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## Reconciling the individual and societal level in comparative cultural analysis: An archetypal analysis of values and norms across 76 countries

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# **Reconciling the individual and societal level in comparative cultural analysis:**

## **An archetypal analysis of values and norms across 76 countries**

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### **ABSTRACT**

Despite the continued popularity of cross national culture research across social sciences, the use of multidimensional value based models is not without discussion. A key issue concerns the observation that value diversity within countries may be larger than between countries, giving rise to a theoretical and empirical tension between the national cultural level and the individual level. This paper examines the individual and national cultural level simultaneously using a novel typology of norms and values. Leveraging pooled World Values Survey and European Values Study data of 137,505 individuals that live in 76 countries across the world, we find three archetypes that capture individuals' values and norms in a cross-country setting. Each individual is characterized by a configuration of archetypes. Findings illustrate that each archetype is associated with different socio-economic demographics. Moreover, we observe marked differences between the probability of finding any of the three individual archetypes in a country. The paper illustrates how a typological approach can advance our understanding of cultural differences across countries, while acknowledging individual level value diversity.

**Keywords:** values, norms, international comparison, culture, archetype, typology

**JEL classification:** D02, P50, Z13,

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## 1. INTRODUCTION

Norms and values differ between individuals, groups of people and societies. At the country level, Hofstede and co-authors (1980, 2001, 2010), Schwartz (1994, 1999, 2006), House, Hanges, Javidan, Dorfman and Gupta (2004), and Inglehart (1977, 1990, 1997) have ranked countries on a set of cultural dimensions allowing for cross-country comparisons of cultural values. Despite the widely acknowledged importance of these cross-cultural frameworks for international comparative research and their intense use across social sciences, they are not without criticism. A key concern that has been leveraged against all national culture frameworks is the tension between the national cultural level and the individual level (Baskerville, 2003; Fischer & Schwartz, 2011; McSweeney, 2002; Minkov & Hofstede, 2012; Schwartz, 2014a, 2014b; Tsui, Nifadkar, & Ou, 2007a; Tung, 2008).

The discussion on the relation between the individual and national cultural level is rooted in i) the generally accepted definition of culture as a “configuration of values, of normative principles and ideals” (Kroeber & Kluckhohn, 1952: 14), ii) the practice of averaging individual responses on survey questions to calculate country scores on national cultural dimensions (Hofstede, 1980; House et al., 2004), and iii) the use of such national cultural dimensions in applied culture research often leading to an ecological fallacy (Brewer & Venaik, 2014; Robinson, 1950). The goal in this paper is to combine (A) the theoretical starting point that individuals hold certain values that logically “hang together” with (B) the ambition to compare countries without imposing national cultural homogeneity.

We leverage data on norms and values of 137,505 individuals from 76 countries interviewed in the 1990-2009 period. Our data is based on the pooled World Values Survey (WVS) and European Value Studies (EVS). Empirically we proceed in three steps. We first select a battery of questions from the WVS/EVS database capturing values and norms across multiple domains. Using these questions, we develop individual archetypes using archetypal

analysis. Individuals' values and norms are characterized by a configuration of archetypes. This approach is appealing because it does justice to the theoretical starting point that individuals' norms and values are configurational (Kluckhohn & Strodtbeck, 1961; Kroeber & Kluckhohn, 1952). The resulting archetypes are not discrete groups to which individuals belong or do not belong, but instead form Weberian ideal types with which individuals more or less identify. We find three sets of individual archetypes. We label these archetypes the *liberal*, the *traditionalist* and the *conservative collectivist*. In a second step we relate the archetypes to socio-economic demographics. In a third and final step we document significant differences in the presence of the archetypes across countries as reflected in different centers of gravity across countries.

This paper makes three contributions to international comparative culture research. First, the development of individual level value *configurations* (re-)introduces a classic conceptualization of value differences to the field of cross-cultural modelling. In the cross-cultural literature, there has been a longstanding dimensional view of culture that translates into empirical, isolated dimensions at the country level, which obscures the complex interrelations between dimensions (Tsui et al., 2007a). Our proposed configurational view of values and norms is intuitive and echoes the view that "culture comprises a configuration of values" (Kroeber & Kluckhohn, 1952: 14) and is "patterned" (Kluckhohn & Strodtbeck, 1961: 4). Whilst generally accepted, few have sought to operationalize these notions in the context of cross-country value differences (Longest, Hitlin, & Vaisey, 2013). The novelty of our paper is that we illustrate how these theoretical assumptions can be integrated in a cross-country comparative analysis of norms and values.

Second, we do not define cultural groups to which individuals belong or do not belong, but relate every individual to a particular archetype which shows the extent to which individuals resemble the constructed ideal types. Instead of conceptualizing individuals as members of discrete categories, the archetypes serve as ideal types with which people identify to a greater

or lesser extent (e.g. liberals, traditionalists, or conservative collectivists). This approach does justice to the observation that most people cannot be categorized in mutually exclusive groups of people holding certain values (Peterson, Søndergaard, & Kara, 2018). Only few individuals perfectly fit the ideal type of the liberal, the traditionalist, or the conservative collectivists and have norms and values that are fully consistent with these labels. Our approach allows for flexibility by calculating the extent to which people lean towards these ideal types.

Third, our analysis of norms and values at the individual level corroborates findings of previous studies that there is a significant degree of value heterogeneity within countries that coexists with cross-national diversity (Au, 1999; Beugelsdijk & Klasing, 2017; Fischer & Schwartz, 2011; Schwartz & Rubel, 2005). Our explicit departure from the homogeneity assumption yields an attractive framework in which value diversity can be further investigated in ways various scholars have called for (Greenfield, 2014; Matsumoto & Hee Yoo, 2006; Morris, 2014; Tsui et al., 2007a). The analyses at the individual level highlight several avenues for future research, including dynamic analyses that disentangle the process of value change in terms of cohort, zeitgeist, and age effects, the endogenous delineation of cultural borders (instead of imposing national borders to define the cultural group), and multilevel analyses that address both individual and societal level factors (Pandian, 2019; Shu & Meagher, 2018). Collectively, our paper sheds novel light on cultural diversity within and between countries.

## **2. COMPARATIVE CULTURAL ANALYSIS**

### **2.1 Multidimensional value based frameworks**

The tradition of comparative cultural analysis took flight when Hofstede (1980) introduced his model of national culture. Drawing on the work of Rokeach (Rokeach's Value Survey (1968)) and on Kluckhohn and Strodtbeck's (1961) values orientation theory, Hofstede was one of the first to develop a structured account of national cultural differences. Following upon Hofstede's

framework several other models have been developed (see Tung and Stahl (2018) for an overview). Most of them are conceptual and empirical refinements of Hofstede's model (Leung & Morris, 2015). The Schwartz personal values inventory was introduced as an alternative conceptual and operational approach to that of Hofstede (Schwartz, 1992, 1994, 2006).<sup>2</sup> In 2004 an additional project was set up, the GLOBE project, in which the relationships among culture, organizations, and leadership are examined (House et al., 2004). GLOBE is intentionally designed to measure practices as well as values, thereby extending the notion of culture as values to culture as values and practices (Smith, 2006). Table A1 in Appendix A shows the details of each of these frameworks.

In the 1980s, several large-scale surveys and publicly available datasets were developed. Specifically, the European Social Survey (ESS, 2016), the European Value Study (EVS, 2015), and the World Values Survey (WVS, 2018). Over the years, these datasets have been used in a variety of applications, one of which led to the development of a model of cultural change by Inglehart (1997), another to the construction of indices for secular and emancipative values (Welzel, 2013) as well as for gender attitudes (Pandian, 2019).<sup>3</sup> Other scholars have validated, evaluated, as well as extended Hofstede's and Schwartz' model by for example incorporating cultural change (e.g. Beugelsdijk, Maseland, & van Hoorn, 2015; Beugelsdijk & Welzel, 2018).

Despite the differences between the above-mentioned models in terms of countries and time periods covered, samples (e.g. managers or teachers/students) and techniques used to extract dimensions, all models construct national cultural dimensions in a similar way. Individual responses to survey items capturing norms and values (broadly defined) are

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<sup>2</sup> While Schwartz acknowledges the contribution of Hofstede in particular, he questions, amongst others, the exhaustiveness of Hofstede's cultural dimensions, the country coverage, and the theoretical and statistical independence of individual-level and country-level culture. Taking this criticism as his starting point, Schwartz derived seven fine-grained value types, namely conservatism, intellectual and affective autonomy, hierarchy, egalitarianism, mastery and harmony (1992).

<sup>3</sup> The WVS and ESS also provide a set of items that attempt to measure Schwartz cultural dimensions, asking whether the respondent finds certain values important or not.

aggregated to the country level, and subsequently used as input in data reduction models to construct a limited number of national cultural dimensions (such as individualism-collectivism). Collectively, the work by Hofstede (1980, 2001, 2010), Schwartz (1994, 1999, 2006), House et al. (2004), and Inglehart (1977, 1990, 1997) is referred to as the multidimensional value based approach in culture research (Beugelsdijk, Kostova, & Roth, 2017; Leung & Morris, 2015; Peterson & Barreto, 2018).

The continuing popularity of the value based approach makes it impossible to keep track of the plethora of studies using these frameworks in applied culture research. These frameworks and databases have been used across social sciences, including cross-cultural psychology (e.g. Beugelsdijk & Welzel, 2018; Fischer & Schwartz, 2011), economics (e.g. Gorodnichenko & Roland, 2011), international business and management (e.g. Beugelsdijk et al., 2018; Kirkman, Lowe, & Gibson, 2006), political science (e.g. Welzel, 2013), and sociology (e.g. Inglehart & Baker, 2000).

## **2.2 Recurring critique**

Each of the multidimensional value based frameworks has been criticized. Hofstede has been criticized for his ad hoc theorizing (Brett & Okumura, 1998), as well as for the outdatedness of his dataset (Earley, 2006; House et al., 2004; McSweeney, 2002; Peterson, 2003); Schwartz for the abstract nature of his value items and his static approach (Greenfield, 2014; Smith, 2015); GLOBE for the structure and use of their sample (Peterson, 2004; Peterson & Barreto, 2014; Peterson & Castro, 2006; Smith, 2006), as well as for their puzzling finding that values and practices are negatively correlated (Hofstede, 2006; Maseland & van Hoorn, 2010; Peterson & Søndergaard, 2014; Taras, Steel, & Kirkman, 2010); and Inglehart for obscuring the multidimensional nature of value change by using a unidimensional measure (Flanagan, 1982; Steel et al., 1992). Table A2 in Appendix A summarizes the main critiques that the multidimensional value based approach has received over the past few decades.

In addition to the specific critiques leveraged against each of these frameworks, two recurring criticisms apply to all multidimensional value based frameworks. This concerns i) the definition of culture as a configurational construct, and ii) the practice of relating national cultural dimensions (obtained via the analysis of aggregated, individual survey responses) to individual level outcomes. These two criticisms are related because they are rooted in the tension between the individual level and the societal (national) level. We discuss each of these below.

### **Culture as configuration**

The multidimensional value based models have typically drawn on Rokeach (1968, 1973) and Kluckhohn and Strodtbeck (1961) for their conceptualization of national culture as configurational construct. Hofstede quotes the configurational definition of Kluckhohn (1951) when defining culture: “Culture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups including their embodiments in artifact; the essential core of culture consist of traditional (i.e. historically derived and selected) ideas and especially their attached values (Kluckhohn, 1951: 86)” (Hofstede, 1980: 21). Hofstede explicitly states that he cannot operationalize all aspects of Kluckhohn’s definition and therefore defines culture as those aspects he considers to be operationalizable. In his view, culture is a shared system of values that distinguishes members of one group from the members of another group (Hofstede, 1980). The similarities across cultures are captured by universal societal dimensions on which countries score high or low. Survey items, aggregated to the country level, are reduced to a limited set of orthogonal dimensions using exploratory factor analysis (Minkov, Bond, & Blagoev, 2015). Orthogonality holds for all dimensions, with the exception of Power Distance and Individualism which are correlated by construction; they actually load on the same factor, but are treated as two distinct dimensions (Hofstede, 1980: 62).



