries. Here, we ask the question whether the same is true if values polarization is measured between identity groups. As before, we consider five alternative identity traits: politics, gender, ethnicity, income, and religion.

To determine whether values polarization based on identity partitions has increased or decreased over the last decades, we start by computing for each country, wave, and identity partition, the reduction in within-group antagonism r^g when society is partitioned into groups according to identity trait g . Recall that r^g is defined as the degree of values polarization between identity-based clusters.

For each of the 63 countries for which we have information on at least four waves, we regress r^g on a time trend. As can be seen in Table 6, depending on the specific identity trait, between 70 percent and 90 percent of countries do not display a statistically significant time trend. In that sense, polarization between identity-based clusters has been fairly stable over time, similar to polarization between values-based clusters.

There are some notable differences between identity traits, however. For values polarization between gender groups, 27 percent of countries show a statistically negative time trend, whereas only 3.2 percent display a statistically positive trend. In contrast, values polarization between religious groups is increasing in 20.6 percent of countries, and decreasing in only 1.6 percent of countries. Something similar occurs with values polarization between political parties: it is also increasing in 20.6 percent of countries, and decreasing in only 3.2 percent of countries. For the two remaining identity traits, ethnic polarization and income polarization display no statistically significant trend in, respectively, 90.5 percent 84.1 percent of countries.

In the specific case of the US, values polarization between identity clusters exhibits no statistically significant trend, with the notable exception of politics. Before 2000, values polarization between groups defined by political affiliation was consistently below 5 percent. Around 2000, it started to increase, reaching 9 percent by the mid-2000s, and then further rising to around 15 percent in the last decade. This is consistent with recent work that has documented the rising political divide in the US (Desmet and Wacziarg, 2021; Boxell, Gentzkow and Shapiro, 2022). Our findings suggest that this growing political divide is not due to growing polarization of people’s underlying values, but rather due to an increased alignment between political affiliation and people’s values. Indeed, as we showed earlier, values polarization in the US has been stable in the last three decades. Instead, polarization between groups defined by political affiliation has increased.

5.3 Further Evidence on the Rising Political Divide in the US

Difference in identity traits between clusters. In this subsection, we approach the issue of identity-based values polarization from a different angle. We look at the degree of alignment between endogenous clusters and identity groups. Figure 11 displays the differences in identity traits between the two clusters in the US over time, using the endogenous partitions obtained with the first two principal components. We do so for nine identity markers, adding the difference in the share of Democrats and the difference in the share of Whites to the list of seven identity cleavages discussed in Section 4.2.1 (these additional identity markers are specific to the US).

We uncover a notable pattern: ideological and political differences between clusters have increased sharply over time. More specifically, the ideological difference, on a scale of 1 to 10, has increased steadily from 0.68 points in 1981 to 2.13 points in 2017, with the biggest increase occurring in the last decade of the sample. Similarly, the difference in the share of Democrats across clusters, which stood at 4.71 percentage points in 1995, has grown to 28.75 percentage points by 2017. Thus, endogenous partitions have become much more politically patterned. That is, partitions derived from values are more predictive of political and ideological positions today than they were in the past.

For other identity cleavages, we do not observe sharp increases. For instance, there is no systematic tendency for the clusters to differ more in terms of gender, age, schooling, or income. The increase in racial differences across clusters is quantitatively modest: the difference in the share of Whites across clusters only increased by about 2 percentage points over almost four decades. One cleavage that displays a reduction in between-cluster difference is age, with a six year decline in the absolute age difference between clusters from 1981 to 2017. Income differences between clusters also display, if anything, a downward trend, consistent with a lower salience of economic position as a determinant of values-based partitions. This last finding is also consistent with the facts reported in Gethin, Martínez-Toledano and Piketty (2021) concerning the gradual reversal of the income gradient between left and right in the US - which is still in process.¹⁸

Convergence between political and values-based clusters. Figure 12 compares the mean positions of the two endogenous clusters in the US along the first two principal components to the mean positions of the individuals that vote for different political parties. It does so separately for each of six waves of the WVS (we omit wave 4 for readability).

In 1982 (wave 1), the mean positions of Democrats and Republicans almost coincide, and they are relatively far removed from the mean positions of clusters 1 and 2. Voters of the two main political parties in the US did not differ much in terms of values, and their values were not well aligned with those of the endogenous clusters. Starting in wave 2, the mean positions of the two parties start to gradually diverge, with the Republicans moving closer to the mean position of cluster 1 and the Democrats moving closer to the mean position of cluster 2.

By wave 7, the average respondent who aligned with the Republican Party has fully converged to the mean position of cluster 1 - the majority cluster that makes up around two-thirds of the US population. The Democrats have moved closer to cluster 2, but continue to be more centrist than the mean position of the second cluster. This is consistent with the vote share of the two parties being close to 50-50, as cluster 2 only makes up only about one-third of the population: if the mean values of supporters of the Democratic Party had moved to those of cluster 2, the Democratic Party would only command a vote share of roughly one-third. Overall, in the US there has been both a notable divergence between voters of the two main political parties on values, and a notable alignment of politics with the positions of the endogenous partitions. This is consistent with rising political polarization, in spite of relatively stable values polarization.

6 Conclusion

In this paper, we proposed a novel methodology to endogenously partition society into groups based on homophily in values, without considering predefined identity traits. These partitions minimize within-group antagonism, and hence maximize between-group antagonism. As such, the difference

¹⁸Of course, it is important to keep in mind that our values-based partitions are *not* the same as political partitions. However, to the extent that values-based partitions are more reflective of political divisions today than in the past, it is not unreasonable to argue that the decline in income differences between values-based clusters is related to the partial reversal of the income gradient in political affiliation.

in values between these endogenous clusters provides a measure of the maximum attainable values polarization in society.

We found that values-based partitions reduce antagonism by an order of magnitude more than partitions based on exogenous identity traits, such as gender or ethnicity. If individuals have a preference for associating with other like-minded people, then using identity traits to determine group membership is costly. This is reminiscent of our past work in Desmet, Ortuño-Ortín and Wacziarg (2017) and Desmet and Wacziarg (2021), showing that identity traits are not very predictive of people's values. The novelty here is that, in spite of high overall heterogeneity in values, there are ways to cluster people into relatively homogeneous groups. This suggests that political parties and other social organizations can create more cohesive coalitions when focusing directly on people's values.

We also found that over the last four decades, values-based polarization in the US has been rather stable. In addition, the two main values dimensions along which people disagree the most have not changed since the early 1980s. The culture war that has come to the forefront in recent years has been latent for a long time. What has changed instead is the difference in values between political parties: values-based polarization between Democrats and Republicans was relatively low and stable until the early 2000s, but has since then tripled in magnitude. During this process, the mean positions of the Democrats and the Republicans have become increasingly aligned with the endogenous values-based clusters that we identified. As such, the realignment of political parties in the US is not due to an increasingly divided and polarized society, but rather to political parties becoming more representative of pre-existing values-based clusters.

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Table 1 – Reduction in Antagonism (r) and Group Size in the Two-Cluster Case, using different numbers of principal components (81 Countries)

Country	ISO2	Source	First Principal Component		First Two Principal Components		First 75 Principal Components	
			r	% Size largest	r	% Size largest	r	% Size largest
Andorra	AD	WVS7	70.21	50.40	42.26	50.30	7.24	50.20
Albania	AL	EVS5	62.75	56.08	33.90	54.07	4.30	66.68
Armenia	AM	EVS5	64.66	58.94	40.69	53.20	4.20	51.41
Argentina	AR	WVS7	62.33	59.48	31.38	86.50	4.86	51.88
Austria	AT	EVS5	64.79	59.02	37.23	55.86	6.93	57.24
Australia	AU	WVS7	69.85	55.73	45.08	59.33	8.34	56.62
Azerbaijan	AZ	EVS5	65.40	56.59	38.02	54.26	4.85	53.66
Bos & Herzeg	BA	EVS5	64.86	51.80	36.38	52.78	4.91	52.74
Bangladesh	BD	WVS7	71.46	67.39	37.44	66.97	5.20	66.97
Bulgaria	BG	EVS5	70.08	50.21	37.57	51.05	4.99	50.66
Bolivia	BO	WVS7	65.28	65.84	37.82	65.59	4.21	65.01
Brazil	BR	WVS7	64.10	59.51	37.39	59.45	4.56	61.65
Belarus	BY	EVS5	63.88	59.77	42.07	57.99	6.06	58.68
Canada	CA	WVS7	67.92	58.21	42.11	55.42	8.39	54.84
Switzerland	CH	EVS5	66.70	59.51	40.23	57.04	7.00	56.90
Chile	CL	WVS7	85.72	85.87	46.64	85.70	8.91	85.70
China	CN	WVS7	66.77	54.39	39.43	54.04	4.37	57.80
Colombia	CO	WVS7	85.64	68.62	57.82	68.62	11.14	68.82
Cyprus	CY	WVS7	69.13	77.39	39.74	77.41	6.27	77.03
Czechia	CZ	EVS5	70.25	71.90	38.30	71.90	5.25	73.21
Germany	DE	WVS7	65.79	55.82	37.56	57.86	6.83	56.67
Denmark	DK	EVS5	64.11	54.38	35.81	54.84	5.52	51.18
Ecuador	EC	WVS7	67.77	75.71	42.37	76.79	5.64	76.04
Estonia	EE	EVS5	65.76	54.82	38.70	58.07	5.96	59.60
Egypt	EG	WVS7	64.37	59.66	35.84	50.42	3.83	53.87
Spain	ES	EVS5	69.92	50.23	50.04	50.11	8.88	50.46
Ethiopia	ET	WVS7	64.34	85.92	34.88	83.47	5.61	95.01

Country	ISO2	Source	First Principal Component		First Two Principal Components		First 75 Principal Components	
			r	% Size largest	r	% Size largest	r	% Size largest
Finland	FI	EVS5	65.36	54.21	37.81	53.66	7.56	55.61
France	FR	EVS5	68.19	60.20	39.67	60.65	7.75	60.49
United Kingdom	GB	EVS5	65.55	52.96	39.82	59.05	7.38	58.90
Georgia	GE	EVS5	68.07	59.11	38.90	60.24	5.23	60.77
Greece	GR	WVS7	66.17	51.72	46.47	51.80	7.64	51.65
Guatemala	GT	WVS7	76.21	73.15	54.72	73.65	11.07	73.91
Hong Kong	HK	WVS7	72.36	82.80	49.32	85.42	9.32	85.93
Croatia	HR	EVS5	67.34	62.74	45.74	62.45	7.49	62.75
Hungary	HU	EVS5	68.14	50.58	42.06	51.82	7.06	53.16
Indonesia	ID	WVS7	71.56	69.07	43.54	68.79	6.12	68.59
Iraq	IQ	WVS7	65.35	58.88	37.53	59.55	5.86	61.47
Iran	IR	WVS7	66.29	68.42	47.11	67.82	7.04	66.36
Iceland	IS	EVS5	68.46	60.94	44.43	61.27	7.80	60.27
Italy	IT	EVS5	66.73	60.13	40.43	61.69	7.19	61.18
Jordan	JO	WVS7	62.06	55.17	33.85	54.08	3.33	56.00
Japan	JP	WVS7	65.89	56.44	35.89	56.44	4.83	56.97
Kyrgyzstan	KG	WVS7	61.78	54.41	38.66	54.47	5.33	54.54
South Korea	KR	WVS7	79.98	69.72	51.39	69.72	8.84	69.48
Kazakhstan	KZ	WVS7	66.56	51.79	36.95	52.60	5.20	53.25
Lebanon	LB	WVS7	69.39	62.17	40.00	58.08	6.24	58.25
Lithuania	LT	EVS5	64.90	51.75	35.65	54.26	5.27	53.23
Montenegro	ME	EVS5	79.71	53.64	50.29	52.72	8.59	55.69
N. Macedonia	MK	EVS5	63.85	55.25	40.55	55.07	7.03	51.87
Myanmar	MM	WVS7	66.03	52.17	35.85	56.58	4.34	54.67
Macao	MO	WVS7	67.25	52.20	43.74	55.34	7.32	55.93
Mexico	MX	WVS7	79.57	83.52	50.84	84.02	8.34	84.87
Malaysia	MY	WVS7	77.42	73.04	46.57	72.89	9.68	73.57
Nigeria	NG	WVS7	63.13	53.89	37.02	63.53	6.05	62.22
Nicaragua	NI	WVS7	75.11	71.25	50.64	74.67	8.95	74.67

Country	ISO2	Source	First Principal Component		First Two Principal Components		First 75 Principal Components	
			r	% Size largest	r	% Size largest	r	% Size largest
Netherlands	NL	EVS5	71.03	65.20	43.76	65.60	8.44	65.05
Norway	NO	EVS5	67.57	55.27	41.42	59.06	6.90	59.15
New Zealand	NZ	WVS7	71.27	64.99	44.17	65.86	7.96	65.66
Peru	PE	WVS7	63.87	54.36	32.13	59.47	3.42	56.11
Philippines	PH	WVS7	71.72	75.11	42.58	74.30	6.08	75.15
Pakistan	PK	WVS7	65.29	75.06	40.91	72.29	7.82	73.70
Poland	PL	EVS5	67.62	61.44	44.27	61.63	7.89	60.14
Puerto Rico	PR	WVS7	64.10	67.53	35.71	68.69	4.86	68.07
Portugal	PT	EVS5	65.71	61.85	40.79	63.06	6.08	63.21
Romania	RO	WVS7	63.29	50.35	37.38	50.73	5.08	52.72
Serbia	RS	WVS7	69.43	82.57	47.68	79.48	8.95	80.28
Russian Fed.	RU	WVS7	65.36	52.99	36.62	53.15	5.09	53.22
Sweden	SE	EVS5	66.22	59.62	38.50	61.95	6.19	64.40
Singapore	SG	WVS7	68.75	56.79	41.61	56.04	6.81	55.49
Slovenia	SI	EVS5	70.35	53.50	44.67	52.80	7.35	52.76
Slovakia	SK	EVS5	72.80	53.09	45.37	53.70	8.15	56.14
Thailand	TH	WVS7	84.74	66.29	69.01	66.62	18.14	66.61
Tajikistan	TJ	WVS7	80.86	78.08	54.78	78.17	11.52	77.83
Tunisia	TN	WVS7	60.29	77.03	35.56	74.27	6.50	79.78
Türkiye	TR	WVS7	71.77	57.06	45.35	57.27	8.11	57.60
Taiwan	TW	WVS7	65.35	54.38	36.62	51.08	6.15	51.48
Ukraine	UA	WVS7	65.66	86.26	34.92	55.37	4.96	88.81
USA	US	WVS7	69.10	69.24	41.10	67.50	8.32	67.81
Viet Nam	VN	WVS7	69.49	51.08	39.92	63.67	5.61	66.92
Zimbabwe	ZW	WVS7	63.56	54.24	35.14	77.70	5.81	54.40
Average			68.49	61.83	41.51	62.36	6.79	62.58
Standard Dev.			5.42	9.92	6.24	9.81	2.18	10.29
Min			60.29	50.21	31.38	50.11	3.33	50.20
Max			85.72	86.26	69.01	86.50	18.14	95.01

Table 2 - Reduction in Antagonism (r) for Different Numbers of Clusters, using the first two principal components baseline

Country	ISO2	Two Clusters	Three Clusters	Four Clusters	Five Clusters	2-to5 spread
Andorra	AD	42.26	62.48	70.22	76.66	34.40
Albania	AL	33.91	53.38	63.29	70.12	36.21
Armenia	AM	40.69	60.06	73.30	78.27	37.58
Argentina	AR	34.86	61.19	71.90	77.93	43.07
Austria	AT	37.23	59.19	68.68	73.66	36.43
Australia	AU	45.08	63.75	71.47	76.66	31.58
Azerbaijan	AZ	38.02	59.70	70.24	76.32	38.30
Bosnia & Herzegovina	BA	36.38	59.64	69.15	75.52	39.14
Bangladesh	BD	37.44	59.82	70.74	75.61	38.17
Bulgaria	BG	37.57	60.02	67.85	73.77	36.20
Bolivia	BO	37.82	58.36	67.06	72.91	35.09
Brazil	BR	37.39	56.10	66.18	72.41	35.02
Belarus	BY	42.07	57.80	67.94	73.76	31.69
Canada	CA	42.11	63.78	71.88	77.66	35.55
Switzerland	CH	40.23	59.83	69.32	74.81	34.58
Chile	CL	46.64	75.39	82.07	85.49	38.85
China	CN	39.43	55.57	65.53	71.53	32.10
Colombia	CO	57.82	74.02	78.92	83.36	25.53
Cyprus	CY	39.74	64.35	71.57	76.82	37.08
Czechia	CZ	38.30	61.36	68.84	74.10	35.80
Germany	DE	36.96	60.53	70.08	74.76	37.79
Denmark	DK	35.81	57.19	66.45	73.01	37.20
Ecuador	EC	42.37	63.27	70.47	76.17	33.80
Estonia	EE	38.70	61.87	69.20	75.15	36.44
Egypt	EG	35.84	57.23	66.47	73.74	37.90
Spain	ES	50.04	64.98	72.25	76.84	26.80
Ethiopia	ET	34.88	62.10	70.16	76.93	42.05

Country	ISO2	Two Clusters	Three Clusters	Four Clusters	Five Clusters	2-to5 spread
Finland	FI	37.81	59.59	68.06	74.00	36.19
France	FR	39.67	63.43	70.64	77.22	37.55
United Kingdom	GB	39.82	63.84	71.02	76.62	36.80
Georgia	GE	38.90	57.56	69.75	74.81	35.91
Greece	GR	46.47	61.33	69.99	75.58	29.11
Guatemala	GT	54.72	73.71	80.74	84.86	30.14
Hong Kong	HK	49.32	74.45	79.88	83.68	34.36
Croatia	HR	45.74	59.12	68.44	74.92	29.18
Hungary	HU	42.06	61.98	70.64	75.91	33.85
Indonesia	ID	43.54	63.98	71.73	77.06	33.51
Iraq	IQ	37.54	60.15	68.43	74.43	36.90
Iran	IR	47.11	63.45	71.93	77.39	30.29
Iceland	IS	44.43	61.04	71.66	76.08	31.64
Italy	IT	40.43	57.72	67.49	72.78	32.35
Jordan	JO	33.85	53.94	64.04	70.94	37.09
Japan	JP	35.93	56.43	66.56	71.93	36.00
Kyrgyzstan	KG	38.66	58.19	67.20	73.02	34.35
South Korea	KR	51.39	68.01	74.78	79.29	27.90
Kazakhstan	KZ	36.95	58.23	66.77	73.34	36.39
Lebanon	LB	40.00	60.05	72.46	78.09	38.10
Lithuania	LT	35.65	59.05	66.58	72.38	36.73
Montenegro	ME	50.29	70.78	77.87	82.03	31.75
North Macedonia	MK	40.55	56.97	67.07	73.41	32.86
Myanmar	MM	35.85	56.53	66.17	72.26	36.40
Macao	MO	43.74	68.15	76.38	81.38	37.64
Mexico	MX	50.84	70.47	75.78	80.31	29.47
Malaysia	MY	46.57	69.91	75.16	80.05	33.48
Nigeria	NG	37.02	59.29	69.17	74.61	37.59
Nicaragua	NI	50.64	70.28	76.74	81.83	31.19
Netherlands	NL	43.76	65.41	72.21	77.34	33.58

Country	ISO2	Two Clusters	Three Clusters	Four Clusters	Five Clusters	2-to5 spread
Norway	NO	41.42	61.42	71.73	76.60	35.18
New Zealand	NZ	44.17	63.68	71.51	76.50	32.32
Peru	PE	33.81	56.40	65.54	70.97	37.15
Philippines	PH	42.58	64.43	71.63	77.60	35.02
Pakistan	PK	40.91	62.53	72.12	77.73	36.83
Poland	PL	44.27	58.47	68.83	75.04	30.77
Puerto Rico	PR	35.71	59.41	68.66	74.49	38.78
Portugal	PT	40.79	60.42	68.96	75.13	34.35
Romania	RO	38.39	57.55	68.03	73.54	35.16
Serbia	RS	39.70	56.69	66.18	73.27	33.57
Russian Federation	RU	45.73	59.38	68.34	73.39	27.66
Sweden	SE	38.50	59.21	69.12	74.99	36.48
Singapore	SG	41.61	58.84	69.10	74.83	33.22
Slovenia	SI	44.67	61.48	70.44	75.47	30.80
Slovakia	SK	45.37	61.48	71.70	76.94	31.58
Thailand	TH	69.01	76.86	82.21	85.49	16.47
Tajikistan	TJ	54.78	73.18	78.76	83.33	28.55
Tunisia	TN	35.57	62.64	73.89	78.93	43.36
Türkiye	TR	45.35	59.90	69.80	75.46	30.11
Taiwan	TW	36.62	64.08	71.40	77.05	40.43
Ukraine	UA	42.80	63.55	71.93	77.16	34.36
USA	US	41.10	61.80	70.44	75.21	34.11
Viet Nam	VN	40.48	68.65	78.40	82.40	41.92
Zimbabwe	ZW	35.57	64.36	71.65	77.46	41.90
Average		41.70	62.13	70.83	76.30	34.60
Standard Dev.		6.05	5.10	4.02	3.41	4.23
Min		33.81	53.38	63.29	70.12	16.47
Max		69.01	76.86	82.21	85.49	43.36

Table 3 - Differences in Identity Traits between Two Clusters (based on first 2 PCs)

Panel A - Summary Statistics (81 countries, WVS Wave 7 and EVS Wave 5)

	Men (Percent)	Age (Years)	Income (1-10)	Education (Years)	Ideology (1-10)	No Religion (Percent)	Social Class (% in lowest two classes)
Average	7.693	4.985	0.376	0.488	0.649	20.740	4.870
Standard Deviation	5.769	3.788	0.295	0.500	0.567	21.814	6.266
Minimum	0.370	0.144	0.000	0.000	0.000	0.000	0.000
Maximum	22.539	15.806	1.451	2.383	2.136	77.201	26.296

Panel B - Six Selected Country Examples (WVS Wave 7)

	Men (Percent)	Age (Years)	Income (1-10)	Education (Years)	Ideology (1-10)	No Religion (Percent)	Social Class (% in lowest two classes)
Brazil	6.561	8.388	0.589	0.153	0.455	26.452	1.009
China	5.648	7.354	0.405	0.251	-	5.454	0.478
Germany	7.668	3.470	0.214	0.131	0.645	46.563	6.220
Ethiopia	8.411	1.657	0.005	0.667	0.328	0.990	3.424
South Korea	22.373	6.398	0.064	0.135	0.598	74.700	1.844
Nigeria	8.032	1.034	0.108	0.178	0.104	0.271	2.824
USA	14.609	2.027	0.111	1.137	2.136	28.314	9.977

Table 4 - Differences in Cultural Values between Two Clusters (based on first 2 PCs)

Panel A - Summary Statistics (up to 81 countries, WVS Wave 7 and EVS Wave 5)

	Important in life: Religion A006	How often do you attend religious services F028	Most people can be trusted A165	Justifiable: Homo- sexuality F118	Justifiable: Abortion F120	Hard work brings success E040	Confidence in government E069_11	Willingness to fight for country E012	Priority to nationals over immigrants for jobs C002	Election officials are fair E265_06
Obs.	81	81	81	78	81	51	80	80	81	78
Average	0.204	0.205	0.088	0.173	0.169	0.065	0.117	0.097	0.085	0.082
St Dev	0.168	0.147	0.078	0.129	0.121	0.049	0.100	0.084	0.075	0.075
Min	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.001	0.000
Max	0.552	0.623	0.346	0.495	0.393	0.230	0.485	0.452	0.342	0.386

Panel B - Selected Examples (WVS Wave 7)

	Important in life: Religion A006	How often do you attend religious services F028	Most people can be trusted A165	Justifiable: Homo- sexuality F118	Justifiable: Abortion F120	Hard work brings success E040	Confidence in government E069_11	Willingness to fight for country E012	Priority to nationals over immigrants for jobs C002	Election officials are fair E265_06
Brazil	0.224	0.320	0.030	0.207	0.206	0.075	0.079	0.122	0.159	0.106
China	0.057	0.019	0.226	0.165	0.138	0.022	0.052	0.010	0.086	-
Germany	0.456	0.362	0.018	0.236	0.316	0.055	0.102	0.083	0.013	0.018
Ethiopia	0.039	0.020	0.050	0.286	0.274	0.129	0.092	0.027	0.070	0.092
South Korea	0.325	0.623	0.078	0.029	0.062	0.033	0.069	0.045	0.005	0.050
Nigeria	0.021	0.061	0.083	0.063	0.063	0.036	0.123	0.024	0.001	0.005
USA	0.520	0.371	0.181	0.436	0.391	0.111	0.237	0.179	0.117	0.090

Table 5 – Values-Based Polarization and Opportunity Cost of Identity-Based Partitions

Panel A - Summary Statistics (81 countries, WVS Wave 7 and EVS Wave 5)

	Values-Based Polarization across Identity Groups					Opportunity Cost of Identity Partitions				
	Politics	Religion	Income	Ethnicity	Gender	Politics	Religion	Income	Ethnicity	Gender
Average	9.03	13.36	4.39	3.36	1.26	57.53	50.53	65.86	67.88	71.44
Standard deviation	6.56	10.47	3.16	4.74	1.10	20.84	30.30	22.46	25.81	24.11
Min	0.00	0.01	0.00	0.00	0.02	22.05	7.60	43.41	23.02	48.98
Max	30.90	41.74	19.85	22.52	4.66	122.99	219.49	193.49	221.02	219.36

Panel B - Selected Examples (WVS Wave 7)

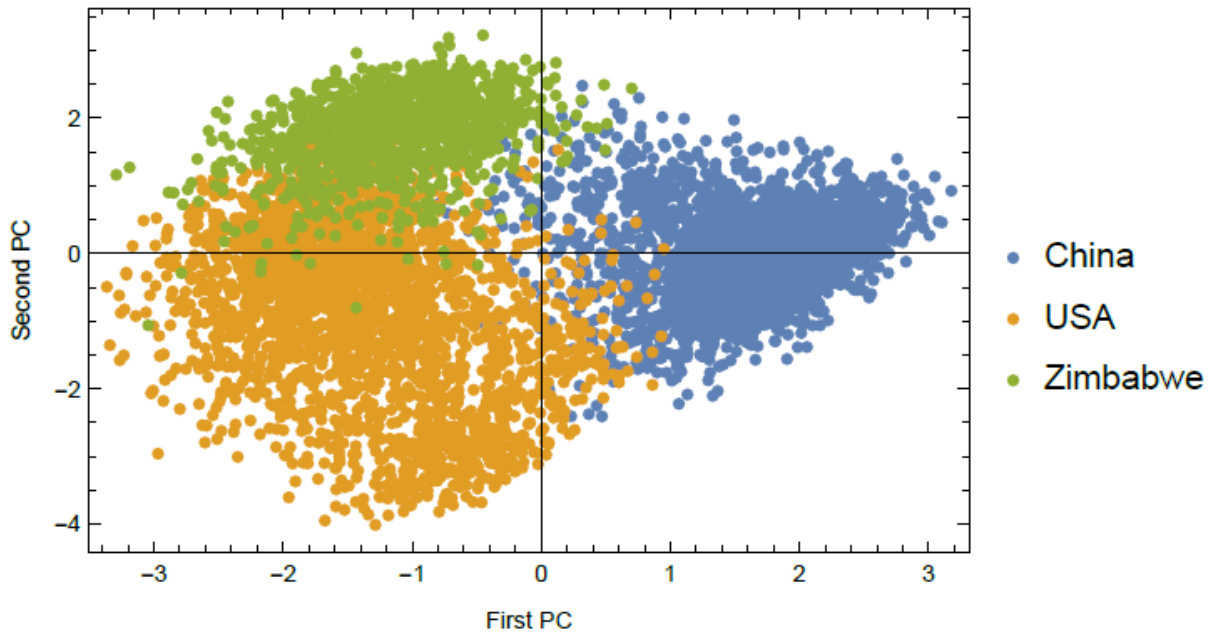
	Values-Based Polarization across Identity Groups					Opportunity Cost of Identity Partitions				
	Politics	Religion	Income	Ethnicity	Gender	Politics	Religion	Income	Ethnicity	Gender
Brazil	1.40	14.81	3.62	2.51	0.56	57.48	36.06	53.93	55.71	58.82
China	0.00	3.85	2.72	0.00	0.48	65.11	58.75	60.62	65.11	64.31
Germany	13.63	25.20	5.65	0.00	0.39	38.35	19.82	51.13	60.18	59.55
Ethiopia	12.21	8.08	2.72	18.43	0.87	34.82	41.16	49.39	25.26	52.23
South Korea	2.43	41.74	1.63	0.04	3.23	100.71	19.85	102.37	105.63	99.07
Nigeria	11.03	17.99	2.71	22.52	1.90	41.26	30.21	54.48	23.02	55.77
USA	14.66	13.40	4.79	1.54	1.07	44.89	47.04	61.64	67.16	67.96

Table 6 – The Time Evolution of Values Polarization across Identity Groups

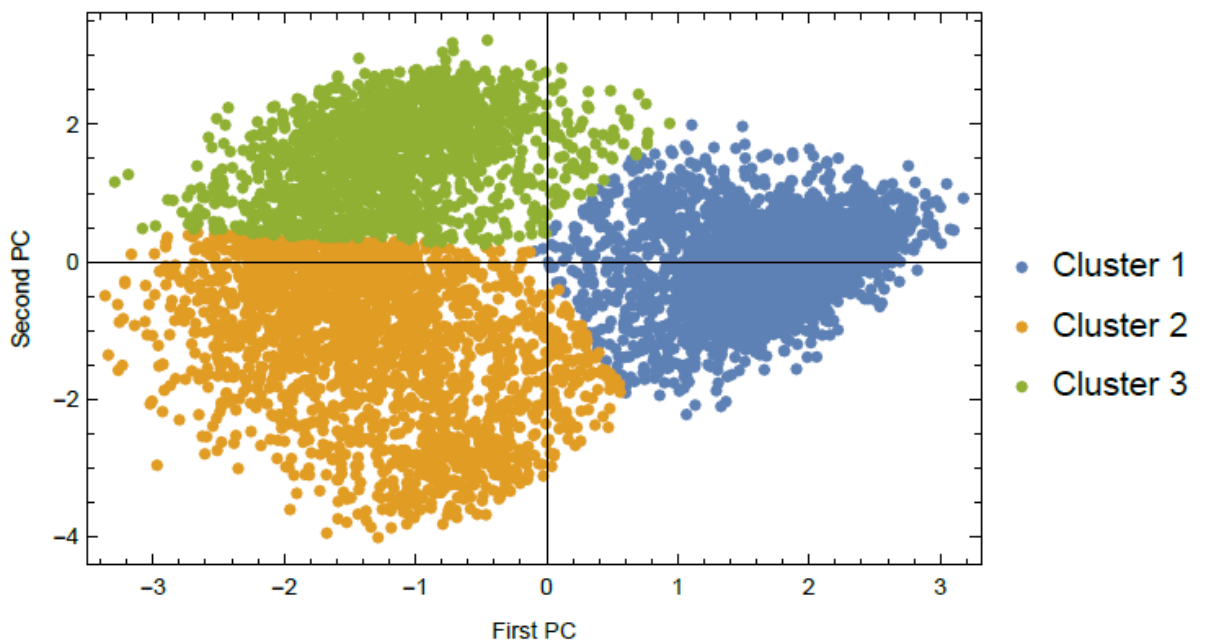
Country	Politics		Religion		Income		Ethnicity		Gender	
	Rising	Falling	Rising	Falling	Rising	Falling	Rising	Falling	Rising	Falling
Albania										1
Argentina							1			1
Austria			1			1				
Australia	1		1				1			1
Bosnia & Herz.				1						
Belgium										1
Canada	1									
Chile	1		1				1			1
China			1							
Colombia						1				
Cyprus					1					
Germany					1					
Denmark			1			1				
Estonia					1					
Egypt										1
Spain	1		1							1
Finland	1									
United Kingdom	1		1							1
Iceland						1				
Italy		1								1
Jordan						1				
South Korea	1		1						1	
Lithuania										
Latvia	1				1					
Moldova							1			1
Montenegro										
Malta			1				1			
Mexico										1
Nigeria	1						1		1	
Netherlands										1
Norway			1							
New Zealand			1							
Poland	1		1							
Romania										1
Russian Fed.	1									1
Sweden	1		1							
Slovenia										1
Slovakia		1								
Turkey						1				1
United States	1									
South Africa										1
Share Countries	20.63%	3.17%	20.63%	1.59%	6.35%	9.52%	9.52%	0.00%	3.17%	26.98%