The configurational notion of culture returns in Schwartz's circumplex model of values (Schwartz, 1994). Schwartz speaks of a national "cultural-level value structure" in which seven value types are interrelated, stressing that these "form an integrated structure of relations" (Schwartz, 1994: 106). Some patterns are more likely to prevail than others, since the combination of some dimensions would lead to "cultural contradictions and disruptions of social action" (Schwartz, 1994: 106). The interdependency that exists empirically is inherent to cultural values and arises from a priori theorizing in Schwartz' model. The cultural value types are conceptualized as a shared, coherent, integrated system of relations that are interdependent rather than orthogonal. This feature distinguishes Schwartz' model from that of Hofstede (1980) whose dimensions are orthogonal (Baskerville, 2003; Longest, Hitlin, & Vaisey, 2013; Schwartz, 2006).

The multidimensional value based models struggle with the configurational notion of culture. Schwartz stresses the patterned nature of his value based model. Hofstede is more ambiguous. As Hofstede moves from Kluckhohn's definition of culture to the empirical operationalization of national cultural dimensions, the configurational element is lost and replaced by orthogonality of dimensions. However, at the same time, the configurational element returns when Hofstede discusses how his dimensions ought to be used. He explicitly states that, while it is a "useful intellectual exercise" to study the dimensions in isolation, in reality they interact with each other and should be considered together (Hofstede, 1980: 213).

At the same time, both Hofstede and Schwartz emphasize the conceptual attractiveness of typologies versus a set of single dimensions used in isolation (Hofstede, 2001; Schwartz, 2006). Typologies are easier to grasp, even when they consist of a multiplicity of characteristics. They are wholes in themselves. People tend to think in terms of ideal types –the Liberal, the Mother, the Idealist– and use them to make sense of the complex reality (Hofstede, 2001: 28). Schwartz refers to the notion of Weberian ideal types when presenting his value dimensions

(Schwartz, 2006: 140).

The ambiguity regarding the configurational nature of the multidimensional value based models is reflected in the way they are used. Many users focus on a subset of individual dimensions, in which a country is either classified as “individualist” or “masculine” but not necessarily both (Baskerville, 2003; Kirkman, Lowe, & Gibson, 2006, 2017; Longest, Hitlin, & Vaisey, 2013; Matsumoto & Hee Yoo, 2006; Schwartz, 2006; Tsui et al., 2007a). This is not without empirical consequences (Tsui, Song, & Yang, 2007b).

Interestingly, the configurational notion resurfaces in comparative institutionalist approaches that identify clusters of countries (Hall & Soskice, 2001; LaPorta et al., 1998; Whitley, 1999). These approaches develop typologies. Supra-national configurations generate a particular systematic logic of behavior that affects the overall “character” of the nation (Jackson & Deeg, 2008, 2019). The idea is that “families of nations” exists, which share (cultural) commonalities (values, norms, attitudes, but also language, geography, and religion) (Ronen & Shenkar, 1985, 2013). The Anglo Saxon cluster, for example, consists of Australia, Canada, Ireland, New Zealand, the UK, and the USA. These countries score relatively high on individualism and low on power distance (Ronen & Shenkar, 2013). In such a conceptualization, and irrespective of the cultural framework used (Hofstede, Schwartz, GLOBE, or Inglehart), countries cluster together in supra-national cultural zones with specific cultural characteristics (Beugelsdijk et al., 2017; Hofstede, 1980, 2001; House et al., 2004; Ronen & Shenkar, 2013; Schwartz, 1994, 1999). The configurational notion of culture is a key feature of such supra-national cultural models. Yet, such an approach also reduces cultural variation to a limited set of discrete cultural clusters, restricting the possibility for comparative analysis considerably.

It is clear from the above discussion that the notion of culture as configuration of (sets of) values has explicitly or implicitly shaped comparative culture research in the

multidimensional value based tradition.

### **Levels of analysis**

To capture culture, the multidimensional value based approach uses aggregated survey data of individual members of a society. Aggregation refers to the use of country means to distill universal value dimensions that capture a country's value priorities (Klasing, 2013; Maseland & van Hoorn, 2017; Peterson & Barreto, 2018). Based on the score on each dimension, countries are ranked and compared.

The operationalization of culture as national-level cultural dimensions presupposes that the average set of values in a country is representative of the values of all individuals in that country (Au, 1997). This homogeneity assumption is well-known across social sciences. Political scientists refer to methodological nationalism (e.g. Martins, 1974; Smith, 1983), international business and management scholars refer to the national homogeneity assumption (e.g. Baskerville, 2003; Peterson & Barreto, 2018), and sociologists and cross-cultural psychologists talk about value consensus (e.g. Leung & Morris, 2015).

There is a growing body of literature that criticizes the homogeneity assumption on empirical grounds. Fischer and Schwartz (2011) established that value differences within countries are larger than between countries. Other studies have shown that the extent of within-country diversity can be large (Au, 1999; Ralston et al., 2014; Schwartz, 2006; Schwartz & Rubel, 2005; Taras, Steel, & Kirkman, 2016; Tung, 2008). These within-country value differences can be attributed to, amongst others, differences across gender (Haski-Leventhal, Pournader, & McKinnon, 2017; Schwartz & Rubel, 2005), age (Malinowski & Berger, 1996), social class (Kraus & Keltner, 2013; Piff et al., 2010), and levels of education (Sheldon, 2005).

The recent empirical evidence on value diversity within countries has re-invigorated the debate on levels of analysis. More specifically, the question rises how to reconcile the observed individual level variation in values and norms with the ambition to compare cultural differences

across countries. Users of these models run the risk of an ecological fallacy when using country level dimensions to explain lower level relations (Robinson, 1950). The ecological fallacy as such is not new. What is new, is the increased awareness of the difficulty of using national cultural models to explain outcomes observed at lower levels (such as firms and individuals) (Brewer & Venaik, 2014).

Some scholars consider within-country heterogeneity to be too large for the multidimensional value based models to have any value (Baskerville, 2003; Greenfield, 2014; McSweeney, 2002). Others are less radical. They argue that all individuals in a society are exposed to social institutions and norms that reflect generally shared values, which individuals need not personally endorse but still have to cope with (Schwartz, 2014a). In such a view, evidence of within-country heterogeneity of values and norms does not necessarily invalidate the models of the multidimensional value based approach; the two may go together (Peterson & Barreto, 2018; Schwartz, 2014a, 2014b).

Hofstede (1980) and Schwartz (1999) both describe how within-country differences can arise by referring to, amongst others, the demographic composition of national populations (Hofstede, 1980: 52). An individual's value set is not only affected by national culture, but also by personality and experiences that result in a unique and personal part (Hofstede, 1980; Schwartz, 1994, 1999). The individual part may give rise to behavior that cannot be traced back to the national culture, and thus does not (fully) coincide with the average value set that the national cultural dimensions capture. Therefore, in a cross-country setting, we do not only observe different average value sets (as captured by national dimensional scores), but we are also likely to observe different distributions around the average value priorities across countries (Beugelsdijk & Klasing, 2017).

To conclude, the multidimensional value based approach is under increased theoretical and empirical scrutiny because of the tension between the individual and the societal level. We

examine how we can combine the theoretical starting point that individuals hold certain values that logically “hang together” with the ambition to compare countries without imposing national cultural homogeneity. To do so, we use individual level data to develop individual level value configurations (combinations of established sets of norms and values) and we explore the different probabilities with which these configurations can be found across countries.

### **3. DATA AND METHOD**

#### **3.1 Variable selection**

To develop individual level value configurations, we combine the European Values Study (EVS, 2015) and the World Values Survey (WVS, 2018). This results in a dataset that consists of about 500,000 individuals interviewed across 112 countries in the time period 1981-2014. EVS and WVS include at least 1,000 respondents per wave per country, with the exception of small countries such as Malta. Samples are drawn from the population aged 18 and older, and can be seen as a representative sample of the whole population. The sampling method accounts for potential differences between “regions, districts, census units, election sections, electoral registers or voting stations, and central population registers” (Beugelsdijk & Klasing, 2017: 142).

We use three selection criteria to extrapolate survey items from our merged dataset. First, we follow Rokeach (1968) and Schwartz (2006) and define values as an enduring preference for goals, actions or, more generally, states of affairs. Values reflect a personal end-state to which one strives, as well as an instrumental value that is needed to achieve the end-state. To measure norms, we adopt the following definition: norms are behavioral rules that are shared among members of a particular group. These rules direct human action once they are adhered to (Bicchieri, 2006). There is a normative, or deontological, dimension to norms that ensures that the members of a particular group adhere to the norm. People feel that there is a

duty to conform, or that they may be punished if they do not conform. To capture the normative aspect, we carefully screen the survey questions on terms that relate to norms, such as: duty, (one) must, should, needs or has to, and justified (De Wit & Lisciandra, 2021). Given the empirical difficulty to distinguish between values and norms on theoretical grounds, we select items that relate to either norms or values, but choose not to explicitly differentiate between the two in subsequent steps: We select items with the broadest country coverage possible, and that are at least asked in three consecutive waves.

[Insert Table 1 about here]

The stepwise selection procedure yields 50 items available for 137,505 respondents across 76 countries. The full list of 50 items is included in Table 1. They capture values and norms related to the economic, the professional, the political, the family and religious sphere (DiMaggio & Powell, 1983; Thornton & Ocasio, 1999; Thornton, Ocasio, & Lounsbury, 2012). A subset of 23 items out of this set of 50 has been used to develop multi-item scales, specifically political action (Norris, 2002), religiosity (Berggren & Bjørnskov, 2013), and two-dimensional morally debatable behavior scale (Crissman, 1942). We collapse these 23 items into these four established constructs (see Table A3 in Appendix A for more details), leaving us with an additional 27 individual items. The input in our statistical model thus consist of four multi-item constructs and 27 individual items. We briefly discuss the background of the validated and established constructs.

*Religiosity.* This construct captures religious experience, focusing on the importance an individual attaches to religion in daily life (Berggren & Bjørnskov, 2013). We use five items to capture religiosity. Exploratory factor analysis shows that the items (coded F034–F065) all positively load on one factor. This is in line with findings elsewhere (Berggren & Bjørnskov,

2013). The Cronbach's alpha of this construct is .87, which suggests excellent reliability.

*Political action.* Norris (2002) identifies political action as a key dimension of political participation. We construct a measure using five items that ask whether people have done/would never do: sign a petition, join in boycotts, attend lawful/peaceful demonstrations, join unofficial strikes, and occupy buildings or factories (Quaranta, 2015). Exploratory factor analysis shows that all items (coded E025–E029) load positively on one dimension. The Cronbach's alpha is .76.

*Morally debatable behaviour scale (MDBS).* This scale is originally represented by ten items (coded F114–F123) (Beugelsdijk & Klasing, 2017; Crissman, 1942; Harding, Phillips, & Fogarty, 1986; Katz, Santman, & Lonero, 1994), which we have extended with three additional items (coded F125–F128). The items relate to behavior that is morally questionable or proscribed (and prohibited) by law. Exploratory factor analysis shows there are two dimensions to this scale (see Table A3 in the Appendix), which is in line with findings in the literature. The first dimension captures the acceptance or justification of progressive values such as homosexuality, prostitution and euthanasia (items F118–F123). We label this dimension “Personal norms”. Cronbach's alpha is .82. The second dimension relates to behavior that is either proscribed or prohibited by law (items F114–F117 + F125–F128). We label this dimension “Civic norms”. Cronbach's alpha is .77.