Figure 1 – Validation: Recovering Countries from Pooled Data from China, the US and Zimbabwe

Panel A – Individuals from the Three Countries along the First and Second PCs



Panel B – Individuals from the Three Endogenous Partitions along the First and Second PC



Percentages of respondents from each country that belong to each cluster:

□	China	USA	Zimbabwe
Cluster 1	96.5	2.2	0
Cluster 2	1	79.5	1.7
Cluster 3	2.4	18.2	98.2

Figure 2 – Validation: Detecting East and West Germany, WVS Wave 3

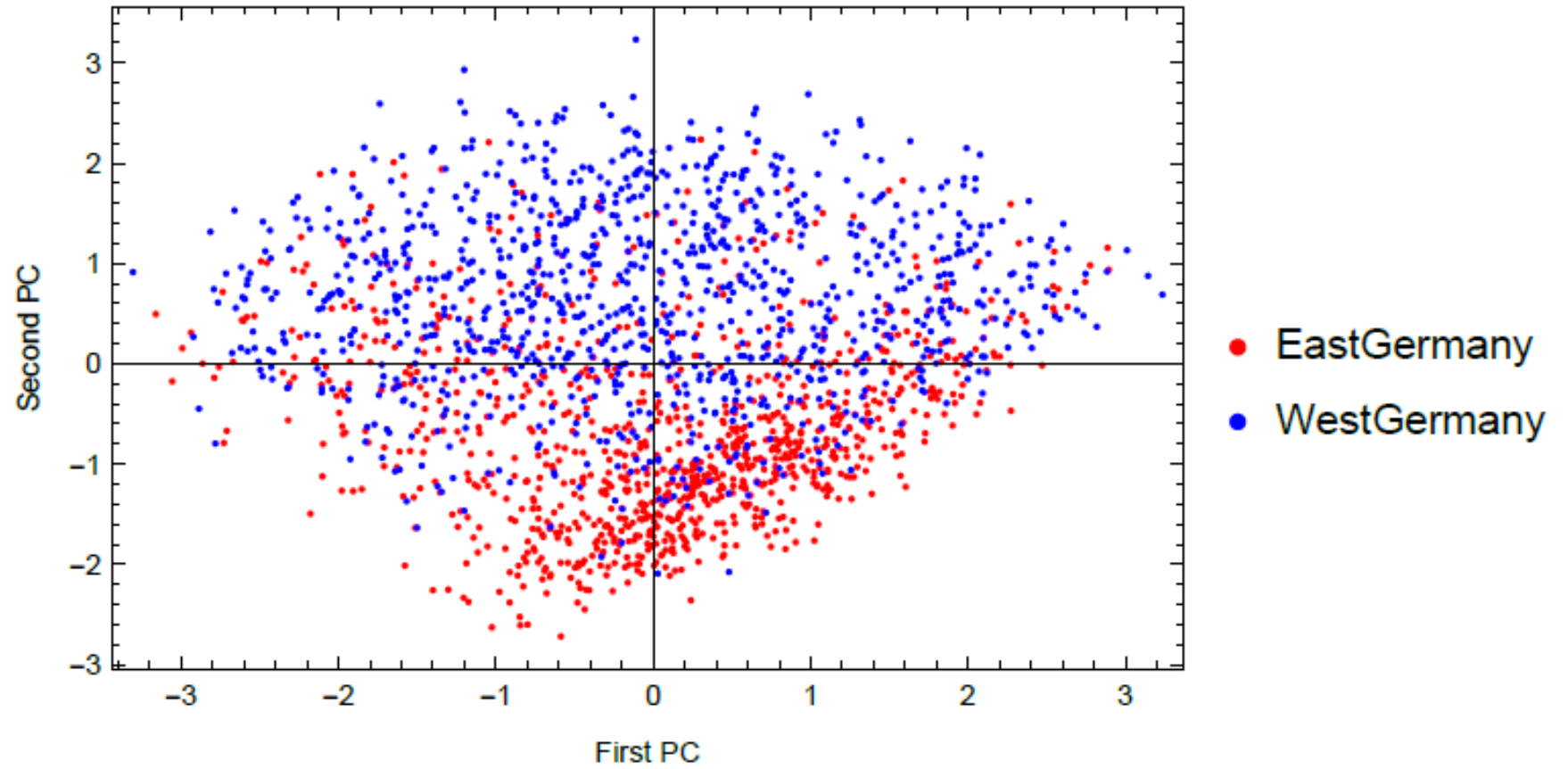
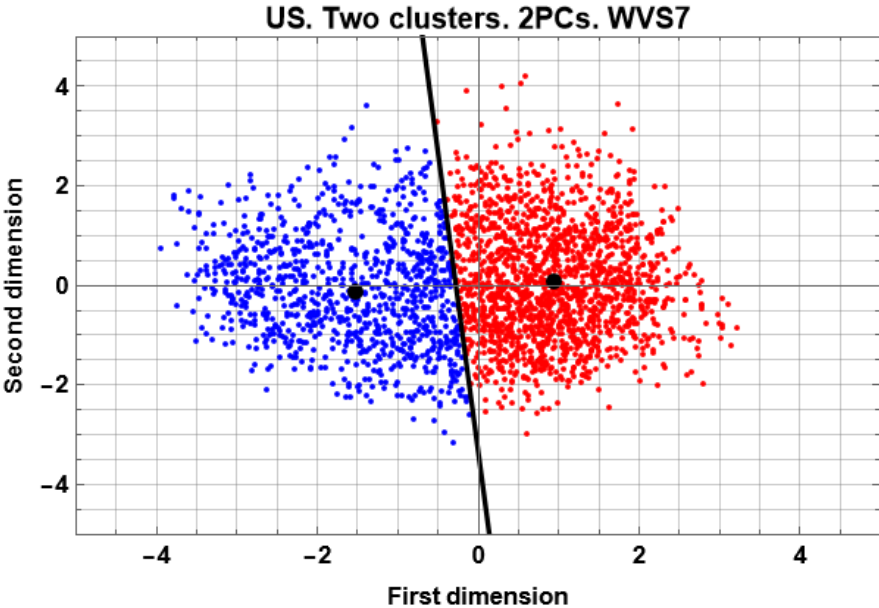
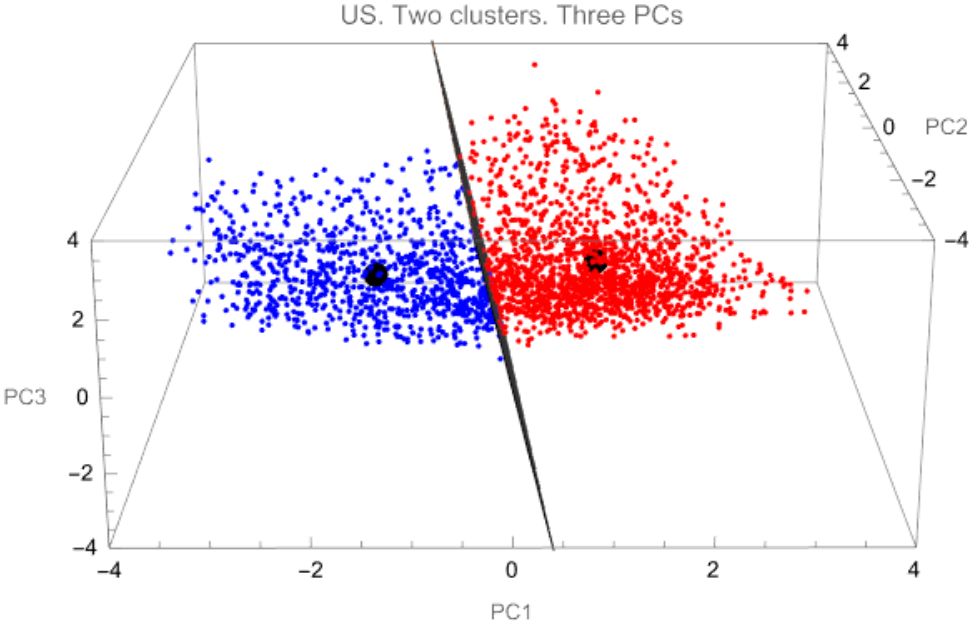


Figure 3 – Endogenous Partitions for a Selection of 7 Countries: The Case of 2 Clusters

Panel A – USA, 2 and 3 Principal Components



Out[]=



Panel B – Selection of Other Countries (Wave 7)

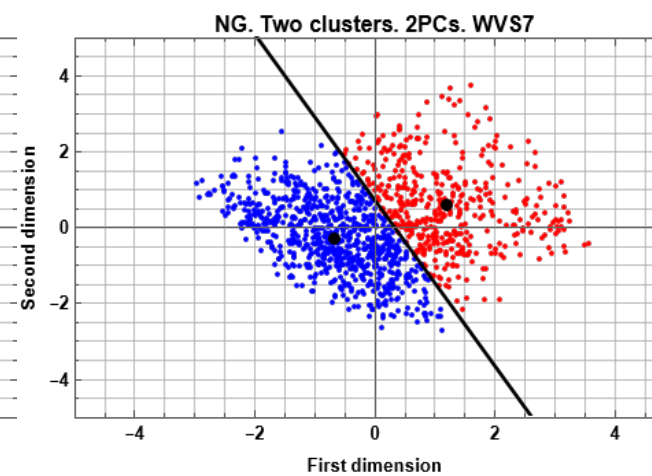
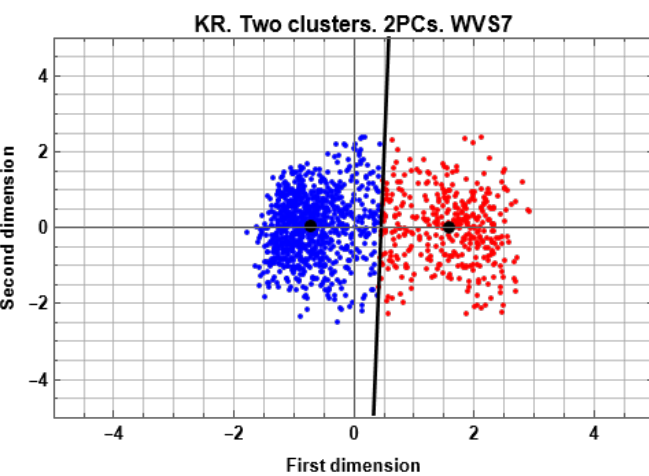
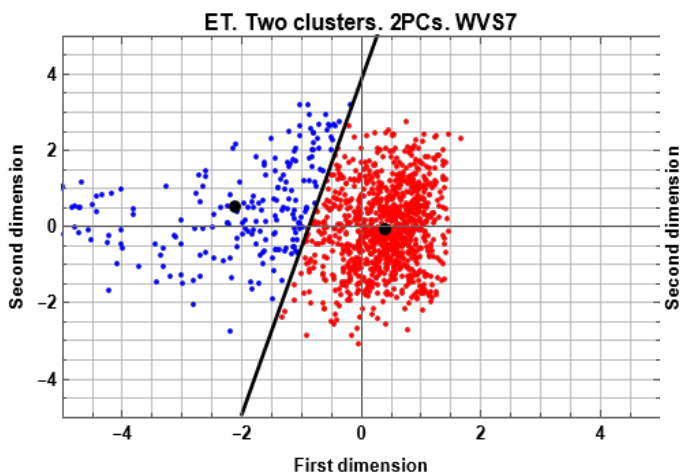
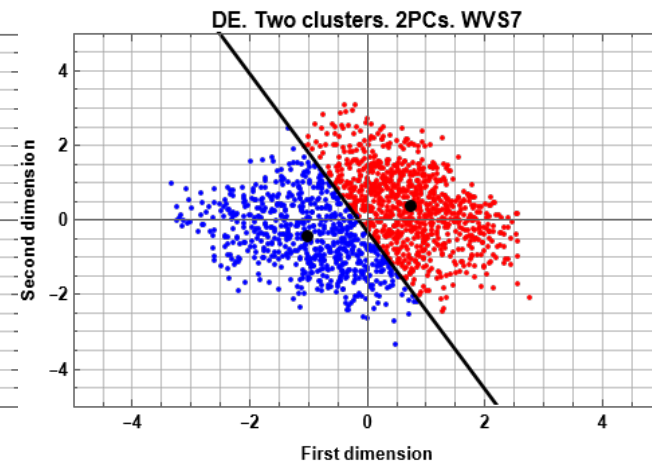
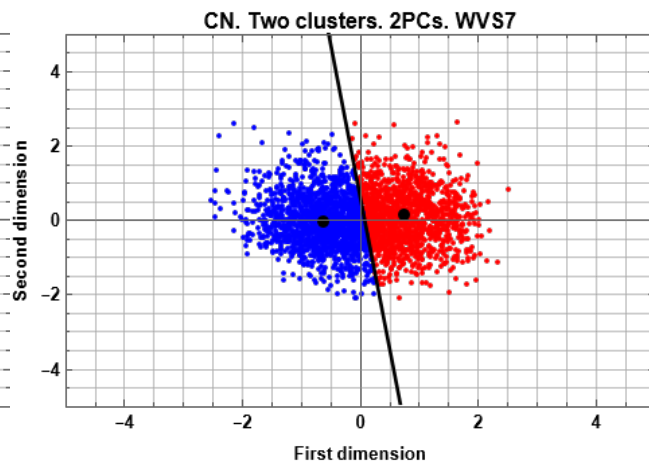
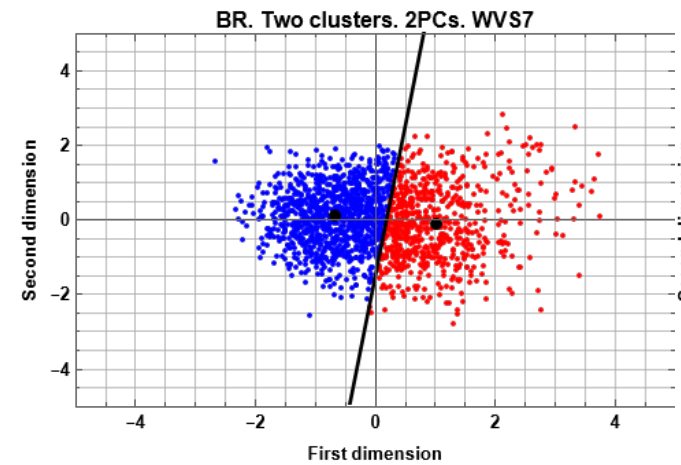
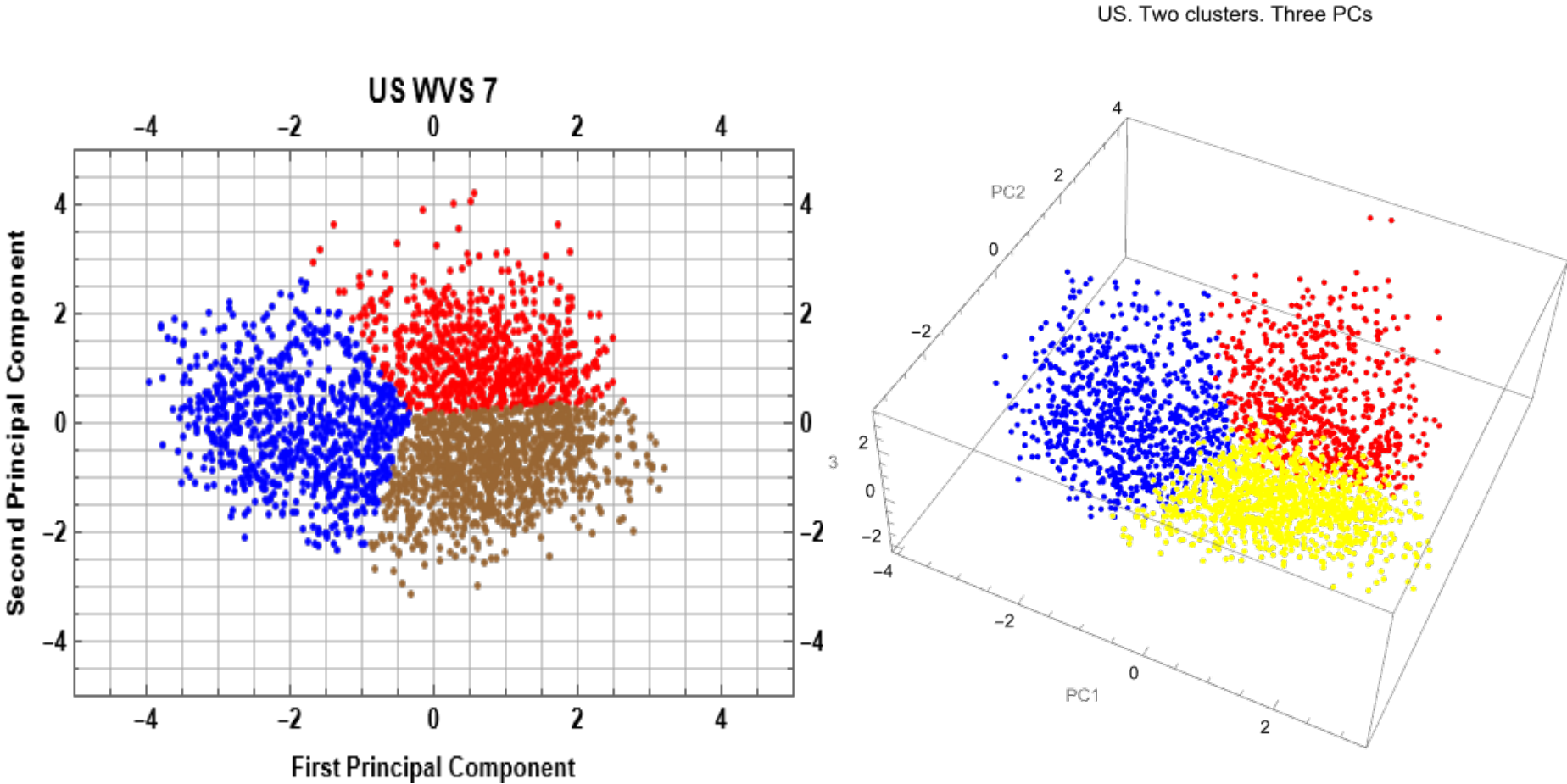


Figure 4 – Endogenous Partitions for a Selection of 7 Countries: The Case of 3 Clusters

Panel A – USA, 2 and 3 Principal Components



Panel B – Selection of Other Countries (2 PCs)

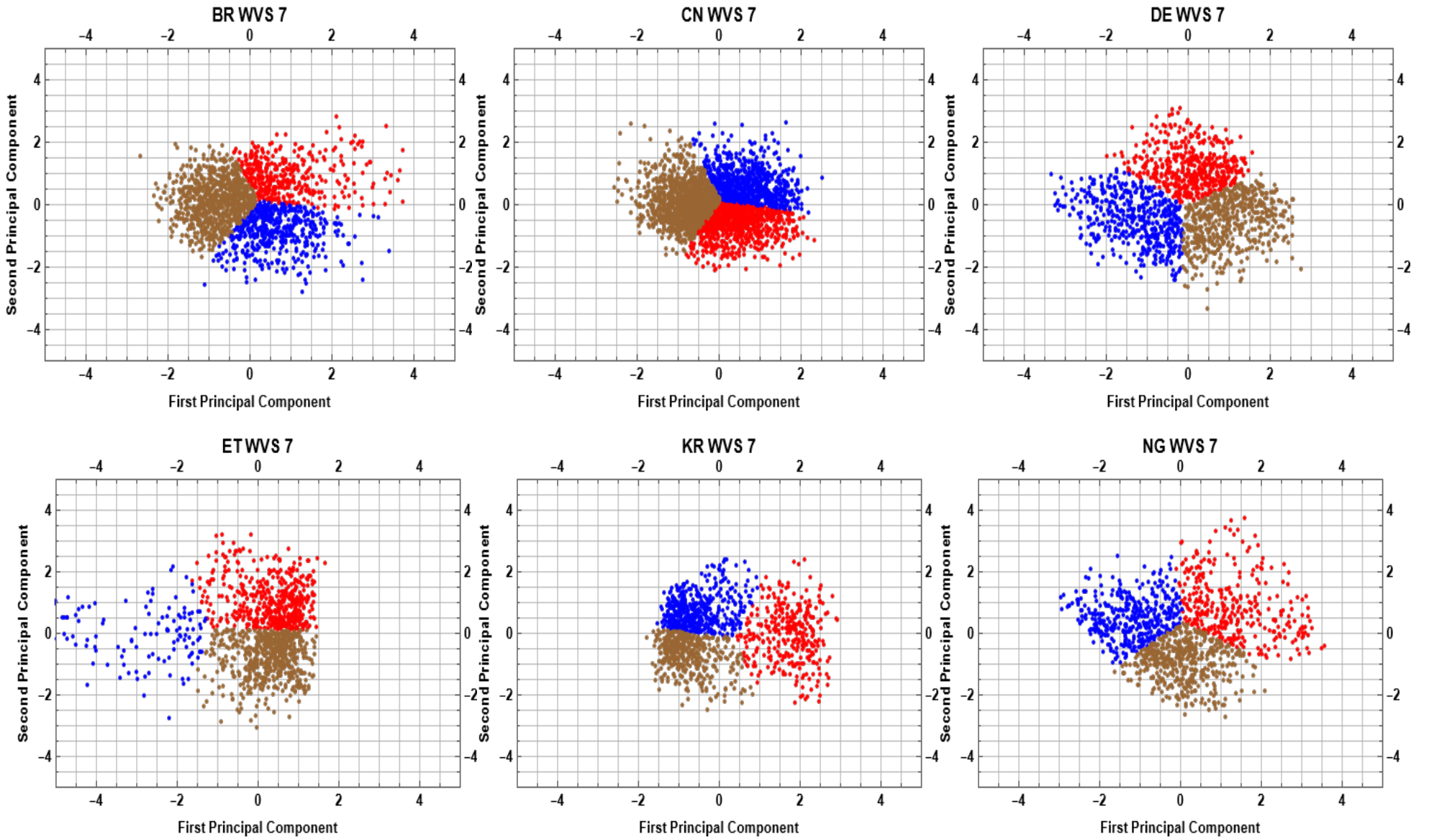
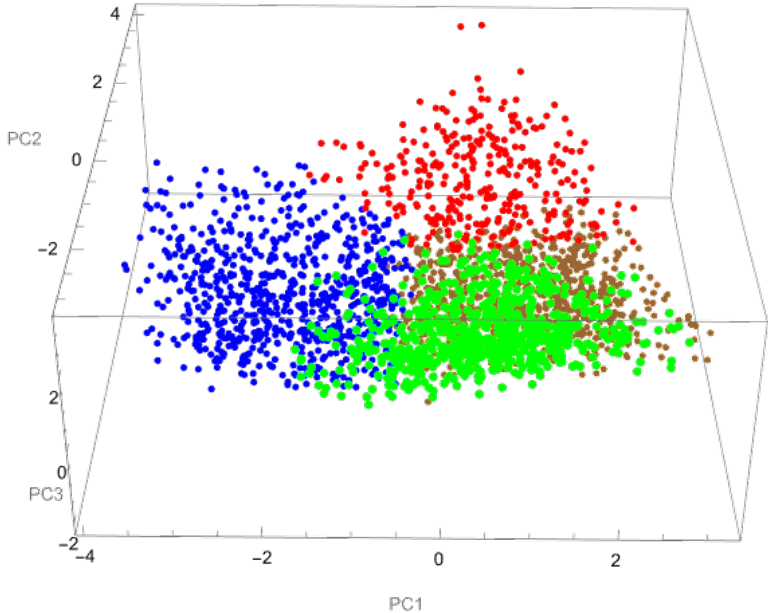
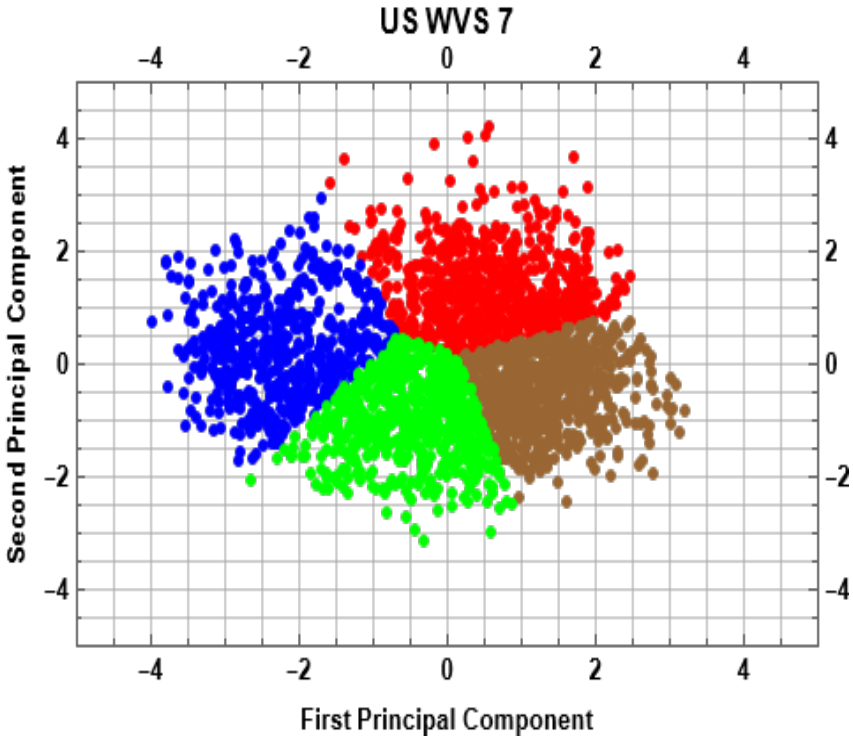


Figure 5 – Endogenous Partitions for a Selection of 7 Countries: The Case of 4 Clusters
Panel A – USA - Two and Three Principal Components

US. Four clusters. Three PCs



Panel B – Selection of Other Countries (2 PCs)

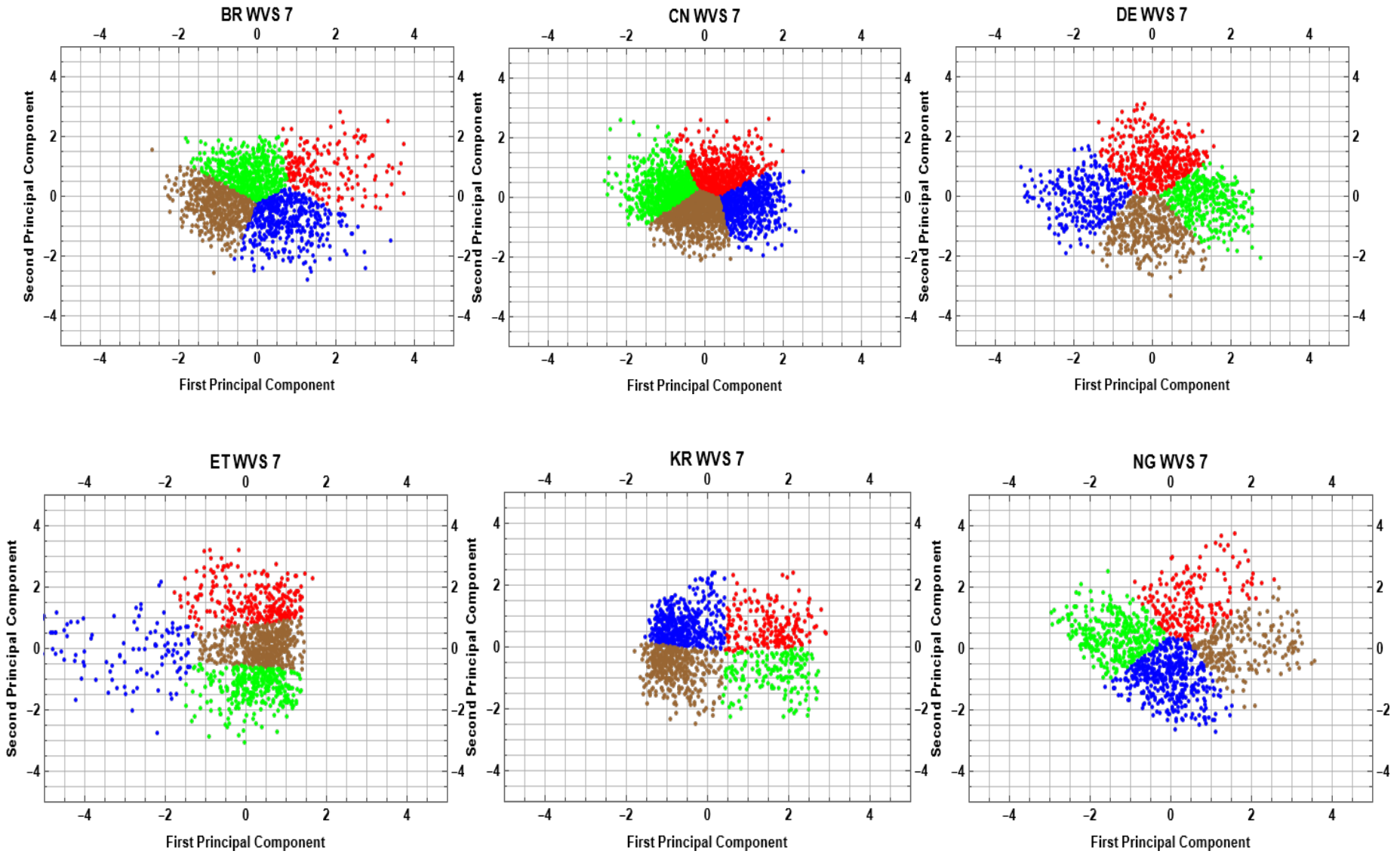
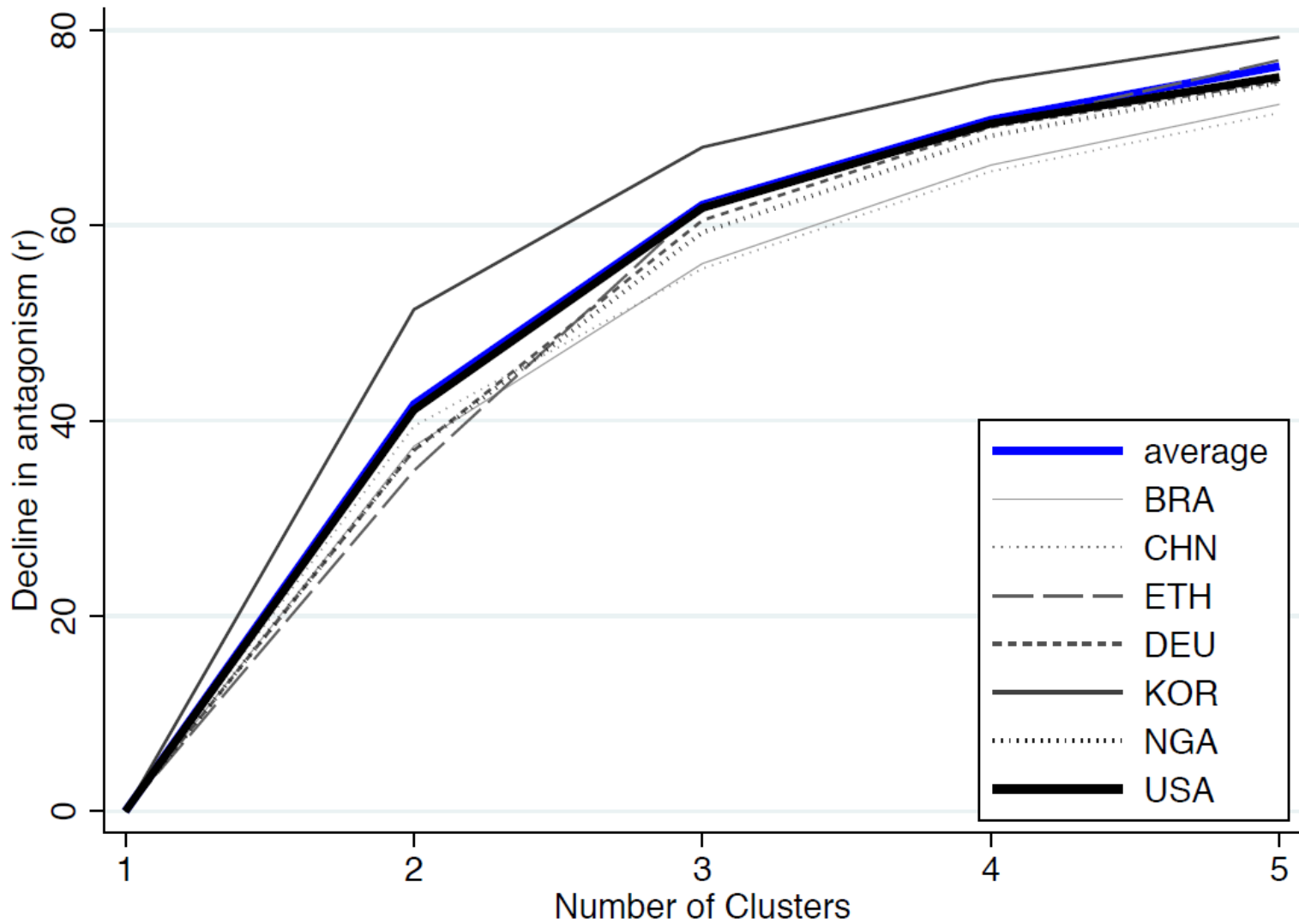