We use the average value of the items included in each construct in subsequent steps. In addition to these four multi-item constructs, we use the score on each of the 27 additional items. We have full information for these four constructs and 27 items for 137,505 respondents. In the remainder we refer to these four constructs and 27 items as our input variables. Table A4 shows the number of respondents in each of the 76 countries across four waves (1990-2009) in our sample. Summary statistics can be found in Table A5 of Appendix A.

### 3.2 Method

We start from the theoretical assumption that people hold a configuration of values and norms, and that most people identify more or less with Weberian ideal types but do not necessarily endorse all values and norms associated with these ideal types. As a result, we are not interested in classifying individuals as for example either liberals or conservatives, but we aim to map them on the value space between such ideal types.

To construct the ideal types we use archetypal analysis (Cutler & Breiman, 1994). The objective of archetypal analysis is to represent all observations in a multivariate data set as convex combinations of a few (not necessarily observed) extreme points known as archetypes. Envision the data as a cloud of data points in a multidimensional space. Archetypal analysis encloses the data cloud by a hypersurface that covers all the exterior corners of the cloud (the convex hull). The hull is approximated by a simpler “polytope” (a multidimensional extension of a polyhedron), whose corner solutions are the archetypes (Eugster & Leisch, 2009). The number of corner solutions is defined by minimizing the distance between the observations and the archetypes (based on the residual sum of squares), while capturing as much as possible of the distribution of the value space. The archetypes themselves are thus restricted to being convex combinations of the observations in the data set and lie on the data boundary (i.e. the convex hull) spanning all data points in a Euclidean space. Archetypal analysis has been applied in climatology (Hannachi & Trendafilov, 2017; Steinschneider & Lall, 2015), biology (Römer et al., 2012) and business (Venaik & Midgley, 2015).

Archetypal analysis distinguishes itself from other data reduction techniques in that the corner solutions are the focus. Cluster analysis and latent class analysis define groups (clusters) of observations that are more similar to each other than the observations in other groups. Unlike cluster and factor analysis, archetypal analysis focuses on the boundaries of the data cloud and treats these observations as informative. As our theoretical framework defines ideal types with



which people more or less identify, archetypal analysis is the most appropriate technique (Seiler & Wohlrabe, 2013).

We visualize archetypal analysis in Figure 1. Panel A in Figure 1 shows a data cloud for two input variables  $x$  and  $y$ . In reality this is a multidimensional space (in our case we have 31 input variables as defined in the previous section). Panel B in Figure 1 illustrates how corner solutions are defined (marked  $\times$ ), and Panel C in Figure 1 illustrates that each individual observation is presented as a combination of corner solutions ( $x_1$ - $x_3$ ). Depending on one's position in the data, respondents are given a score between 0-1 where 1 indicates a full overlap with that archetype. The result is that each of the 137,505 individuals in our dataset are characterized as a configuration of archetypes, where the sum of the archetypal scores always sums up to one. This analytical property fits the conceptual definition of culture as a configuration of values. Each observation is described as a weighted combination of the established archetypes. The archetypes themselves are the Weberian ideal types with which individuals more or less identify. We estimate the archetypes in  $R$  (Eugster & Leisch, 2009).

[Insert Figure 1 about here]

## 4. RESULTS

### 4.1 Three archetypes

The four multi-item constructs and 27 items lead to three archetypes. Figure 2 visualizes the unique patterns of the three archetypes by showing scores for the 31 input variables (4 constructs and 27 items) included in the archetypal analysis. The number of archetypes is defined by the “elbow-criterion” that is applied to the scree plot (see Figure A1 in Appendix A). A model with three archetypes fit our data best and is robust across countries and continents (see Appendix B for details).

To interpret the three archetypes we compare the scores on the 31 input variables. The scores in Figure 2 and Table 2 can be directly inferred from the answer scale used in the original question, as shown in Table 1. Differences between the scores on these 31 input variables illustrate the difference between the archetypes. Archetype 1, for example, finds friendship very important as reflected in the archetypal score of 1.2 (measured on a 4-point scale where 1 reflects “very important”). Archetype 3 on the other hand answers the same question with “not so important”, reflected in a score of only 2.2 and therefore signals that friends are not so important to archetype 3.

Based on the unique configuration of norms and values we define each archetype and provide a label below. To do so, we refer to the EVS codes and variable names (and implicitly the scores listed in Table 2) in the text. We would like to note that the labels we introduce are imperfect, because the meaning of specific labels depends on context. For example, the word liberal has a different meaning in the United States than in Germany. Acknowledging this contextual variation in the meaning of such labels, we have used labels of which we think reflect the three archetypes best.

[Insert Table 2 about here]

[Insert Figure 2 about here]

**Archetype 1 (AT1)** Individuals that identify with the first archetype adhere to liberal economic and social views. They greatly value private ownership (E036) as well as the absence of paternalism (E037). According to them, governments should not interfere too much in the economy. Citizens should be free to take matters into their own hands. AT1s do not eschew political action (*political action*). Signing a petition, joining in boycotts, attending lawful/peaceful demonstrations, joining unofficial strikes, and occupying buildings or factories

(see Table 1 for all the items) are considered as legitimate. Moreover, adherents of AT1 may break the law when doing so, since civic non-conformity is considered as justified (*civic norms*).

In line with traditional liberal ideology (Mill, 1982 [1859]), choices of others are considered their own responsibility, and should be treated with tolerance, respect, and trust (A035, A165). Individual ownership and freedom are highly valued and guide the decision making process of the adherents of archetype 1. They make their own choices with respect to homosexuality, abortion, euthanasia, and suicide (*personal norms*), as well as with respect to children (D019, D023, D056) and family structure (D018). AT1s believe that women do not need children in order to be fulfilled (D019), nor do children need a father and a mother to grow up happily (D018).

Archetype 1 holds the opinion that men and women have equal rights and roles in and outside relationships (C001, D058) and that immigrants should enjoy the same rights as natives (C002). More generally, archetype 1 does not conform to traditional role patterns; women have the right to make their own decisions with respect to children and jobs (D023, D056). Marriage, as well as Christian traditions, are outdated (D022, F028, and *religiosity*). We label this archetype the *liberal*.

**Archetype 2 (AT2)** Respondents that identify with archetype 2 value religion (A006), attend religious services often (F028), and consider themselves religious: God is important in their lives, they believe in a God, and they pray often (*religiosity*). AT2 tends to trust individuals (A165). Family plays an important role (A001) in which “traditional” gender roles are adhered to: AT2 does not see men and women as equal (C001) and believes that women need children in order to be happy (D019). The family is seen as corner stone of society, as children need a father and a mother (D018) and should be conceived within a stable relationship (D023). Relatedly, marriage is not seen as outdated (D022).

Archetype 2 does not have outspoken views when it comes to the economy. Responses

of archetype 2 to the economic items (E035-E039, Y002) lie in the middle range of each answer scale. AT2 does have clear views on the behaviour that should be displayed at work: one should take responsibility (C019) and achieve something (C018). Moreover, in the social and political dimension of society, archetype 2 shows a strong sense of norm conformity. Archetype 2 is conservative with respect to norms of self-expression (*personal norms*), condemning abortion, euthanasia, suicide, and other related acts. Moreover, archetype 2 conforms to civic norms (*civic norms*), and thus does not cheat or lie, cooperates with others, and does not consider political acts of any sort (*political action*). Given the norms and values of this archetype, we label AT2 the *traditionalist*.

**Archetype 3 (AT3)** In contrast to the previous archetype, the third archetype (AT3) is characterized by outspoken economic views. People that identify with the third archetype are egalitarians in the economic sphere (E035) and have no problem with a paternalist state (E037). In this sense they are economic collectivists that take care of those who are not able to take care of themselves. This is further confirmed by their views on competition, stating that this brings out the worst in people (E039). Archetype 3 takes a passive stance towards the nature of their job: initiative, being able to achieve something, and a sense of responsibility are not important (C016, C018, C019).

Religion is absent in the lives of individuals that relate to the third archetype. However, archetype 3 does conform to traditional gender and family values. Men and women should not, for example, have equal rights (C001). Moreover, the view of the traditional, nuclear family that consists of a father, mother, and child(ren) is dominant (D018, D019, D023). The family is seen as quite important (A001).

Within the public domain, archetype 3 considers non-conformity as sometimes justified (*civic norms*). This implies that acts against the public good, for example by not paying a fare when using public transport or by cheating on taxes, are not eschewed. The literature on civic

conformity and trust (Aghion et al., 2010; Knack & Keefer, 1997; Tabellini, 2008) helps to further interpret the justification of civic non-conformity, as civic conformity has been found to promote trust. Archetype 3 scores low on trust (A165). This is in line with findings of Aghion et al. (2010) and Knack and Keefer (1997), who established that the absence of civic norm conformity coincides with a low degree of trust. Given the characteristics of archetype 3 we label this archetype as the *conservative-collectivist*.

Figure 2 confirms that the individuals that identify with each of the archetypes differ in many ways. This is reflected in the pairwise correlation coefficients depicted in Table A6 of Appendix A. The moderate correlation between archetype 1 and archetype 3 (-.27) stands in stark contrast with the strong negative correlation between the second archetype and the other two types (-.58 (AT1) and -.63 (AT3)). One striking observation that might explain this negative correlation, is the importance of religious norms and values for AT2 and their absence for the other two archetypes.

Having defined and labelled the three archetypes (representing corner solutions in our data cloud), we compute archetypal scores for each of the 137,505 respondents across 76 countries. These scores reflect the extent to which a respondent resembles a particular archetype. As explained before, each respondent has scores that sum up to 1. A respondent may score .3 on archetype 1, .5 on archetype 2 and .2 on archetype 3. We use this information to relate the archetypal score to socio-demographic characteristics and the relative frequency of archetypes across countries.

#### **4.2 Socio-demographic characteristics of the three archetypes**

We relate archetypal scores to age (measured per age group), gender (male/female), marital status (married or not), and years of education (highest level attained). In the second step we include income level. Income levels are measured on a five-point scale ranging from a low to a

high monthly income. Income categories are country specific. Data on income is only available for waves 2 to 4. To rule out time (in)variant country-specific effects we include country- and time-fixed effects. We cluster standard errors at the country level to account for within-country correlation.

We estimate Tobit fixed effects regression models, because our archetypal scores are zero for a part of our sample (for those individuals that do not identify with a specific archetype), and positive for the rest of the sample (for those individuals who identify with a specific archetype to a greater or lesser extent). Other estimation methods, such as OLS and fractional response models, yield similar results (Papke & Wooldridge, 1996, 2008). Finally, we estimate a seemingly unrelated regression (SUR) to control for the linear dependency between the three archetypes. Results of these analyses corroborate the main findings. Detailed results are available in Appendix C (Table C1).

Table 3 reports the main results. Column 1 shows the results for the regression excluding income levels for archetype 1. Column 2 includes income levels. Results for archetype 2 are shown in column 3 (without income) and column 4 (with income). For archetype 3, results are shown in column 5 (without income) and column 6 (with income). The reported coefficients can be interpreted as percentage point differences. For example, a coefficient of -.036 indicates 3.6 percentage point difference between men and women (all else equal).

[Insert Table 3 about here]

Table 3 shows that there are marked differences between the three archetypes. Generation (captured by age- and period-specific effects) and class (captured by education and income levels) appear particularly relevant. Education and income relate to liberals (AT1) and conservative collectivists (AT3) in opposite ways. The higher one's income and education level,

the stronger one identifies with the liberal (AT1) profile. Average archetypal scores (not displayed) more than double when moving from the lowest to the highest income category (from .14 to .31). Conservative collectivists (AT3) on the other hand have lower levels of education and income. Average scores for the conservative collectivist decreases from .44 in the lowest income category to .31 in the highest income category. For the traditionalists (AT2), income and education play a marginal role as reflected in the low correlation between AT2 and education and income level.

Traditionalists (AT2) and conservative collectivists (AT3) are generally older than people leaning towards the liberal (AT1) profile. The age gap between AT1 on the one hand, and AT2 and AT3 on the other hand, widens with age. For respondents younger than 25 there is a difference of .15 average points, whereas the difference has grown to .28 average points for respondents older than 65. Especially traditionalists (AT2) are increasingly represented in older age groups, as reflected in the increasing size of the coefficients for the age variables. Liberals (AT1s), on the other hand, are most prevalent in the younger age groups; identification with the liberal archetype is inversely related to age.

These age related patterns need to be interpreted with care because of the joint effects of ageing and cohort specific effects associated with generational replacement. The age effect needs to be interpreted in the context of period-specific effects (as captured by the wave-specific dummies). Results in Table 3 suggest that younger liberals push out the older conservative collectivists. Conservative collectivists tend to be older and are, in comparison to the 1990-1994 period, increasingly less prevalent over time. Over time, liberals are more prevalent in the younger age groups. Interestingly, relative to the 1990-1994 period, respondents are more likely to identify with the traditionalist profile in the 2005-2009 period. Overall, we observe a pattern suggesting generational replacement of conservative collectivists by liberals, and a relatively stable presence of traditionalists.

### 4.3 Centers of gravity across countries

Countries differ in their relative presence of people leaning towards liberal, traditional or conservative collectivist values. Each country has a different *center of gravity* describing the most prevalent combination of archetypes within a country. Figure 3 provides the average scores for all 76 countries ranked according to the relative probability of encountering a particular type in that country.

[Insert Figure 3 about here]

Sweden, the Netherlands and Denmark are characterized by a relatively large presence of individuals with a liberal profile (AT1), whereas the likelihood of finding such individuals (AT1) is low in Turkey, Bangladesh and Tanzania. In contrast, the likelihood of finding someone who's value-set corresponds to the traditional archetype (AT2) in the latter group of countries is relatively high, and they are least prevalent in Russia, the Czech Republic, and Estonia. The countries belonging to the former Soviet Union tend to have more individuals identifying with the conservative collectivist profile (AT3).

We plot the individual level archetypal scores in a ternary (density) plot. Figure 4 displays ternary plots for three selected countries: Russia, United States, and the Netherlands. These three countries serve to illustrate the notion of cross-national differences in centers of gravity (similar plots for all 76 countries are available upon request). The plot shows the distribution of archetypes, as well as the configuration that is most prevalent in a particular country. Each archetype is represented by a corner point of the triangle. Each leg of the triangle indicates the relative presence of a specific archetype on a 0 to 1 scale. Each dot in the triangle plot represents a respondent, whose location is determined by its archetypal scores. Darker



shades of red indicate that a configuration is more prevalent. The center of gravity is depicted by a dot. The closer the center of gravity towards the upper corner of the ternary plot, the higher the probability of encountering a conservative collectivist (AT3). Similarly, the closer the center of gravity is towards the lower left corner, the higher the probability of finding a traditionalist (AT2). The closer the center of gravity towards the bottom right corner, the higher the probability of finding someone with liberal values (AT1).

The ternary plots illustrate that individuals center around specific configurations in each country. The ternary plot for Russia is shown in panel A of Figure 4. Panel A shows that the center of gravity in Russia is in the upper corner of the triangle. Most Russian respondents lean towards the conservative collectivist profile (AT3). Russia scores relatively low on the liberal archetype. Panel B shows the relative distribution of liberals (AT1), traditionalists (AT2), and conservative collectivists (AT3) in the United States. The center of gravity in the United States is more on the lower left corner of the ternary plot, indicative of the relative salience of traditional (AT2) values. Individuals with values leaning towards the conservative collectivists archetype are uncommon in the United States. Panel C shows the ternary plot for the Netherlands. The center of gravity is in the lower right corner. This implies that we are more likely to encounter an individual whose values correspond to the liberal type (AT1) than to a traditionalist (AT2) or a conservative collectivist (AT3) in the Netherlands.

Across countries, we also observe differences in the relative dispersion of types. For example, when comparing the dispersion of archetypes between Russia and the Netherlands, we observe that Russia leans more towards AT3 than the Netherlands to AT1. Moreover, the archetypes seem to be less dispersed in Russia than in the Netherlands. In other words, the prevalent configurations of archetypes are more homogeneous in Russia in comparison to the Netherlands. When comparing the United States with the Netherlands on the other hand, it seems that the dispersion of types is of comparable size, even though their center of gravity

leans towards AT2 and AT1 respectively.

[Insert Figure 4 about here]

## 5. CONCLUSION

Leveraging data on values and norms of 137,505 individuals that live in 76 countries across the world, this paper introduced an archetypal model of values and norms which captures individuals' value configuration in a cross-country setting. Doing so we address the theoretical and empirical tension that exists between the national cultural level and the individual level. To explore individual-level value diversity, we have used questions capturing key values and norms as included in the pooled WVS and EVS database (1990-2009 period). Our main findings can be summarized in the following four points.

First, we have developed an empirical taxonomy of individual level value configurations that is in line with the theoretical starting point that individuals' norms and values are configurational (Kluckhohn & Strodtbeck, 1961; Kroeber & Kluckhohn, 1952). We find three archetypes which we have labelled the liberal, the traditionalist and the conservative collectivist archetype.

Second, only very few individuals fit the ideal type of the archetypal solutions perfectly. We document substantial individual level value diversity, captured by 137,505 configurations of three basic archetypes, as well as national level diversity, captured by 76 different centers of gravity across countries.

Third, while we are careful to interpret the results of our analysis on the relation between socio-demographic factors and archetypal scores, our findings suggest generational replacement of conservative collectivists by liberals, and a relatively stable presence of traditionalists over time.

Fourth, at the societal level, we find that countries have different centers of gravity such that countries' mean scores for the three archetypes diverge. As a result, the overall distribution of individuals that we have labeled as liberals, traditionalists, and conservative-collectivists varies between countries. Countries are not culturally homogenous, and the overall cultural profile of a country is determined by the relative salience of the three archetypes. Moreover, we have observed that the relative distribution of types differs between countries, indicating that some countries are more homogeneous than others.

Our study is not without limitations. First, we have labeled the three archetypes as liberal, traditionalist and conservative collectivist. Just like any other label, these can be debated. One limitation of these labels is that the connotation may differ across countries. For example, the meaning of liberal is not the same in Europe and the United States. While the labels may be imperfect, it is important to realize that these labels do reflect combinations of sets of norms and values that can be found across and within the 76 countries in our sample. The labels may not be universal, but we have no reason to doubt the underlying archetypes themselves.

A second limitation of our analysis is related to our data. We have used generally accepted and well-known indicators capturing a broad set of values and norms. These indicators were taken from the combined WVS and EVS capturing as many countries as possible. We think this broad country coverage is a strength of our analysis. However, some countries have only been sampled once or twice. This implies that the possibilities to analyze within-country changes for a large number of countries over time is limited. As a result, our analysis of age, period and cohort effects is succinct. This is a limitation of the data. We document tentative evidence of value change at the individual level, yet we have not distinguished between its different drivers. Given the analyses of cultural change at the societal level (Beugelsdijk & Welzel, 2018; Inglehart, 1990, 1997, 2018; Twenge, Carter, & Campbell, 2015; Zhao & Cao, 2010), the

archetypes we developed in this paper provide an excellent starting point to further explore age, period and cohort effects at the individual level. As more data becomes available, future research may use the archetypal scores to explore shifts over time.

Acknowledging the aforementioned limitations, this paper makes three contributions to the literature. The three contributions are related. First and foremost, this paper contributes to the discussion how to reconcile observed individual level variation in values and norms with the ambition to compare national cultural differences in comparative research (Fischer & Schwartz, 2011; Greenfield, 2014; Matsumoto & Hee Yoo, 2006; Minkov & Hofstede, 2012; Morris, 2014). Within-country value heterogeneity is large, and often larger than between country value heterogeneity. This has led to a heated debate across social sciences on the usefulness of cultural models. While this issue has received more attention over the past years, there are only few studies that analyze the two levels of analysis simultaneously as we do in this study. The individual and societal level of analysis are often examined separately. Our study explicitly combines the two levels of analysis. Our study corroborates that there is a significant degree of value heterogeneity within countries, yet also shows that this individual level diversity coexists with diversity between countries.

Second and related to our first contribution, our analysis of value heterogeneity at the individual and societal level is rooted in the overarching theoretical notion of culture as a configurational construct. Comparative cultural analysis is criticized for its assumption of national cultural homogeneity and the myopic focus on (single) cultural dimensions (Tsui et al., 2007a). We re-introduce the configurational notion of culture, as reflected in the individual archetypes and the national cultural profile of each country. At the societal level we show how different countries have different profiles rooted in the overall distribution of the three archetypes in a country. Norms and values hang together in a logical way. Such a configurational approach is not new. Many well-known cross cultural frameworks explicitly or

implicitly start from the same definition (Hofstede, 1980; Schwartz, 1994, 1999, 2006). We show how a configurational approach towards culture can be used to examine the individual and societal level of analysis in an integrated manner.

Our third contribution is methodological. Various methods exist to extract the patterns underlying norms and values. Factor analysis yields a number of (orthogonal) dimensions (Hofstede, 1980; Inglehart, 1990, 1997; House et al., 2004), a similarity structure analysis results in a circumplex model (Schwartz, 1994, 1999), and archetypal analysis yields a typology of archetypes. Our study shows that archetypal analysis can do justice to the theoretical starting point that values and norms are configurational, as it is designed to identify, define and extract ideal types from a dataset. People identify more or less with ideal types, yet do not necessarily endorse all values and norms associated with these ideal types. Instead of classifying individuals as belonging to a discrete class or cluster, individuals are mapped on a configuration of ideal types. This comes closest to the typological style of inquiry that has a long standing tradition in social sciences, as it allows us to identify how much people identify with an ideal type. The typological approach is regaining interest in the social sciences. Our contribution adds to this literature by proposing an elegant and novel way to shed new light on an old question.