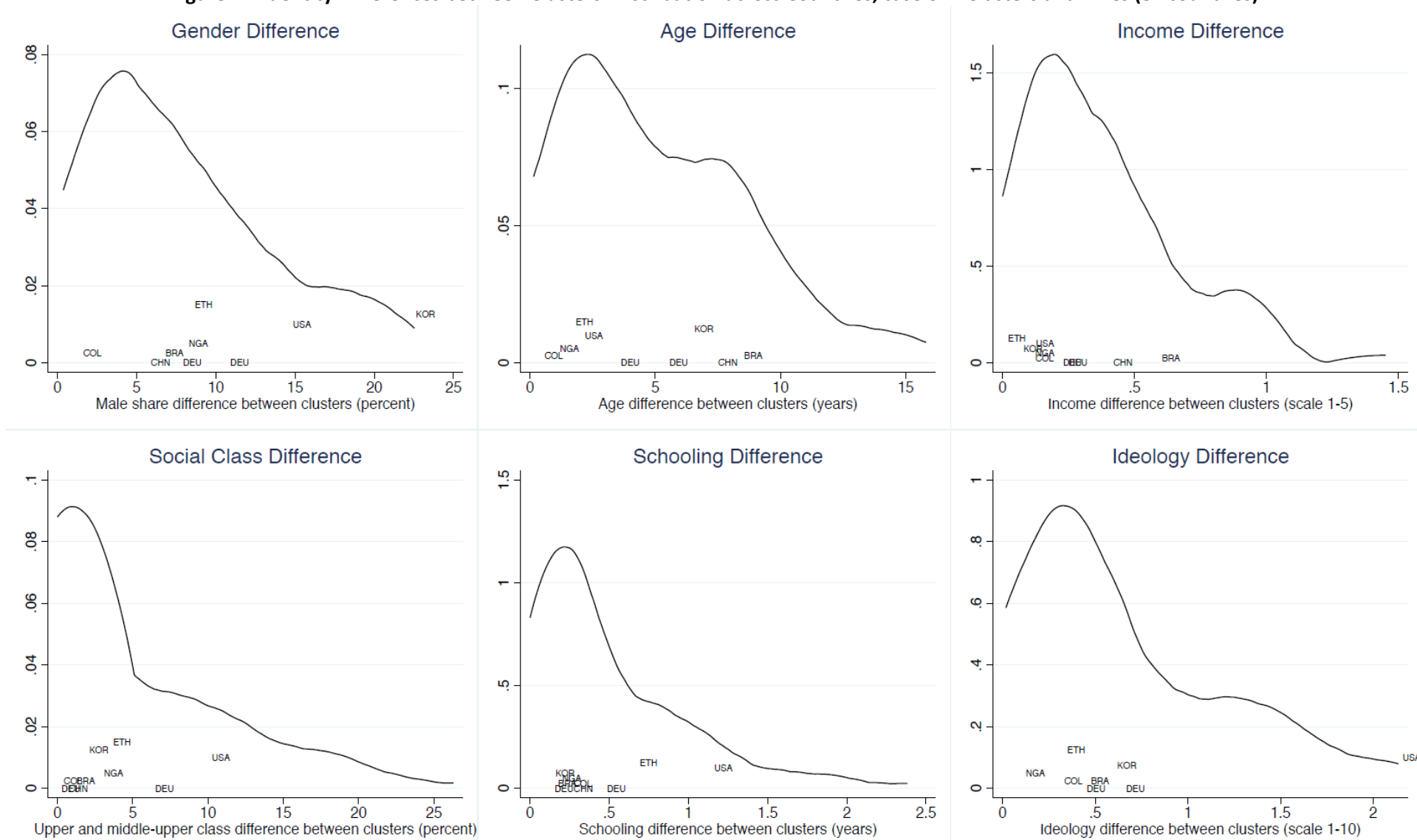
Figure 6 – Reduction in Within-Group Antagonism (r),
for various numbers of clusters and for 7 illustrative countries



Note:

- Clusters are based on 2 principal components
- Average refers to the average reduction in within-cluster antagonism over the 81 countries in sample.

Figure 7 – Identity Differences between Clusters: Distribution across Countries, case of 2 Clusters and 2 PCs (81 countries)



Note: Country labels are for illustrative purposes and refer to their values along the x-axis

Figure 8 – Values Differences between Clusters: Distribution across Countries, case of 2 Clusters and 2 PCs (81 countries)

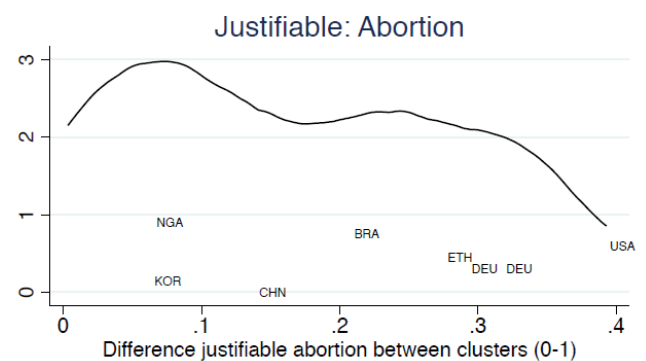
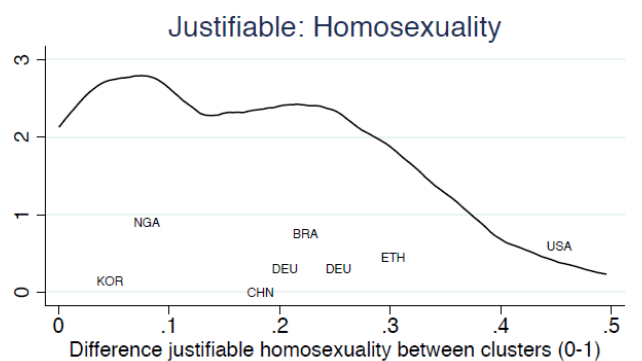
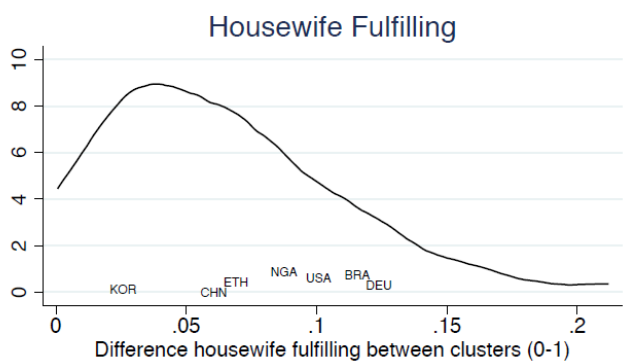
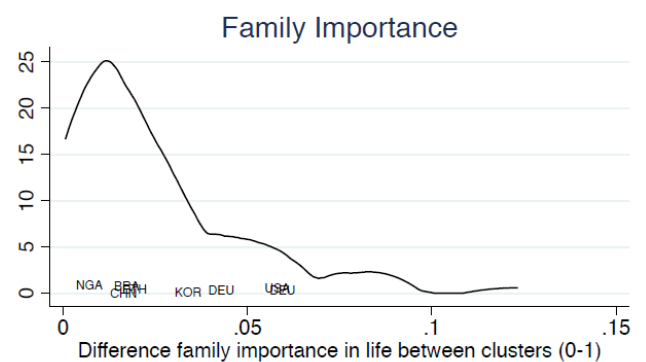
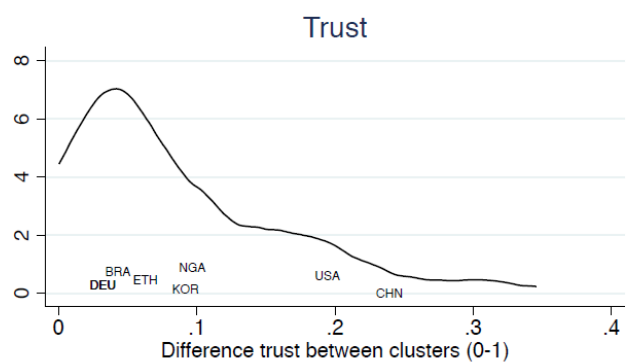
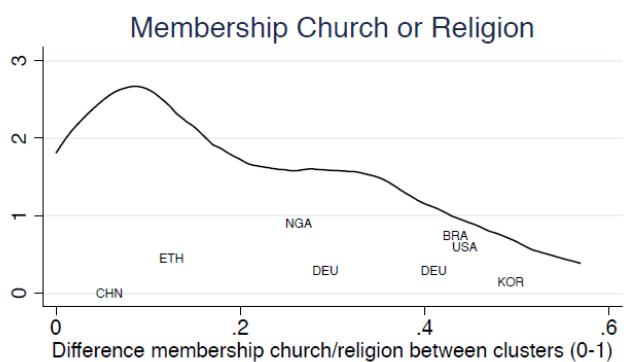
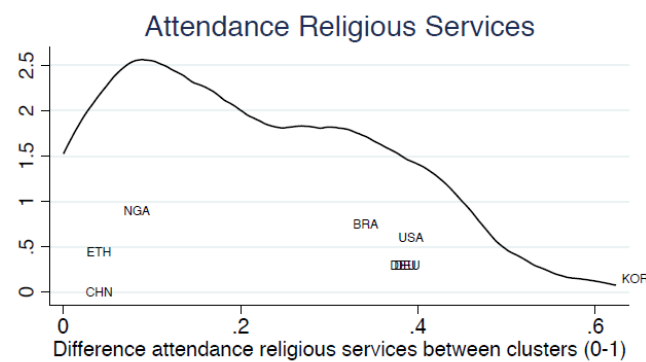
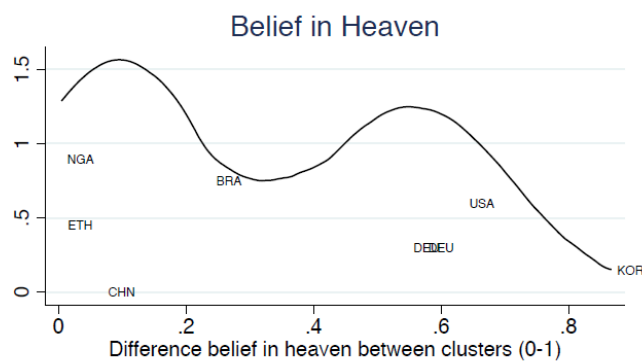
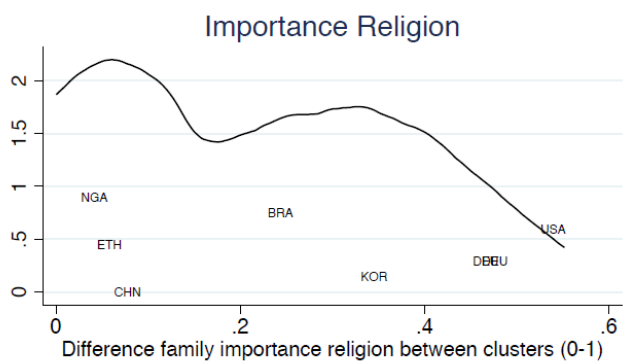


Figure 8 (contd.)

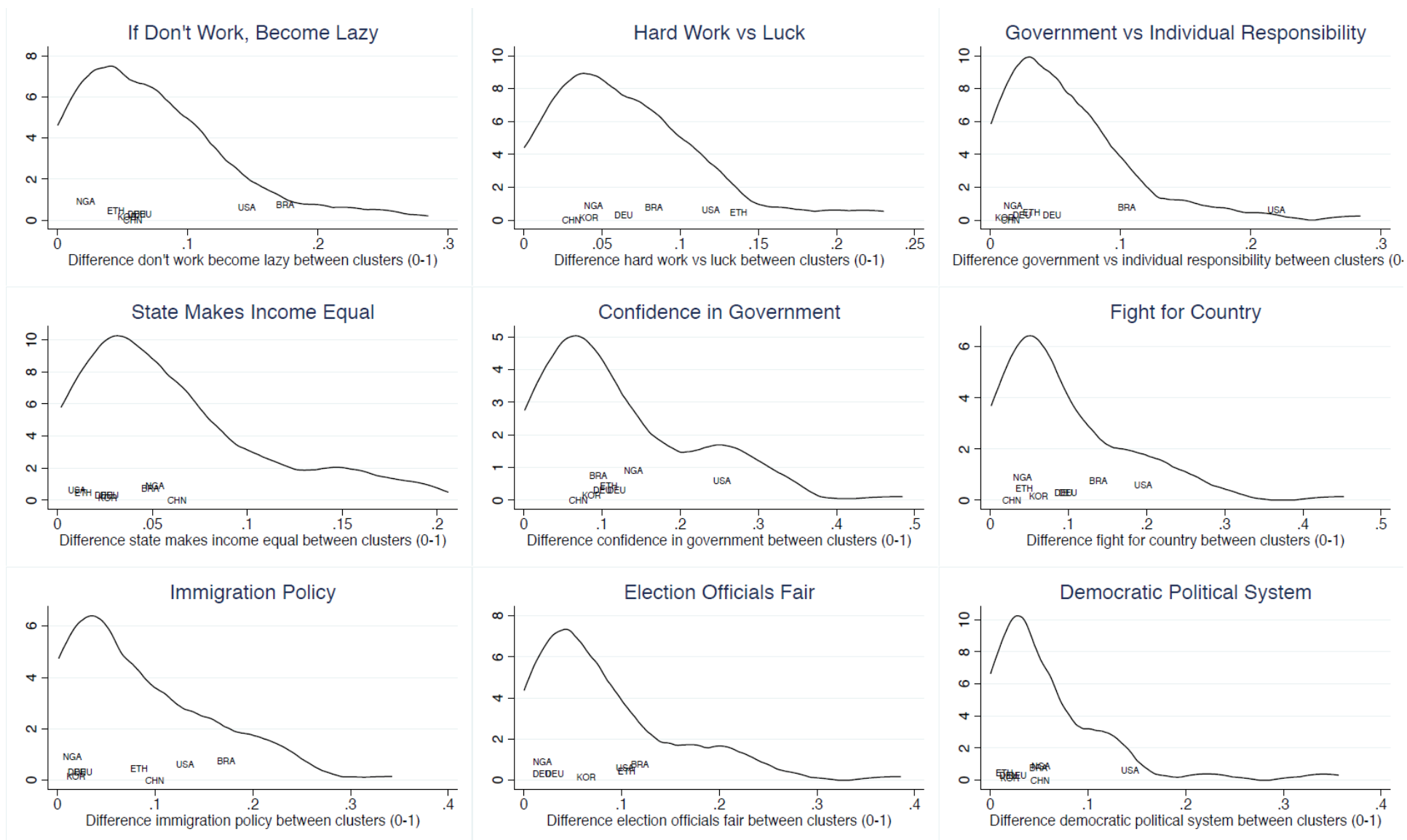


Figure 9 – The Evolution of Values Polarization (r) between Two Values-Based Clusters, different WVS waves in 6 illustrative countries