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## TABLES AND FIGURES

**Table 1** Selected survey items

	EVS code	Question	Answer categories
1	A001	Important in your life: <i>Family</i>	1 Very important,
2	A002	Important in your life: <i>Friends</i>	...,
3	A003	Important in your life: <i>Leisure time</i>	4 Not at all
4	A006	Important in your life: <i>Religion</i>	important
5	A025	Which of these two statements do you tend to agree with? A: Regardless of what the qualities and faults of ones parents are, one must always love and respect them; B: One does not have the duty to respect and love parents who have not earned it by their behavior and attitudes	0 Agree with B or neither, 1 Agree with A
6	A035	Important child quality: <i>Tolerance and respect for other people</i>	0 Not mentioned,
7	A040	Important child quality: Religious faith	1 Important
8	A042	Important child quality: Obedience	
9	A165	Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?	0 Cannot be too careful, 1 Most people can be trusted
10	C001	Do you agree or disagree with the following statements? <i>When jobs are scarce, men have more right to a job than women</i>	0 Disagree or neither, 1 Agree
11	C002	Do you (...) following statements? <i>When jobs are scarce, employers should give priority to [nationality country] people over immigrants</i>	
12	C016	Important in job: An opportunity to use initiative	0 Not mentioned, 1 Important
13	C018	Important in job: A job in which you feel you can achieve something	
14	C019	Important in job: A responsible job	
15	D018	If someone says a child needs a home with both a father and a mother to grow up happily, would you tend to agree or disagree?	0 Tend to disagree, 1 Tend to agree
16	D019	Do you think that a woman has to have children in order to be fulfilled or is this not necessary?	0 Not necessary, 1 Needs children
17	D022	Do you (...) following statement? <i>Marriage is an outdated institution</i>	0 Disagree 1 Agree
18	D023	If a woman wants to have a child as a single parent, but she doesn't want to have a stable relationship with a man, do you approve or disapprove?	0 Approve or depends, 1 Disapprove
19	D056	Can you tell me how much you agree with each. <i>A working mother can establish just as warm and secure a relationship with her children as a mother who does not work.</i>	1 Agree strongly, ..., 4 Disagree strongly
20	D058	Can you (...) with each. <i>Both the husband and wife should contribute to household income</i>	
21	E035	Rate views on scale: A Incomes should be made more equal, B We need larger income differences as incentives	1 Agree with (A), ..., 10 Agree with (B)
22	E036	Rate views on scale: A Private ownership of business should be increased, B Government ownership of business should be increased	
23	E037	Rate views on scale: A Individuals [WVS: people] should take more responsibility for providing for themselves, B The state [WVS: government] should take more responsibility to ensure that everyone is provided for.	
24	E039	Rate views on scale: A Competition is good, B Competition is harmful	
25	F028	Apart from weddings, funerals and christenings, about how often do you attend religious services these days?	1 More than once a week, ..., 8 Never, practically

		never
26	G006 How proud are you to be [Nationality]?	1 Very proud, ..., 4 Not at all proud
27	Y002 Post-Materialist Index:	1 Materialist 2 Mixed 3 Post-materialist
28	<i>Religiosity</i> . The average value of:	
	F034 Independently of whether you go to church or not, would you say you are ...	1 Other answer 3.3 A convinced atheist 6.6 Not a religious person 10 A religious person
	F062 Which of these statements comes closest to your beliefs?	1 No spirit God or life force 3.3 Don't know what to think 6.6 Spirit or life force 10 Personal God
	F063 And how important is God in your life?	1 Not at all important, ..., 10 Very important
	F064 Do you find that you get comfort and strength from religion?	0 No
	F065 Do you take some moments of prayer, meditation or contemplation or something like that?	10 Yes
29	<i>Political action</i> . The average value of:	
	E025 (...) I'd like you to tell me, for each [form of political action], whether you have actually done any of these things, whether you would/might do it or would never, under any circumstances, do it/any of them. <i>Signing a petition</i>	1 Have done 2 Might do 3 Would never do
	E026 (...)I'd like (...) of them. <i>Joining in boycotts</i>	
	E027 (...)I'd like (...) of them. <i>Attending lawful demonstrations</i>	
	E028 (...)I'd like (...) of them. <i>Joining unofficial strikes</i>	
	E029 (...)I'd like (...) of them. <i>Occupying buildings or factories</i>	
30	<i>Civic norms</i> . The average value of:	
	F114 Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card. <i>Claiming state benefits which you are not entitled to.</i>	1 Never justifiable, ..., 10 Always justifiable
	F115 Please tell (...) this card. <i>Avoiding a fare on public transport</i>	
	F116 Please tell (...) this card. <i>Cheating on tax if you have the chance</i>	
	F117 Please tell (...) this card. <i>Someone accepting a bribe in the course of their duties</i>	
	F125 Please tell (...) this card. <i>Taking and driving away a car belonging to someone else</i>	
	F127 Please tell (...) this card. <i>Taking the drug marijuana or hashish</i>	
	F128 Please tell (...) this card. <i>Lying in your own interest</i>	
31	<i>Personal norms</i> . The average value of:	
	F118 Please tell (...) this card. <i>Homosexuality</i>	1 Never justifiable, ..., 10 Always justifiable
	F119 Please tell (...) this card. <i>Prostitution</i>	
	F120 Please tell (...) this card. <i>Abortion</i>	
	F121 Please tell (...) this card. <i>Divorce</i>	
	F122 Please tell (...) this card. <i>Euthanasia</i>	
	F123 Please tell (...) this card. <i>Suicide</i>	

Note: The items listed under “Religiosity”, “Political Action”, “Civic norms” and “Personal norms” are included as constructs in the final archetypal model, calculated as row-means for each individual respondent.

**Table 2** Three archetypes (answer score on each item between brackets)

	AT1	AT2	AT3
<b>Interaction with others</b>			
A002	Friends important (1.2)	Friends quite important (1.5)	Friends not so important (2.2)
A003	Leisure time important (1.2)	Leisure time quite important (1.7)	Leisure time not so important (2.4)
A025	No duty to respect (-0.0)	Duty to respect very important (1.0)	Duty to respect very important (1.0)
A035	Strong preference for tolerance and respect (1.0)	Slight preference for tolerance and respect (0.8)	No preference for tolerance and respect (0.4)
A042	No preference for obedience (-0.0)	No preference for obedience (0.4)	Slight preference for obedience (0.6)
A165	Very high trust (0.8)	Slight degree of trust (0.4)	No trust (-0.0)
<b>Gender differences</b>			
C001	Men and women equal rights (-0.0)	Men slightly more right to job than women (0.3)	Men more right to job than women (0.7)
D023	Children outside relationship allowed for women (-0.0)	Children outside relationship not allowed for women (0.7)	Children outside relationship not allowed for women (0.4)
D056	Working mother can have warm relationship with children (1.4)	Difficult for working mother to have warm and secure relationship with children (2.1)	Difficult for working mother to have warm and secure relationship with children (2.19)
D058	Equal roles among partners (2.1)	Indifferent (1.9)	Indifferent (1.5)
<b>Family</b>			
A001	Family quite important (1.4)	Family very important (1.0)	Family quite important (1.2)
D018	Child does not need father and mother (0.4)	Child may need father and mother (0.9)	Child needs father and mother (1.0)
D019	Women do not need children (-0.0)	Women may need children (0.5)	Women need children (1.0)
D022	Marriage is outdated (0.5)	Marriage is not outdated (-0.0)	Marriage is somewhat outdated (0.2)
<b>Professions</b>			
C016	Important in job: use of initiative (0.9)	Not important in job: use of initiative (0.1)	Not important in job: use of initiative (-0.0)
C018	Important in job: feeling of achievement (0.9)	Very important in job: feeling of achievement (1.0)	Not important in job: feeling of achievement (-0.0)
C019	Somewhat important in job: responsibility (0.5)	Very important in job: responsibility (1.0)	Not important in job: responsibility (-0.0)
<b>Society: economic</b>			
E035	More in favor of income differences (6.3)	More in favor of income differences (6.7)	More egalitarian (4.9)
E036	Preference for private ownership (2.5)	Some preference for private ownership (3.4)	Strong preference state ownership (7.8)
E037	Against paternalism (2.9)	Indifferent (4.2)	Strong preference paternalism (8.3)
E039	In favor of competition (3.1)	In favor of competition (2.3)	Against competition (5.1)
Y002	Post-materialist (2.8)	Post-materialist (2.1)	Materialist (1.1)
<b>Society: social and political</b>			
C002	National employees and immigrants equal rights (0.1)	National employees some more right to a job than immigrants (0.7)	National employees more right to job than immigrants (1.0)
Personal norms	Always justified: homosexuality, abortion etc (9.3)	Never justified: homosexuality, abortion etc (1.7)	Sometimes justified: homosexuality, abortion etc (2.6)
Civic norms	Always justified: civic non-conformity (3.3)	Never justified: civic non-conformity (1.1)	Sometimes justified: civic non-conformity (2.9)
Political action	Political action (1.5)	Political action neutral (2.4)	No political action (2.9)
G006	Very proud of nationality (2.4)	Not proud of nationality (1.0)	Nationality neutral (1.9)
<b>Religion</b>			
A006	Religion is not important (4.0)	Religion is very important (1.0)	Religion is not so important (2.8)
A040	No preference for religious faith (-0.0)	Strong preference for religious faith (0.9)	No preference for religious faith (0.0)
F028	Never attend religious services (8.0)	Very often attend religious services (0.1)	Never attend religious services (6.4)
Religiosity	Not religious (1.1)	Very religious (10.0)	Slightly religious (5.9)

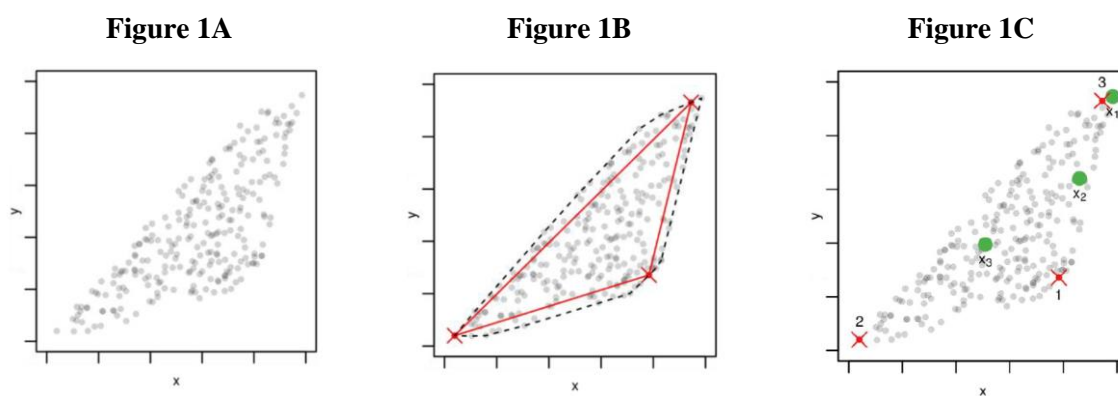
**Table 3** Socio-demographic analysis (tobit fixed effects)

VARIABLES	Liberal (AT1)		Traditionalist (AT2)		Conservative collectivist (AT3)	
	(1)	(2)	(3)	(4)	(5)	(6)
Gender (female = 1)	-0.036*** (0.002)	-0.035*** (0.003)	0.030*** (0.003)	0.029*** (0.004)	-0.001 (0.002)	-0.002 (0.003)
Marital status (married = 1)	-0.050*** (0.003)	-0.058*** (0.004)	0.050*** (0.004)	0.044*** (0.005)	-0.003 (0.002)	0.004 (0.003)
Age <25	(base)					
Age 25-44	-0.006 (0.004)	-0.002 (0.004)	-0.009** (0.004)	-0.006 (0.004)	0.007* (0.004)	0.004 (0.004)
Age 45-64	-0.043*** (0.005)	-0.043*** (0.005)	0.021*** (0.006)	0.028*** (0.007)	0.011 (0.006)	0.004 (0.008)
Age >64	-0.130*** (0.007)	-0.114*** (0.007)	0.084*** (0.010)	0.079*** (0.012)	0.025*** (0.007)	0.016* (0.009)
Highest educational level attained	0.024*** (0.001)	0.019*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	-0.022*** (0.001)	- 0.018*** (0.001)
(Very) low income level	(base)					
Low- income level		0.017*** (0.004)		0.003 (0.005)		- 0.014*** (0.005)
Average income level		0.030*** (0.005)		0.007 (0.005)		- 0.026*** (0.005)
High income level		0.046*** (0.006)		0.011* (0.007)		- 0.046*** (0.006)
(Very) high income level		0.066*** (0.007)		0.016** (0.007)		- 0.073*** (0.007)
Wave 2 (1990-1994)	(base)					
Wave 3 (1995-1998)	0.021 (0.049)	0.017 (0.045)	-0.016** (0.008)	-0.012** (0.006)	-0.006 (0.019)	-0.007 (0.018)
Wave 4 (1999-2004)	0.023 (0.048)	0.022 (0.044)	0.015 (0.010)	0.010* (0.006)	-0.038* (0.021)	-0.033* (0.019)
Wave 5 (2005-2009)	0.011 (0.049)		0.036* (0.021)		-0.049** (0.023)	
Constant	-0.102** (0.050)	0.105** (0.045)	0.539*** (0.019)	0.397*** (0.011)	0.466*** (0.024)	0.469*** (0.022)
Observations	108,951	64,941	108,951	64,941	108,951	64,941
Pseudo R2	1.305	1.273	0.980	1.146	-5.042	-17.26
Log pseudolikelihood	8218	4236	-474.4	1985	25509	15863
Number of clusters	76	58	76	58	76	58

Note: Dependent variables are archetypal scores (0-1) estimated for 137,505 respondents. Tobit regressions are estimated with country and time fixed effects. Clustered standard errors at the country level in parentheses.

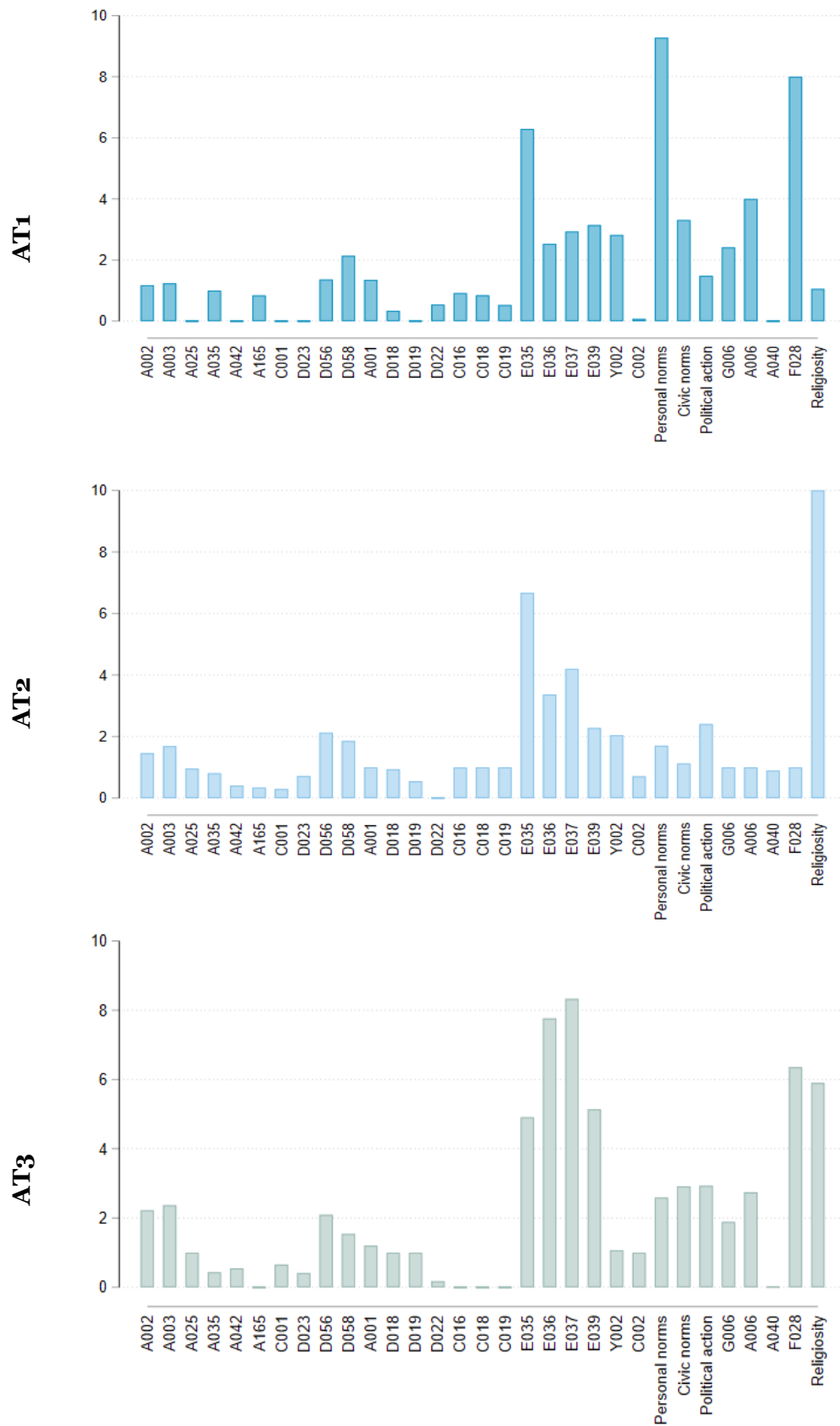
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 1** Stepwise graphical representation of archetypal analysis

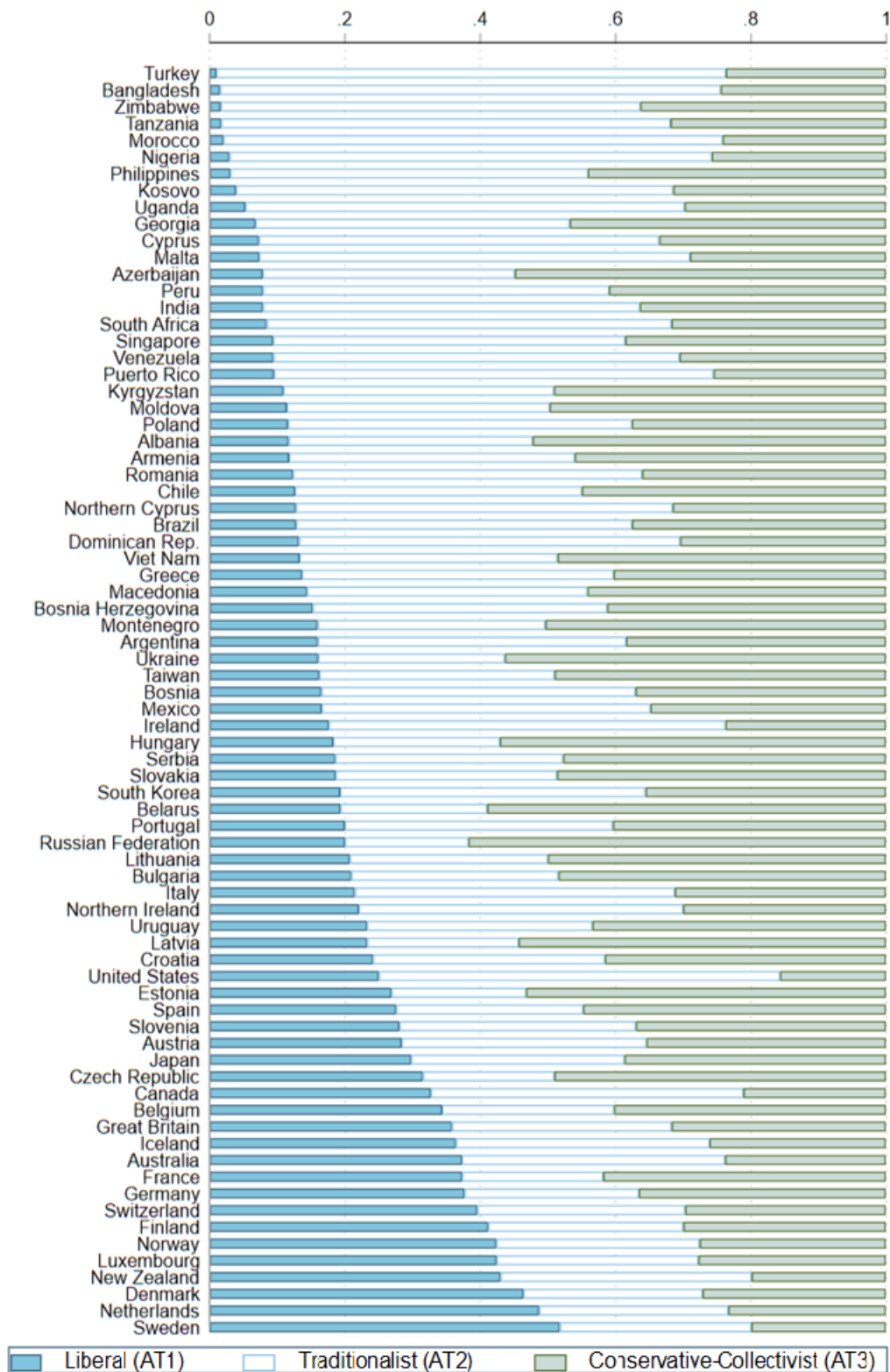




**Figure 2** Archetype model: three configurations of values and norms

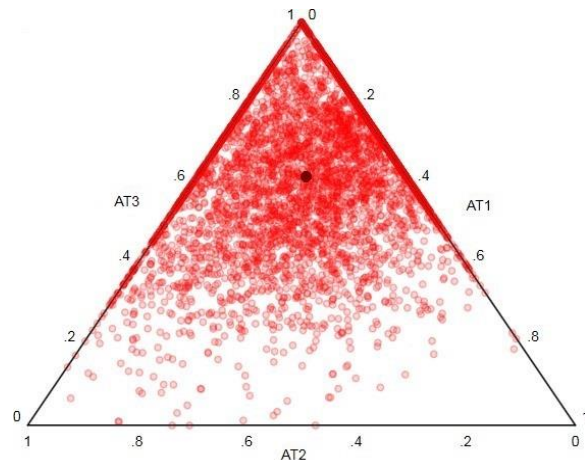


**Figure 3** Archetypes in a cross-country setting

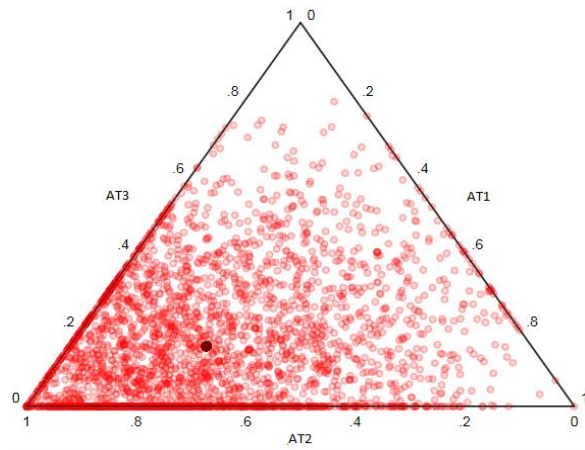


**Figure 4** Different centers of gravity

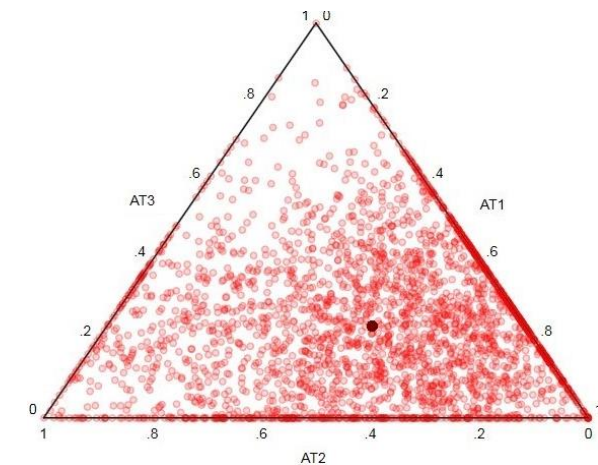
(coordinates in parentheses AT1-liberal; AT2-traditionalist; AT3-conservative collectivist)