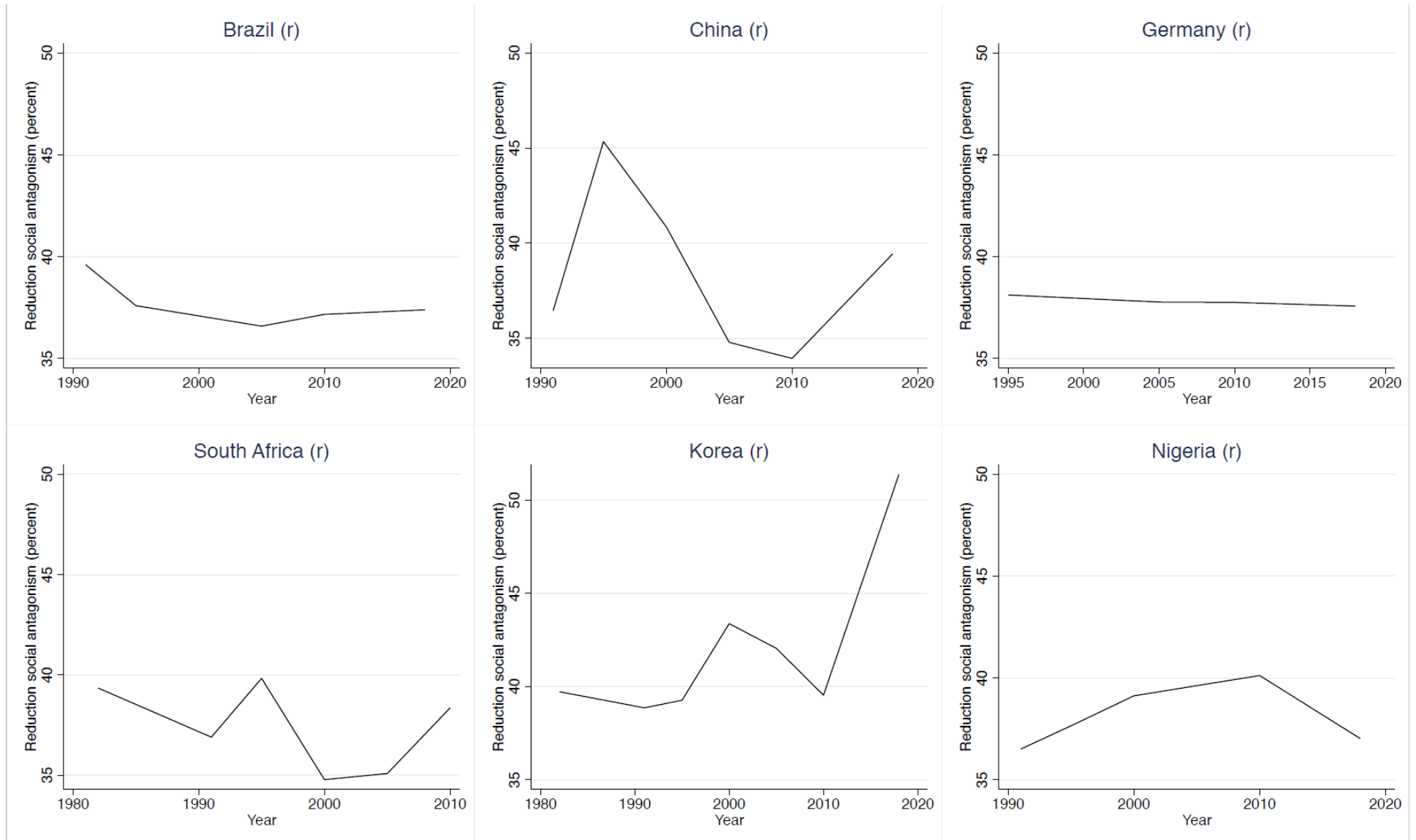


Figure 10 – The Evolution of Values Polarization (r) across WVS Waves in the United States

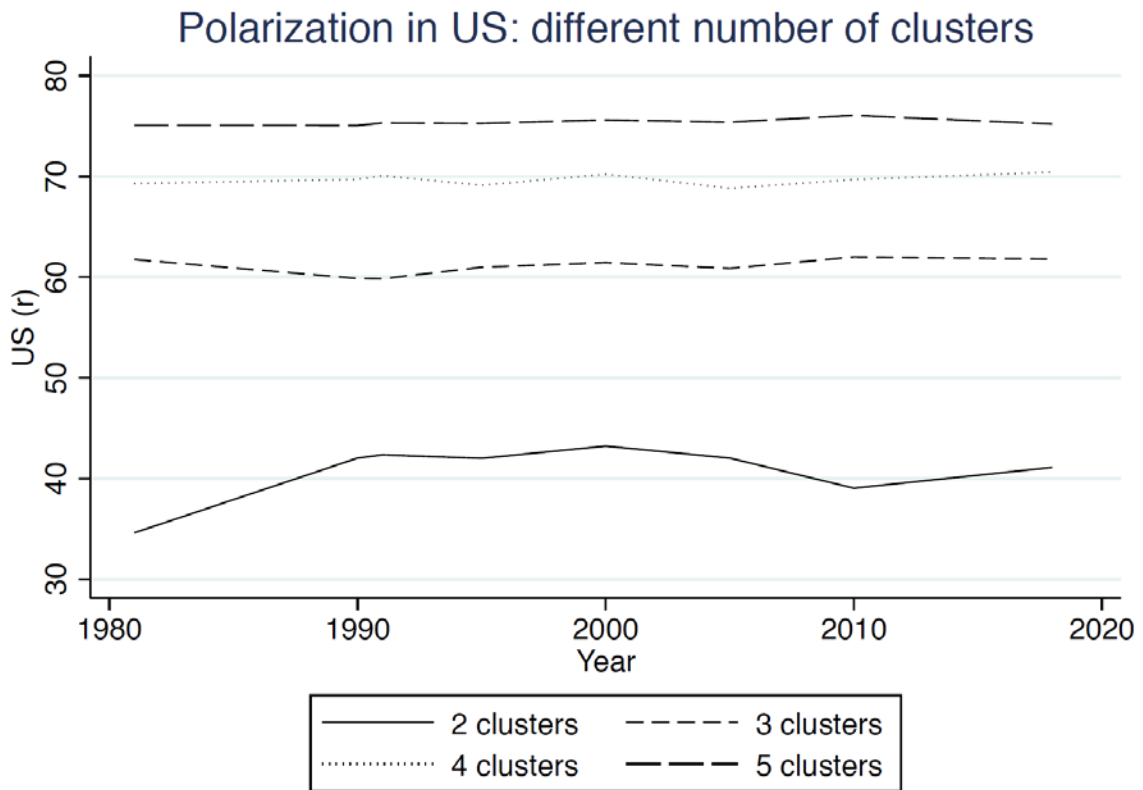
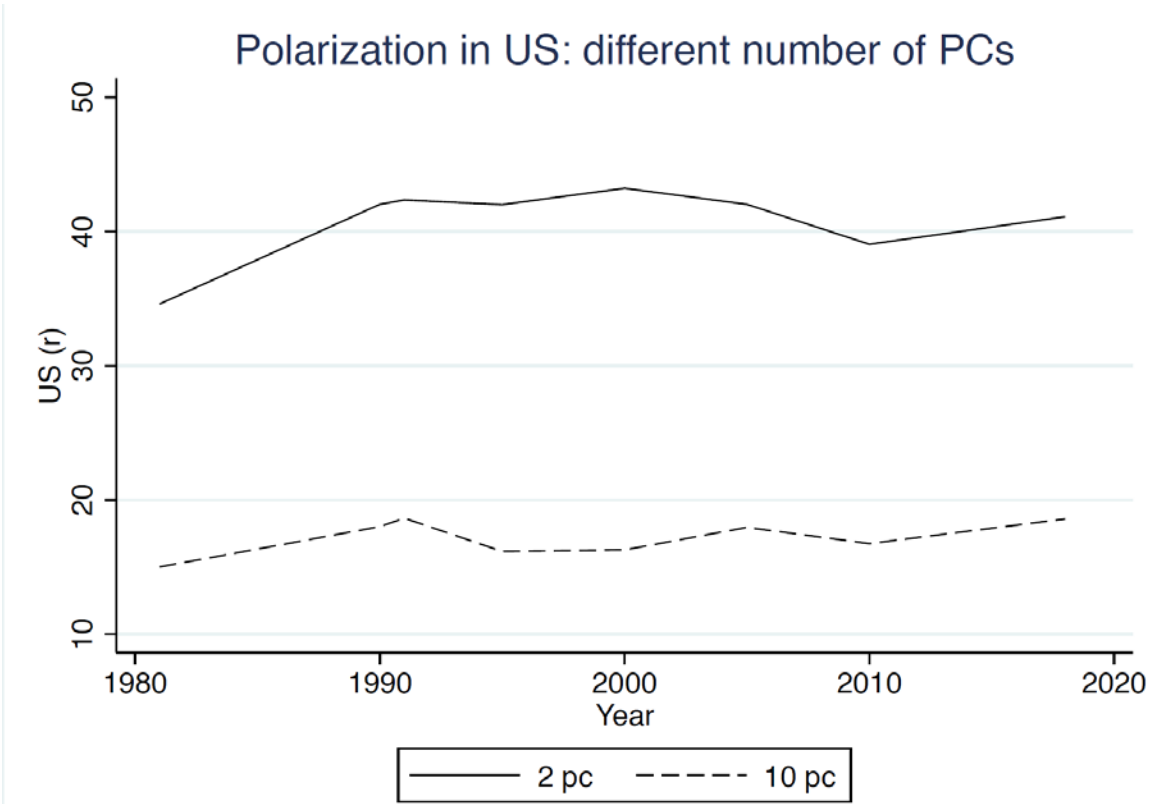


Figure 11 – Identity Differences between Clusters in the US: Evolution over Time, case of 2 Clusters and 2 PCs

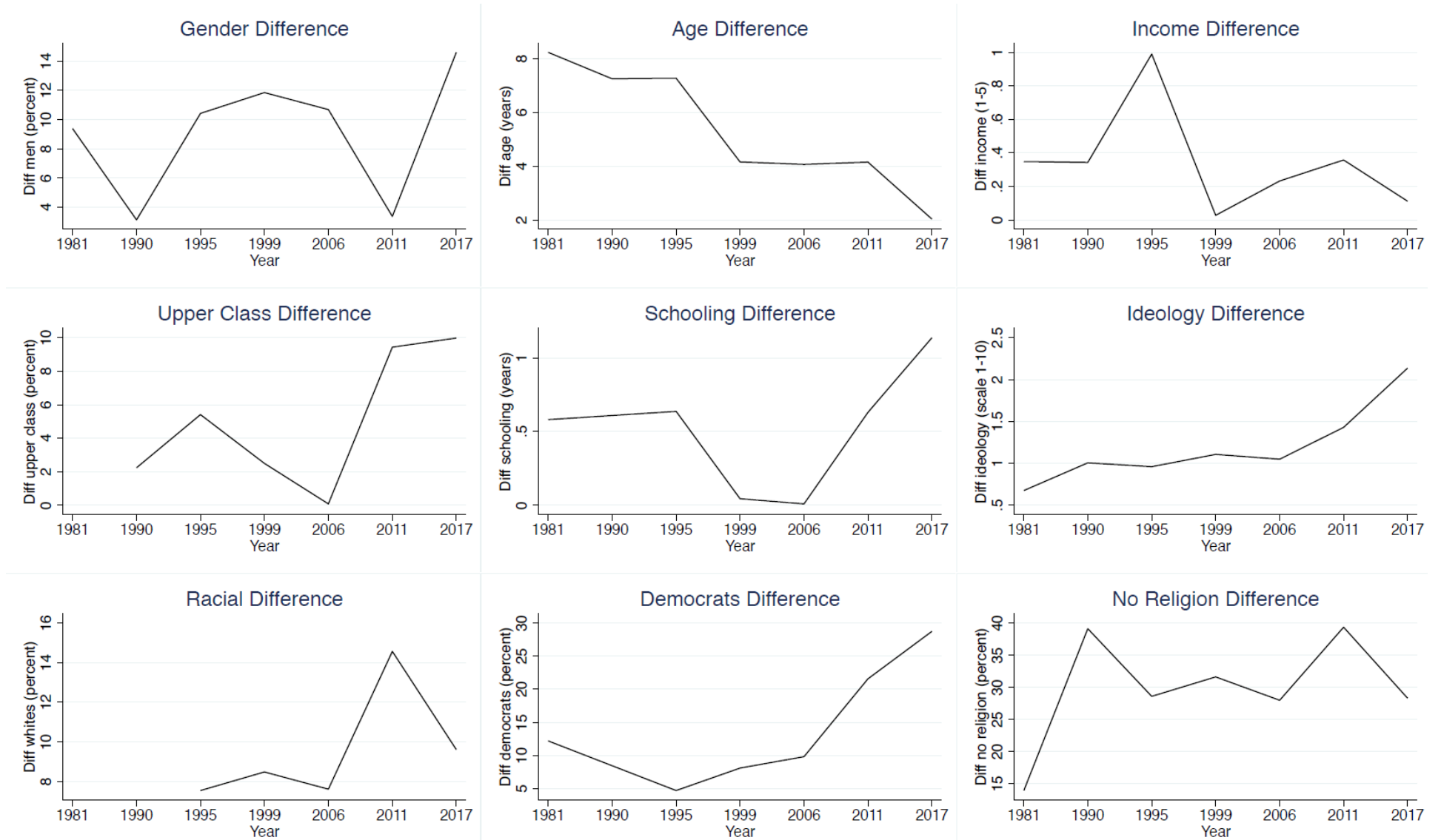
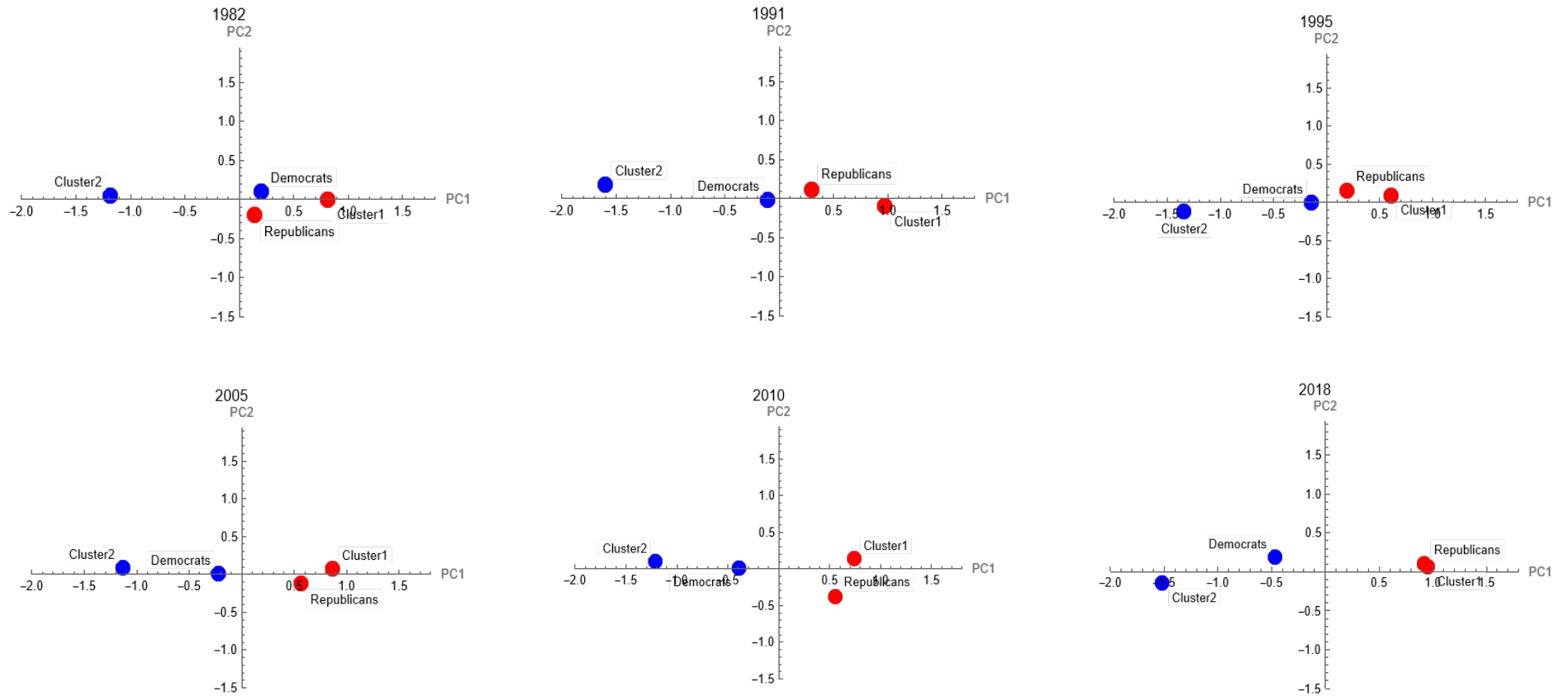


Figure 12 – Alignment between Political Affiliation and Values-Based Partitions



Appendix

Appendix A1. Link between Antagonism and Existing Measures of Heterogeneity

A1A. Antagonism, Cultural Fractionalization and Cultural Differentiation.

The values of individuals are in a Q -dimensional space. Thus, an individual j is characterized by the vector of values $x_j = \{x_j^1, x_j^2, \dots, x_j^Q\}$. Values antagonism within a given group A_i is defined as the average pairwise distance between individuals in that group:

$$E(A_i) = \frac{1}{N_i} \sum_{j=1}^{N_i} E(A_i, x_j) = \frac{1}{N_i} \sum_{j=1}^{N_i} \frac{\sum_{k=1}^{N_i} d(x_j, x_k)}{N_i} = \frac{1}{N_i^2} \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} d(x_j, x_k) \quad (14)$$

We now compare within-group values antagonism (14) with the CF_D index of cultural fractionalization that incorporates distances. Start with the one-dimensional case (i.e., $Q = 1$). Applied to our setup, in that case Desmet, Ortuño-Ortín and Wacziarg (2017, Appendix, page 7) define within-group cultural fractionalization that takes account of distances as:

$$CF_D^{A_i} = \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} \frac{1}{N_i} \frac{1}{N_i} d_{jk} = \frac{1}{N_i^2} \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} d_{jk} \quad (15)$$

where d_{jk} is the distance between individuals in one-dimensional space. $CF_D^{A_i}$ is nothing else than Greenberg's B index: the expected distance between the answers given by two randomly picked individuals. In the one-dimensional case, it is obvious that $E(A_i) = CF_D^{A_i}$.

When considering the Q -dimensional case, $CF_D^{A_i}$ is the average CF over the Q dimensions (see Desmet, Ortuño-Ortín and Wacziarg, 2017):

$$CF_D^{A_i} = \frac{1}{Q} \frac{1}{N_i^2} \sum_{q=1}^Q \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} d_{jk}^q \quad (16)$$

In the case of the squared Euclidean distance, we can compare (14) and (16). With this distance metric, $d(x_j, x_k) = \|x_j - x_k\|^2$, so that (14) can be written as:

$$E(A_i) = \frac{1}{N_i^2} \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} d(x_j, x_k) = \frac{1}{N_i^2} \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} \sum_{q=1}^Q (x_j^q - x_k^q)^2 \quad (17)$$

The index $CF_D^{A_i}$ is now:

$$CF_D^{A_i} = \frac{1}{Q} \frac{1}{N_i^2} \sum_{q=1}^Q \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} (x_j^q - x_k^q)^2 = \frac{1}{Q} E(A_i) \quad (18)$$

Next, consider G groups, A_1, A_2, \dots, A_G , with the number of individuals in group g given by N_g . We write the mean values of group g as $\mu_g = \left(\sum_{k=1}^{N_g} x_k \right) / N_g$. The set of all individuals is $P = A_1 \cup A_2 \dots \cup A_G$. In this case, within-cluster cultural fractionalization is:

$$CF_D^W = \sum_{g=1}^G \frac{N_g}{N} CF_D^{A_g} = \sum_{g=1}^G \frac{N_g}{N} \frac{E(A_g)}{Q} \quad (19)$$

Now we can relate antagonism to the Φ_{ST} as defined on page 7 of the appendix of Desmet, Ortuno-Ortín and Wacziarg (2017) - the so-called "index of genetic differentiation". We have:

$$\Phi_{ST} = \frac{CF_D^P - CF_D^W}{CF_D^P} = \frac{\frac{E(P)}{Q} - \sum_{g=1}^G \frac{N_g}{N} \frac{E(A_g)}{Q}}{\frac{E(P)}{Q}} = \frac{E(P) - \sum_{g=1}^G \frac{N_g}{N} E(A_g)}{E(P)} \equiv r \quad (20)$$

Given the number of groups G , it is immediate to see that the groups $A_1^*, A_2^*, \dots, A_G^*$ that minimize within-group antagonism CF_D^W are the ones that maximize Φ_{ST} (i.e. between-group antagonism) - which also happens to be the indicator r .

A1B. Antagonism, Mean Position and Between-Cluster Variance in the Squared Euclidian Case.

We next show the well-known fact that in the case of Squared Euclidean distances, we have:

$$E(A_i) = \frac{1}{N_i^2} \sum_{j=1}^{N_i} \sum_{k=1}^{N_i} \|x_j - x_k\|^2 = \frac{2}{N_i} \sum_{j=1}^{N_i} \|x_j - \mu_i\|^2 \quad (21)$$

where μ_i denotes the vector of mean values of group A_i :

$$\mu_i = \frac{\sum_{j=1}^{N_i} x_j}{N_i} \quad (22)$$

The proof is straightforward:

$$\begin{aligned} E(A_i) &= \frac{1}{N_i^2} \sum_{k=1}^{N_i} \sum_{j=1}^{N_i} \|x_j - x_k\|^2 = \frac{1}{N_i^2} \sum_{k=1}^{N_i} \sum_{j=1}^{N_i} \sum_{q=1}^Q (x_j^q - x_k^q)^2 = \frac{1}{N_i^2} \sum_{k=1}^{N_i} \sum_{j=1}^{N_i} \sum_{q=1}^Q (x_j^q - \mu_i^q - x_k^q + \mu_i^q)^2 \\ &= \frac{1}{N_i^2} \sum_{k=1}^{N_i} \sum_{j=1}^{N_i} \sum_{q=1}^Q \left((x_j^q - \mu_i^q)^2 + (x_k^q - \mu_i^q)^2 - 2(x_j^q - \mu_i^q)(x_k^q - \mu_i^q) \right) \\ &= \frac{2}{N_i} \sum_{k=1}^{N_i} \sum_{q=1}^Q (x_k^q - \mu_i^q)^2 - 0 = \frac{2}{N_i} \sum_{k=1}^{N_i} \|x_k - \mu_i\|^2 \end{aligned} \quad (23)$$

We can also relate the antagonism in A_i with the variance of the values $\{x_1, \dots, x_{N_i}\}$. In the one-dimensional case, the variance of values in group A_i is:

$$Var(A_i) = \frac{1}{N_i} \sum_{j=1}^{N_i} (x_j - \mu_i)^2 \quad (24)$$

Thus, $E(A_i) = 2Var(A_i)$. With G groups, A_1, A_2, \dots, A_G we have:

$$\sum_{g=1}^G \frac{N_g}{N} E(A_g) = 2 \sum_{g=1}^G \frac{N_g}{N} Var(A_g) \quad (25)$$

Thus, average within-group values antagonism is closely related to the average within-group variance when the distance metric is squared Euclidian. Another way to state this result is that the groups $A_1^*, A_2^*, \dots, A_G^*$ that minimize values antagonism are the ones that minimize average within-group

variance. Given that total variance is constant, this is equivalent to the partition that maximizes average between-group variance.

In the multidimensional case ($Q > 1$), the interpretation is not exactly the same. We have:

$$E(A_i) = \frac{2}{N_i} \sum_{j=1}^{N_i} \sum_{q=1}^Q (x_j^q - \mu_i^q)^2 = \frac{2}{N_i} \sum_{q=1}^Q \sum_{j=1}^{N_i} (x_j^q - \mu_i^q)^2 = 2 \sum_{q=1}^Q Var(x_i^q) \quad (26)$$

where $Var(x_i^q)$ stands for (sample) variance in dimension q . Obviously, $\sum_{q=1}^Q Var(x_i^q)$ is not the "variance" of the random vector x_i , since it ignores covariances. However, if we apply our method using principal components of the value questions, the Q dimensions are by construction uncorrelated, so that $Cov(x^q, x^{q'}) = 0$. In this case, results obtained in the one-dimensional case apply for $Q > 1$ as well, and minimizing within-group antagonism is equivalent to maximizing between-group variance.

Appendix A2. List of Questions Used in the Empirical Analysis (Wave 7)

Category	Variable name (Common Dictionary)	Variable name (WVS 7)	Common Dictionary: Variable label
Environment	B008	Q111	Protecting environment vs. Economic growth
Family	D057	Q32	Being a housewife just as fulfilling
Family	D026_03	Q37	Duty towards society to have children
Family	D081	Q36	Homosexual couples are as good parents as other couples
Family	D001_B	Q58	How much do you trust your family (4-point scale)
Family	D026_05	Q38	It is child's duty to take care of ill parent
Family	D078	Q31	Men make better business executives than women do
Family	D059	Q29	Men make better political leaders than women do
Family	D054	Q27	One of main goals in life has been to make my parents proud
Family	D061	Q28	Pre-school child suffers with working mother
Family	D066_B	Q35	Problem if women have more income than husband (B)
Family	D060	Q30	University is more important for a boy than for a girl
National Identity	G052	Q121	Evaluate the impact of immigrants on the development of [your country]
National Identity	G257	Q257	How close do you feel: to country
National Identity	G256	Q256	How close do you feel: to your county, region, district
National Identity	G062	Q258	How close you feel: Continent; e.g. Europe, Asia etc.
National Identity	G063	Q259	How close you feel: World
National Identity	G255	Q255	How close you feel: Your [village, town or city]
National Identity	G006	Q254	How proud of nationality
National Identity	G007_36_B	Q63	Trust: People of another nationality (B)
National Identity	G007_35_B	Q62	Trust: People of another religion (B)
National Identity	G007_33_B	Q60	Trust: People you know personally (B)
National Identity	G007_34_B	Q61	Trust: People you meet for the first time (B)
National Identity	G007_18_B	Q59	Trust: Your neighborhood (B)
Perceptions of life	A106	Q105	Active/Inactive membership of any other organization
Perceptions of life	A100	Q96	Active/Inactive membership of art, music, educational
Perceptions of life	A105	Q101	Active/Inactive membership of charitable/humanitarian organization

Perceptions of life	A098	Q94	Active/Inactive membership of church or religious organization
Perceptions of life	A103	Q99	Active/Inactive membership of environmental organization
Perceptions of life	A101	Q97	Active/Inactive membership of labour unions
Perceptions of life	A102	Q98	Active/Inactive membership of political party
Perceptions of life	A104	Q100	Active/Inactive membership of professional organization
Perceptions of life	A099	Q95	Active/Inactive membership of sport or recreation
Perceptions of life	A106B	Q102	Active/Inactive membership: Consumer organization
Perceptions of life	A106C	Q103	Active/Inactive membership: Self-help group, mutual aid group
Perceptions of life	A173	Q48	How much freedom of choice and control
Perceptions of life	A062	Q200	How often discusses political matters with friends
Perceptions of life	A039	Q14	Important child qualities: determination perseverance
Perceptions of life	A032	Q10	Important child qualities: feeling of responsibility
Perceptions of life	A027	Q7	Important child qualities: Good manners
Perceptions of life	A030	Q9	Important child qualities: Hard work
Perceptions of life	A034	Q11	Important child qualities: imagination
Perceptions of life	A029	Q8	Important child qualities: independence
Perceptions of life	A042	Q17	Important child qualities: obedience
Perceptions of life	A040	Q15	Important child qualities: religious faith
Perceptions of life	A038	Q13	Important child qualities: thrift saving money and things
Perceptions of life	A035	Q12	Important child qualities: tolerance and respect for other people
Perceptions of life	A041	Q16	Important child qualities: unselfishness
Perceptions of life	A001	Q1	Important in life: Family
Perceptions of life	A002	Q2	Important in life: Friends
Perceptions of life	A003	Q3	Important in life: Leisure time
Perceptions of life	A004	Q4	Important in life: Politics
Perceptions of life	A006	Q6	Important in life: Religion
Perceptions of life	A005	Q5	Important in life: Work
Perceptions of life	A080_02	Q103R	Member: Belong to self-help group, mutual aid group
Perceptions of life	A071B	Q99R	Member: Belong to conservation, the environment, ecology
Perceptions of life	A078	Q102R	Member: Belong to consumer groups
Perceptions of life	A066	Q96R	Member: Belong to education, arts, music or cultural activities
Perceptions of life	A080_01	Q101R	Member: Belong to humanitarian or charitable organization

Perceptions of life	A067	Q97R	Member: Belong to labor unions
Perceptions of life	A079	Q105R	Member: Belong to other groups
Perceptions of life	A068	Q98R	Member: Belong to political parties
Perceptions of life	A072	Q100R	Member: Belong to professional associations
Perceptions of life	A065	Q94R	Member: Belong to religious organization
Perceptions of life	A074	Q95R	Member: Belong to sports or recreation
Perceptions of life	A075	Q104R	Member: Belong to women's group
Perceptions of life	A165	Q57	Most people can be trusted
Perceptions of life	A124_08	Q18	Neighbors: Drug addicts
Perceptions of life	A124_03	Q24	Neighbors: Heavy drinkers
Perceptions of life	A124_09	Q22	Neighbors: Homosexuals
Perceptions of life	A124_06	Q21	Neighbors: Immigrants/foreign workers
Perceptions of life	A124_02	Q19	Neighbors: People of a different race
Perceptions of life	A124_12	Q23	Neighbors: People of a different religion
Perceptions of life	A124_07	Q20	Neighbors: People who have AIDS
Perceptions of life	A124_43	Q26	Neighbors: People who speak a different language
Perceptions of life	A124_42	Q25	Neighbors: Unmarried couples living together
Politics and Society	E001	Q152	Aims of country: first choice
Politics and Society	E003	Q154	Aims of respondent: first choice
Politics and Society	E034	Q42	Basic kinds of attitudes concerning society
Politics and Society	E218	Q159	Because of science and technology, there will be more opportunities for the next generation
Politics and Society	E039	Q109	Competition good or harmful
Politics and Society	E069_02	Q65	Confidence: Armed Forces
Politics and Society	E069_41	Q78	Confidence: Banks
Politics and Society	E069_40	Q81	Confidence: Charitable or humanitarian organizations
Politics and Society	E069_01	Q64	Confidence: Churches
Politics and Society	E069_43	Q82_CIS	Confidence: CIS
Politics and Society	E069_59	Q82_GULFCOOP	Confidence: Cooperation Council for the Arab states of Gulf (GCC)
Politics and Society	E069_45	Q84	Confidence: International Monetary Found (IMF)
Politics and Society	E069_17	Q70	Confidence: Justice System/Courts
Politics and Society	E069_05	Q68	Confidence: Labor Unions
Politics and Society	E069_13	Q77	Confidence: Major Companies