(a) Russia (0.20; 0.18; 0.62)



(b) United States (0.25; 0.59; 0.16)



(c) Netherlands (0.49; 0.28; 0.24)

## APPENDIX A

**Table A1** Overview of the multidimensional value based models

	Hofstede (1980)	Schwartz (1994)	GLOBE (House et al., 2004)	Inglehart (1997)	Beugelsdijk and Welzel (2018)
Aim project	Exploration of differences in thinking and social action across societies (Hofstede, 1980).	Derivation of a new set of dimensions of values to compare cultures (Schwartz, 1994).	Examine the impact of culture on leadership, as well as on society in general.	Examine the impact of economic development on cultural and political change.	To develop a multidimensional dynamic framework of culture.
Understands culture as	Collective programming of the mind reflected in values (Hofstede, 1980). Values are "broad tendencies to prefer certain states of affairs over others" (Hofstede, 1991: 35).	Values are a characteristic of a particular society, and are imparted to societal members through everyday exposure (Schwartz, 1999). Cultural dimensions reflect basic issues that societies are confronted with (Schwartz, 1999: 26).	Culture consists of shared motives, values, beliefs, identities, and interpretations of events that are transmitted across generations.	Culture is expressed in people's values.	
Method					
Selection of items	Using factor analysis.	Rokeach Value Survey is used as benchmark (Rokeach, 1968). Use of Similarity Structure Analysis.	Theory driven design of items/scales.	Via correlations (Schwartz, 2006)	Fifth and sixth dimension of Hofstede (Hofstede et al., 2010) + items that resonate with the content of Hofstede's original four dimensions.
Construction of cultural measure	Factor analysis	Dimensions are average value of related items (Schwartz, 1999).	Factor analysis in combination with correlation analyses.	Principal components factor analysis.	Factor analysis with oblique rotation.
Level of analysis	Country level	Country level	Organizational and country level	Country level	Country level
Aggregation procedure individual to country	Country means	Country means	Organizational and country means	Country means	Country means
Cross cultural equivalence of meaning	Checked for cross-cultural meaning of items.	Translation and back-translation.	Translation and back-translation.	Accounted for in WVS/EVS.	Accounted for in WVS/EVS.

(table A1 continued)

	Hofstede (1980)	Schwartz (1994)	GLOBE (House et al., 2004)	Inglehart (1997)	Beugelsdijk and Welzel (2018)
Data					
Type of data	Self-collected survey data	Self-collected survey data	Self-collected survey data	EVS/WVS data	EVS/WVS data
Type of sample	A matched sample of IBM marketing-plus-service employees.	A matched sample of student and teachers.	Matched sample of middle managers to avoid common method bias.	Representative national samples based on stratified random sampling procedures.	Representative national samples based on stratified random sampling procedures.
Type of items	Satisfactions, perceptions, personal goals and beliefs, and demographics.	“As a guiding principle in my life ...”.	Practices ("as is") and values ("should be").	Values with respect to a variety of topics.	Preferences and beliefs.
Number of respondents	>118,000	75,148	7,670	>60,000	495,011
Number of countries	72	38	61	43	110
Time period	1968-9 & 1971-3	1988-1992	1995-1997	1981-1998	1981-2014
Number of items	32	56	735 (371 related to culture)	44	15
Measurement results					
Number of dimensions	6	3	9	2	3
Interpretation dimensions	Power distance, uncertainty avoidance, individualism vs. collectivism, masculinity vs. femininity, long term orientation vs. short term normative orientation, indulgence vs. restraint.	Conservatism vs intellectual and affective autonomy, hierarchy vs. egalitarianism, mastery vs. harmony.	Power distance, uncertainty avoidance, humane orientation, collectivism I, collectivism II, assertiveness, gender egalitarianism, future orientation, performance orientation.	Tradition vs. secular-rational and survival vs. self-expression.	Collectivism-individualism, Duty-joy, Distrust-trust.
Relation dimensions	Orthogonal	Non-orthogonal	Non-orthogonal	Non-orthogonal	Orthogonal
Stability over time				Dynamic model	Dynamic model

**Table A2** Overview of criticism to cross-cultural models

	Hofstede (1980)	Schwartz (1994)	GLOBE (House et al., 2004)
<b>Aim project</b> Addresses project's aim to measure culture, etc.	Culture cannot be objectively measured (MacIntyre, 1971; Smelser, 1992) since culture is subjective (Hofstede, 1980; McSweeney, 2002). Cultural distance is not symmetric across countries (Shenkar, 2001).		
<b>Understands culture as</b> Addresses the perception of culture as values and related assumptions.	Predominant focus on values, at the expense of other features of culture (Frese, 2015; Kashima, 2015; Peterson, 2003; Peterson & Søndergaard, 2011; Schwartz, 2006; Smith, 2002; 2015). Culture as values invalid: societal values do not direct individual action (McSweeney, 2002) and private values cannot reflect sharedness of culture (Geertz, 1973).  Culture is not universal (Baskerville, 2003; McSweeney, 2002); homogeneous (Baskerville, 2003; McSweeney, 2002; Peterson & Søndergaard, 2011; Schwartz, 2014a; Shenkar, 2001; Tung, 2008); necessarily shared (Schwartz, 2014a); stable over time (McSweeney, 2002; Tung, 2008); a country level phenomenon (Au, 1997; Ralston et al., 2014; Schwartz, 2006) bounded by national boundaries (Peterson & Søndergaard, 2011).		
<b>Method</b> Addresses issues related to:			
Item selection	Item selection without a priori theoretical framework (Brett & Okumura, 1998; Earley, 2006; Schwartz, 2006).		Item selection without thorough theoretical framework (Peterson, 2004).
Measurement construction	First factor is split into two factors (IDV and PDI), without statistical evidence (Bond, 2002; Smith et al., 1996).		
Cross cultural equivalence of meaning	Not sufficiently examined (Schwartz, 1994; Bond, 2002).		
Level of analysis ((reverse) ecological fallacy, country as cultural unit, relation individual and country level values etc.)	The country as unit of analysis overlooks intra-country variation (Au, 1997; Schwartz, 2006); regional and individual variability matters and should be acknowledged (Peterson & Søndergaard, 2011; Ralston et al., 2014). Sharedness of culture cannot be measured by aggregating/averaging heterogeneous individual values (McSweeney, 2002).  Ecological fallacy: There are conceptual and empirical differences between individual and societal level structures (Bond, 2002; Peterson & Søndergaard, 2011; Ralston et al., 2014). Country level measures cannot measure behaviour of individuals (Robinson, 1950).		
	Individualism/collectivism lacks predictive power at the societal level (Ralston et al., 2014).		Method of aggregation unclear (Peterson, 2004; Smith, 2006). Do not properly deal with ecological fallacies (Peterson & Castro, 2006).
	Individual and country level dimensions are conceptually related and not independent (Schwartz, 1994).		
<b>Data</b> Addresses issues related to:			
Type of data	Questionnaire responses cannot be used to measure culture for various reasons (Baskerville, 2003; Maseland & van Hoorn, 2010; McSweeney, 2002; Peterson & Søndergaard, 2011).  Explicit, paper-and-pencil measures of declarative self-knowledge cause biases (Bond, 2002; Peterson, Brett, & Peltola, 2010).		
	Dataset is situationally specific and therefore not generalizable (McSweeney, 2002).	Measured values (and practices) are too abstract (Hofstede, 2010; Smith, 2015)	
	Respondents had foreknowledge regarding the purpose of the survey (McSweeney, 2002).		Nested structure of the dataset is not perfect (Peterson & Castro, 2006).

(table A2 continued)

	Hofstede (1980)	Schwartz (1994)	GLOBE (House et al., 2004)
Number of respondents	Some countries are represented by too few respondents (McSweeney, 2002).		
Type of items	Items do not measure basic values, but values that refer to specific situations or domains (Schwartz, 2006). Items present attitudes or evaluative response scales, instead of measuring the importance of values. Likert-type scales induce biases in response styles (Bond, 2002).		
		Measured values (and practices) are too abstract (Hofstede, 2010; Smith, 2015)	
			Respondents cannot validly characterize their nations values (Hofstede, 2006).
Representativeness sample	Representativeness sample is questioned (McSweeney, 2002; Peterson, 2003; Schwartz, 1994; Smith et al., 1996). Matched sample can only be used for country comparisons (Schwartz, 2014a).		
Country coverage	Former communist excluded (Hofstede, 1980; Schwartz, 1994; Smith et al., 1996). Some countries are represented by small number of respondents (McSweeney, 2002).		Some countries are represented by small number of respondents (McSweeney, 2002; Peterson & Castro, 2006).
Time period	Data is outdated (Brett & Okumura, 1998; Peterson, 2003; Schwartz, 1994); dimensions may have changed since (Smith, 2002).		
<b>Measurement results</b> Addresses issues related to:			
Number of dimensions	Dimensions are not exhaustive (Hofstede, 1980; Schwartz, 1994; Shenkar, 2001).		
	Hofstede adds a 5th and a 6th dimensions at a later stage, indicating non-exhaustiveness (Smith et al., 1996).		
Interpretation dimensions	Dimensional scores do not reflect within country heterogeneity (McSweeney, 2002). Validity of single nation's dimensional score is questioned (Peterson, 2003).		
	Non-intuitive link questionnaire items and dimensions (Bond, 2002; Peterson, 2003; Smith et al., 1996; Smith, 2002). Individualism/collectivism is multifaceted (Bond, 2002; House et al., 2004; Smith et al., 1996). Not all dimensions are replicable (Smith et al., 1996).		Values and practices are negatively related against hypotheses (Peterson, 2004; Taras et al., 2010). Various alternative interpretations (Maseland & van Hoorn, 2010; Peterson, 2004); Unclear what GLOBE really measures (Hofstede, 2010; Smith, 2006).
Relation dimensions	Cultural dimensions are likely to be correlated and not orthogonal (Baskerville, 2003; Schwartz, 2006; Triandis, 1994).		Problems of multicollinearity (Hofstede, 2010; Smith, 2006): correlated dimensions and confounding factors (Peterson & Castro, 2006). Country and organization level culture cannot be disentangled (Peterson & Castro, 2006).
Measurement validity	Techniques to reduce response biases create unreliable results (Peterson, Brett, & Peltola, 2010). Invalid to rely on one framework or on single nation information (Peterson, 2003).		
	Response bias not effectively accounted for (Peterson, 2003). No conventional statistics to assess validity of the dimensions (Smith, 2002).	No check for the scale reliability (Ralston et al., 2011).	Individual selection criteria are not provided (Peterson & Castro, 2006; Smith, 2002).
Stability over time	Culture is likely to be dynamic and change over time (Baskerville, 2003). Cannot assume stability (Ralston et al., 2011; Tung, 2008).		



**Table A3** Exploratory factor output: three validated and established constructs

	Factor 1	Factor 2	Uniqueness
<b>Religiosity</b>			
F034	0.744		0.446
F062	0.716		0.488
F063	0.865		0.252
F064	0.813		0.339
F065	0.689		0.526
<b>Political action</b>			
E025	0.585		0.658
E026	0.681		0.537
E027	0.662		0.561
E028	0.632		0.601
E029	0.526		0.723
<b>Morally debatable behavior scale (MDBS)</b>			
F115		0.562	0.661
F116		0.601	0.626
F117		0.602	0.605
F118	0.668		0.550
F119	0.576		0.587
F120	0.726		0.467
F121	0.730		0.461
F122	0.599		0.626
F123	0.545		0.652
F125		0.514	0.731
F127		0.564	0.621
F128	0.354	0.450	0.676

The table shows the result of three separate exploratory factor analyses. A full explanation of each question and the associated abbreviation can be found in Table 1.