Politics and Society	E069_18A	Q82	Confidence: Major regional organization (combined from country-specific)
Politics and Society	E069_19	Q86	Confidence: NATO
Politics and Society	E069_07	Q73	Confidence: Parliament
Politics and Society	E069_10	Q67	Confidence: Television
Politics and Society	E069_29	Q82_APEC	Confidence: The APEC
Politics and Society	E069_21	Q82_ARABLEAGUE	Confidence: The Arab League
Politics and Society	E069_22	Q82_ASEAN	Confidence: The Association of South East Asian Nations -ASEAN
Politics and Society	E069_08	Q74	Confidence: The Civil Services
Politics and Society	E069_14	Q79	Confidence: The Environmental Protection Movement
Politics and Society	E069_18	Q82	Confidence: The European Union
Politics and Society	E069_30	Q82_TLC	Confidence: The Free Commerce Treaty (Tratado de libre comercio)
Politics and Society	E069_11	Q71	Confidence: The Government
Politics and Society	E069_26	Q82_MERCOSUR	Confidence: The Mercosur
Politics and Society	E069_24	Q82_NAFTA	Confidence: The NAFTA
Politics and Society	E069_56	Q82_OEA	Confidence: The Organization of American States (OAE)
Politics and Society	E069_55	Q82_ISLCOOP	Confidence: The Organization of the Islamic World
Politics and Society	E069_06	Q69	Confidence: The Police
Politics and Society	E069_12	Q72	Confidence: The Political Parties
Politics and Society	E069_04	Q66	Confidence: The Press
Politics and Society	E069_27	Q82_SAARC	Confidence: The SAARC
Politics and Society	E069_20	Q83	Confidence: The United Nations
Politics and Society	E069_15	Q80	Confidence: The Women's Movement
Politics and Society	E069_54	Q75	Confidence: Universities
Politics and Society	E229	Q246	Democracy: Civil rights protect people's liberty against oppression.
Politics and Society	E224	Q241	Democracy: Governments tax the rich and subsidize the poor.
Politics and Society	E226	Q243	Democracy: People choose their leaders in free elections.
Politics and Society	E233B	Q248	Democracy: People obey their rulers
Politics and Society	E227	Q244	Democracy: People receive state aid for unemployment.
Politics and Society	E225	Q242	Democracy: Religious authorities interpret the laws.
Politics and Society	E228	Q245	Democracy: The army takes over when government is incompetent.
Politics and Society	E233A	Q247	Democracy: The state makes people's incomes equal
Politics and Society	E233	Q249	Democracy: Women have the same rights as men.

Politics and Society	E236	Q251	Democraticness in own country
Politics and Society	E018	Q45	Future changes: Greater respect for authority
Politics and Society	E015	Q43	Future changes: Less importance placed on work
Politics and Society	E016	Q44	Future changes: More emphasis on technology
Politics and Society	E037	Q108	Government responsibility
Politics and Society	E040	Q110	Hard work brings success
Politics and Society	E265_06	Q229	How often in country's elections: Election officials are fair
Politics and Society	E265_05	Q228	How often in country's elections: Journalists provide fair coverage of elections
Politics and Society	E265_02	Q225	How often in country's elections: Opposition candidates are prevented from running
Politics and Society	E265_07	Q230	How often in country's elections: Rich people buy elections
Politics and Society	E265_03	Q226	How often in country's elections: TV news favors the governing party
Politics and Society	E265_04	Q227	How often in country's elections: Voters are bribed
Politics and Society	E265_09	Q232	How often in country's elections: Voters are offered a genuine choice in the elections
Politics and Society	E265_08	Q231	How often in country's elections: Voters are threatened with violence at the polls
Politics and Society	E265_01	Q224	How often in country's elections: Votes are counted fairly
Politics and Society	E235	Q250	Importance of democracy
Politics and Society	E035	Q106	Income equality
Politics and Society	E023	Q199	Interest in politics
Politics and Society	E290	Q194	Justifiable: Political violence
Politics and Society	E005	Q156	Most important: first choice
Politics and Society	E027	Q211	Political action: attending lawful/peaceful demonstrations
Politics and Society	E026	Q210	Political action: joining in boycotts
Politics and Society	E028	Q212	Political action: joining unofficial strikes
Politics and Society	E025	Q209	Political action: Signing a petition
Politics and Society	E117	Q238	Political system: Having a democratic political system
Politics and Society	E114	Q235	Political system: Having a strong leader
Politics and Society	E115	Q236	Political system: Having experts make decisions
Politics and Society	E116	Q237	Political system: Having the army rule
Politics and Society	E036	Q107	Private vs state ownership of business
Politics and Society	E124	Q253	Respect for individual human rights nowadays
Politics and Society	E111_01	Q252	Satisfaction with the political system
Politics and Society	E217	Q158	Science and technology are making our lives healthier, easier, and more comfortable

Politics and Society	E266	Q234	Some people think that having honest elections makes a lot of difference in their lives
Politics and Society	E234	Q163	The world is better off, or worse off, because of science and technology
Politics and Society	E263	Q221	Vote in elections: local level
Politics and Society	E264	Q222	Vote in elections: National level
Politics and Society	E220	Q160	We depend too much on science and not enough on faith
Politics and Society	E012	Q151	Willingness to fight for country
Religion and Morale	F050	Q165	Believe in: God
Religion and Morale	F054	Q168	Believe in: heaven
Religion and Morale	F053	Q167	Believe in: hell
Religion and Morale	F051	Q166	Believe in: life after death
Religion and Morale	F063	Q164	How important is God in your life
Religion and Morale	F028	Q171	How often do you attend religious services
Religion and Morale	F028B	Q172	How often do you pray
Religion and Morale	F120	Q184	Justifiable: Abortion
Religion and Morale	F115	Q178	Justifiable: Avoiding a fare on public transport
Religion and Morale	F116	Q180	Justifiable: Cheating on taxes
Religion and Morale	F114A	Q177	Justifiable: Claiming government benefits to which you are not entitled
Religion and Morale	F144_02	Q195	Justifiable: Death penalty
Religion and Morale	F121	Q185	Justifiable: Divorce
Religion and Morale	F122	Q188	Justifiable: Euthanasia
Religion and Morale	F199	Q189	Justifiable: For a man to beat his wife
Religion and Morale	F132	Q193	Justifiable: Having casual sex
Religion and Morale	F118	Q182	Justifiable: Homosexuality
Religion and Morale	F114C	Q190	Justifiable: Parents beating children
Religion and Morale	F119	Q183	Justifiable: Prostitution
Religion and Morale	F135A	Q186	Justifiable: Sex before marriage
Religion and Morale	F117	Q181	Justifiable: Someone accepting a bribe
Religion and Morale	F114B	Q179	Justifiable: Stealing property
Religion and Morale	F123	Q187	Justifiable: Suicide
Religion and Morale	F114D	Q191	Justifiable: Violence against other people
Religion and Morale	F200	Q174	Meaning of religion: To follow religious norms and ceremonies vs To do good to other people
Religion and Morale	F201	Q175	Meaning of religion: To make sense of life after death vs To make sense of life in this world

Religion and Morale	F034	Q173	Religious person
Religion and Morale	F203	Q170	The only acceptable religion is my religion
Religion and Morale	F202	Q169	Whenever science and religion conflict, religion is always right
Science	I002	Q162	It is not important for me to know about science in my daily life
Science	I001	Q161	One of the bad effects of science is that it breaks down people's ideas of right and wrong
Security	H011	Q198	Government has the right: Collect information about anyone living in [COUNTRY] without their knowledge
Security	H009	Q196	Government has the right: Keep people under video surveillance in public areas
Security	H010	Q197	Government has the right: Monitor all e-mails and any other information exchanged on the Internet
Security	H003_03	Q141	Things done for reasons of security: Carried a knife, gun or other weapon
Security	H003_01	Q139	Things done for reasons of security: Didn't carry much money
Security	H003_02	Q140	Things done for reasons of security: Preferred not to go out at night
Security	H006_05	Q148	Worries: A civil war
Security	H006_04	Q147	Worries: A terrorist attack
Security	H006_03	Q146	Worries: A war involving my country
Security	H006_01	Q142	Worries: Losing my job or not finding a job
Security	H006_02	Q143	Worries: Not being able to give one's children a good education
Work	C002	Q34	Jobs scarce: Employers should give priority to (nation) people than immigrants (3 categories)
Work	C002_01	C002_01	Jobs scarce: Employers should give priority to (nation) people than immigrants (5-point scale)
Work	C001	Q33	Jobs scarce: Men should have more right to a job than women (3 categories)
Work	C001_01	C001_01	Jobs scarce: Men should have more right to a job than women (5-point scale)
Work	C038	Q39	People who don't work turn lazy
Work	C039	Q40	Work is a duty towards society
Work	C041	Q41	Work should come first even if it means less spare time

Appendix A3. Questions With the Highest Weights in the First Two Principal Components (WVS wave 7)

The following list displays, for each of 7 illustrative countries, the 5 questions receiving the largest weights in each of the first two principal components (in decreasing order of weight).

BRAZIL:

PC 1: Member: Belong to religious organization; Active/Inactive membership of church or religious organization; Believe in: heaven; Important child qualities: obedience; Important child qualities: religious faith.

PC 2: Confidence: The Environmental Protection Movement; Confidence: The Women's Movement; Important in life: Politics; Confidence: Justice System/Courts; Confidence: Charitable or humanitarian organizations.

CHINA:

PC 1: Neighbors: Unmarried couples living together; Neighbors: People of a different religion; Neighbors: Immigrants/foreign workers; Neighbors: Homosexuals; Neighbors: People who speak a different language.

PC 2: Believe in: God; Most people can be trusted; Believe in: heaven; Believe in: hell; Confidence: The Civil Services.

ETHIOPIA:

PC 1: Important child qualities: religious faith; Important child qualities: obedience; Political system: Having a strong leader; Confidence: Parliament; Confidence: The Government.

PC 2: Confidence: The Government; Confidence: Parliament; Confidence: The Police; Confidence: Justice System/Courts; Member: Belong to self-help group, mutual aid group.

GERMANY:

PC 1: Believe in: God; Believe in: heaven; How important is God in your life; Believe in: life after death; Believe in: hell.

PC 2: Member: Belong to religious organization; Believe in: God; Active/Inactive membership of church or religious organization; Believe in: life after death; How important is God in your life.

NIGERIA:

PC 1: Political action: attending lawful/peaceful demonstrations; Political action: joining unofficial strikes; Satisfaction with the political system; Neighbors: Unmarried couples living together; Important child qualities: religious faith.

PC 2: Confidence: The Political Parties; Interest in politics; Confidence: The Government; Confidence: The Civil Services; Confidence: Justice System/Courts.

SOUTH KOREA:

PC 1: How often do you attend religious services; Religious person; How often do you pray; Meaning of religion: To follow religious norms and ceremonies vs To do good to other people; Meaning of religion: To make sense of life after death vs To make sense of life in this world.

PC 2: Political action: Signing a petition; Democracy: The army takes over when government is incompetent; Political action: attending lawful/peaceful demonstrations; Important child qualities: thrift saving money and things; Democracy: Religious authorities interpret the laws.

UNITED STATES:

PC 1: Believe in: hell; Believe in: heaven; How important is God in your life; Important child qualities: religious faith; Believe in: God.

PC 2: Most people can be trusted; How often do you attend religious services; Political action: attending lawful/peaceful demonstrations; Interest in politics; How often do you pray.

Appendix A4. Questions With the Highest Weights in the First Three Principal Components, United States, across Seven WVS Waves

The following list displays, for the United States, the 5 questions receiving the largest weights in each of the first three principal components (in decreasing order of weight), across successive waves of the WVS:

WAVE 1

DIMENSION 1: How often do you attend religious services; Important for successful marriage: Religious beliefs; Abortion when woman not married; Abortion if not wanting more children; Member: Belong to none.

DIMENSION 2: Voluntary work: Unpaid work none; Political action: joining in boycotts; Political action: Signing a petition; Member: Belong to none; Important child qualities: Good manners.

DIMENSION 3: Important in a job: good hours; Important in a job: generous holidays; Important in a job: not too much pressure; Most people can be trusted; Voluntary work: Unpaid work none.

WAVE 2

DIMENSION 1: Believe in: resurrection of the dead; Important child qualities: religious faith; Member: Belong to religious organization; Get comfort and strength from religion; Life is meaningful because God exists.

DIMENSION 2: Churches speak out on: third world problems; Churches speak out on: ecology and environmental issues; Important in a job: an opportunity to use initiative; Churches speak out on: disarmament; Churches speak out on: racial discrimination.

DIMENSION 3: Important in a job: a responsible job; Important in a job: a respected job; Important in a job: good chances for promotion; Important in a job: meeting people; Important in a job: a job that meets one's abilities.

WAVE 3

DIMENSION 1: Believe in: hell; Important child qualities: religious faith; Believe in: devil; Believe in: heaven; Get comfort and strength from religion.

DIMENSION 2: Important in a job: an opportunity to use initiative; Active/Inactive membership of charitable/humanitarian organization; Active/Inactive membership of professional organization; Active/Inactive membership of church or religious organization; Active/Inactive membership of art, music, educational.

DIMENSION 3: Important in a job: good hours; Important in a job: a responsible job; Important in a job: generous holidays; Important in a job: not too much pressure; Important in a job: a job that meets one's abilities.

WAVE 4

DIMENSION 1: Spend time with people at your church, mosque or synagogue; How often do you attend religious services; Important in life: Religion; Pray to God outside of religious services (i); Justifiable: Homosexuality.

DIMENSION 2: Most people can be trusted; Political action: joining in boycotts; Political action: attending lawful/peaceful demonstrations; Spend time with people at sport, culture, communal organization; How often discusses political matters with friends.

DIMENSION 3: Important in a job: generous holidays; Important in a job: a responsible job; Important in a job: not too much pressure; Important in a job: a respected job; Important in a job: a job that meets one's abilities.

WAVE5

DIMENSION 1: How often do you attend religious services; Woman as a single parent; Justifiable: Homosexuality; Better if more people with strong religious beliefs in public office; Important in life: Religion.

DIMENSION 2: Political action recently done: signing a petition; Most people can be trusted; Political action: joining in boycotts; Interest in politics; Political action: attending lawful/peaceful demonstrations.

DIMENSION 3: Churches give answers: moral problems; Churches give answers: the problems of family life; Churches give answers: the social problems; Churches give answers: people's spiritual needs; Woman as a single parent.

WAVE 6

DIMENSION 1: Important child qualities: religious faith; Believe in: hell; Active/Inactive membership of church or religious organization; How important is God in your life; We depend too much on science and not enough on faith.

DIMENSION 2: Vote in elections: National level; Vote in elections: local level; Most people can be trusted; Interest in politics; Political action: Signing a petition.

DIMENSION 3: Government responsibility; Democracy: Governments tax the rich and subsidize the poor.; Democracy: The state makes people's incomes equal; Things done for reasons of security: Didn't carry much money; Important child qualities: tolerance and respect for other people.

WAVE7

DIMENSION 1: Believe in: hell; Believe in: heaven; How important is God in your life; Important child qualities: religious faith; Believe in: God.

DIMENSION 2: Most people can be trusted; How often do you attend religious services; Political action: attending lawful/peaceful demonstrations; Interest in politics; How often do you pray.

DIMENSION 3: Political system: Having a strong leader; Worries: Not being able to give one's children a good education; Worries: Losing my job or not finding a job; Worries: A civil war; Political system: Having the army rule...