**Table A4** Observations across countries and waves

	Wave			
	2 (1990-1994)	3 (1995-1998)	4 (1999-2004)	5 (2005-2009)
Albania		603	605	880
Argentina	404	738	770	
Armenia		1259		1141
Austria	636			927
Australia		1539		
Azerbaijan		1249		
Bangladesh			1092	
Belarus		1131	526	872
Belgium	1263			1279
Bosnia		618		
Bosnia and Herzegovina			907	1076
Brazil	1517			
Bulgaria	632	493		723
Canada	1200		1535	
Chile	1197	784	925	
Croatia		806		873
Cyprus				639
Czech Republic	2348	815	1391	1030
Denmark	608			1029
Dominican Rep.		264		
Estonia		621	435	926
Finland	317	719	699	541
France	588		1091	1294
Georgia		1593		823
Germany	1207	1251		1187
Great Britain	1001			902
Greece				1145
Hungary	650	500		1308
Iceland	540		689	597
India	1881	839	865	
Ireland	793			193
Italy	1227		1352	836
Japan	184	339	303	
Kosovo				833
Kyrgyzstan			949	
Latvia	122	664		776
Lithuania		592	435	556
Luxembourg				470
Macedonia		547	766	72
Malta	160			827
Mexico	911	1347	980	
Moldova		781	484	820
Montenegro		139	465	943

Morocco			877	
Netherlands	685		860	1138
New Zealand		472		
Nigeria	788	1562		
Northern Cyprus				211
Northern Ireland	238			179
Norway	789	994		929
Peru		806	1198	
Philippines		1117	1114	
Poland	526		700	762
Portugal	793			900
Puerto Rico		916	576	
Romania		778	662	639
Russian Federation	1003	1346	1360	805
Serbia		874	681	1026
Singapore			1367	
Slovakia	1066	788		778
Slovenia	462	698		877
South Africa			2307	
South Korea			894	
Spain	2004	709	760	884
Sweden	555	665		297
Switzerland				621
Taiwan		590		
Tanzania			752	
Turkey				105
Uganda			771	
Ukraine		1253	588	863
United States	1171	969	1003	
Uruguay		671		
Venezuela		776		
Vietnam			740	
Zimbabwe			818	
Total	29466	36215	35292	36532

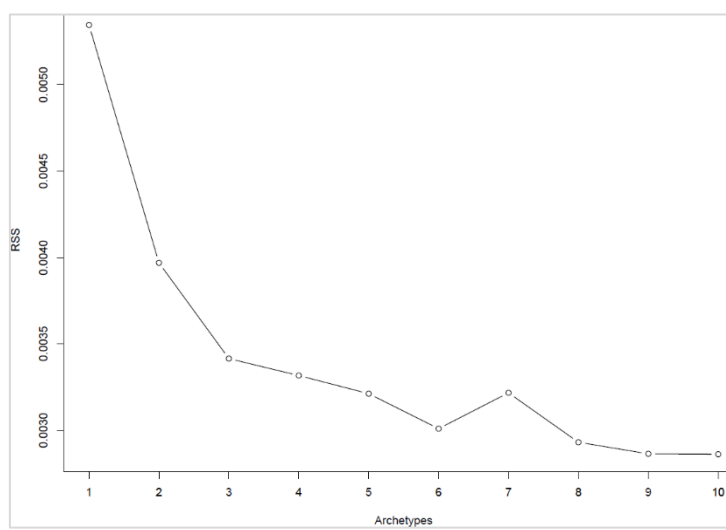
**Table A5** Summary statistics input variables ( $N=137,505$ )

Variable	Mean	Std. Dev.	Min	Max
A001	1.136	0.397	1	4
A002	1.709	0.703	1	4
A003	1.870	0.772	1	4
A006	2.216	1.058	1	4
A025	0.791	0.407	0	1
A035	0.702	0.457	0	1
A040	0.294	0.455	0	1
A042	0.344	0.475	0	1
A165	0.289	0.453	0	1
C001	0.317	0.465	0	1
C002	0.717	0.450	0	1
C016	0.495	0.500	0	1
C018	0.611	0.488	0	1
C019	0.484	0.500	0	1
D018	0.881	0.323	0	1
D019	0.599	0.490	0	1
D022	0.177	0.382	0	1
D023	0.405	0.491	0	1
D056	1.957	0.843	1	4
D058	1.789	0.743	1	4
E035	5.884	2.960	1	10
E036	4.937	2.764	1	10
E037	5.568	2.980	1	10
E039	3.605	2.477	1	10
F028	4.782	2.485	1	8
G006	1.639	0.779	1	4
Civic norms	3.648	2.102	1	10
Personal norms	2.294	1.506	1	10
Political action	2.423	0.484	1	3
Religiosity	7.147	3.077	0	10
Y002	1.822	0.627	1	3

**Table A6** Correlations ATs

	AT 1	AT 2	AT 3
AT 1	1		
AT 2	-0.578 (0.00)	1	
AT 3	-0.272 (0.00)	-0.628 (0.00)	1

**Figure A1** Scree plot archetypal analysis



## APPENDIX B robustness of the three archetypes across countries and continents

We test the robustness of our archetype model for every individual country (Welzel, Brunkert, Inglehart, & Kruse, 2019). We analyse the separate scree-plots of 76 individual countries and denote the optimal number of archetypes based on the “elbow-criterion”. For countries that do not have one, but two optimal solutions, we denote both (the latter denoted as “specification 2” in Figure B1). We display the optimal distributions in Figure B1.

**Figure B1** Distribution of the number of archetypes

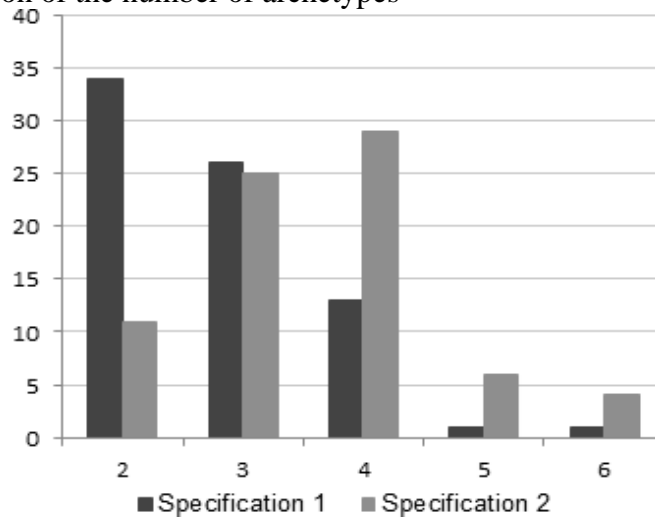


Figure B1 illustrates that the average number of optimal archetypes across countries approximates our three archetype model (2.8 for countries with one optimal solution; 3.6 for countries with two optimal solutions). For a third of our sample, the three archetype solution is the optimal solution (amounting to 25 countries in both specifications). For the other two thirds, either two or four archetypes are optimal. For these cases, the three archetype solution is oftentimes an elegant compromise as the third archetype condenses the information that is captured by the third and fourth archetype. We therefore see no reason to doubt the stability of our model for individual country cases.

We also check whether the archetype model is stable across continents. We run the AA algorithm on all individuals that live on a specific continent. We thus estimate six separate

archetype models, one for Africa, Asia, Australia/Oceania, Europe, South America, and North America. We analyse the scree plot for each separate continent and determine the optimal number of archetypes based on the elbow-criterion. We find that, across continents, the three archetype solution fits best. We thus estimate six models with each three archetypes, and correlate the archetypal scores of each model with the scores of our preferred model. We take high and significant correlations as corroboration of our model. The pairwise correlation coefficients are tabulated in Table B1. All correlation coefficients are significant at the 1% level. Out of eighteen correlations, twelve are above .8, four between .7 and .8, and two below .7. Given these results, the stability and validity of our archetype model is validated.

**Table B1** Pairwise correlation coefficients

			Archetypal scores obtained across continents at the individual level		
			AT1	AT2	AT3
Archetypal scores obtained for separate continents at the individual level	Africa	AT1	0.85	-0.64	0.25
		AT2	-0.33	0.72	-0.62
		AT3	-0.17	-0.41	0.54
	Asia	AT1	0.91	-0.56	0.04
		AT2	-0.42	0.89	-0.74
		AT3	-0.28	-0.49	0.74
	Aus./ Oceania	AT1	0.96	-0.61	-0.33
		AT2	-0.75	0.96	-0.42
		AT3	-0.11	-0.52	0.88
	Europe	AT1	0.92	-0.22	-0.65
		AT2	-0.82	0.87	-0.16
		AT3	0.11	-0.84	0.82
	South America	AT1	0.88	-0.78	0.21
		AT2	-0.15	0.79	-0.79
		AT3	-0.59	-0.19	0.69
	North America	AT1	0.93	-0.86	0.08
		AT2	-0.34	0.85	-0.77
		AT3	-0.67	0.02*	0.77

Note: Pairwise correlation coefficients are all significant at the 1% level, except for the coefficient indicated with \*.



## **APPENDIX C Accounting for correlated error terms**

We have examined the socio-demographics of the archetypes by means of a simple tobit fixed effects model (Table 3). We explore the robustness of these findings since the error terms of each set of equations in Table 3 (labelled as a, b in the table below) may be correlated. The linear dependency that exists among the archetypes by construction  $-AT1 + AT2 + AT3 = 1$  inflicts this problem. While this does not affect the consistency of our findings, it makes the estimators less efficient.

The correlation structure between the error terms and AT1, AT2 and AT3 respectively confirm that error terms are correlated. Pairwise correlation terms suggest that error terms are significantly negatively correlated, ranging from weak (-.14) to strong (-.56). To address this issue, we estimate a seemingly unrelated regression (SUR) in which we allow for correlation among the error terms. The model estimates the covariance matrix for all equations together, such that the correlation among error terms is taken into account. We estimate each set of equations (a, b) separately. Ideally we should estimate a SUR-tobit. However, since this model does not converge, we use the asymptotically efficient, feasible, generalized least-squares algorithm as provided in Stata (Greene, 2012: 292-304).

Estimation results are shown in Table C1. In comparison to the results of Table 3, we observe that the signs, magnitude and significance of the estimated coefficients have not changed significantly. The standard errors are smaller. This indicates that in spite of the fact that the tobit estimations are less efficient, they generally perform well and can be considered robust.

**Table C1** Socio-economic correlates of ATs (SUR)

VARIABLES	(a)			(b)		
	AT1	AT2	AT3	AT1	AT2	AT3
Gender (female = 1)	-0.026*** (0.001)	0.023*** (0.001)	0.003*** (0.001)	-0.025*** (0.001)	0.021*** (0.002)	0.004*** (0.001)
Marital status (married = 1)	-0.043*** (0.001)	0.042*** (0.001)	0.000 (0.001)	-0.046*** (0.001)	0.038*** (0.002)	0.007*** (0.002)
Age <25	(base)					
Age 25-44	-0.002* (0.001)	-0.014*** (0.002)	0.016*** (0.002)	-0.002 (0.002)	-0.017*** (0.002)	0.019*** (0.002)
Age 45-64	-0.033*** (0.002)	0.012*** (0.002)	0.021*** (0.002)	-0.034*** (0.002)	0.013*** (0.003)	0.021*** (0.002)
Age >64	-0.104*** (0.002)	0.067*** (0.003)	0.037*** (0.002)	-0.092*** (0.002)	0.055*** (0.003)	0.037*** (0.003)
Highest educational level attained	0.017*** (0.000)	0.001*** (0.000)	-0.019*** (0.000)	0.013*** (0.000)	0.001 (0.000)	-0.014*** (0.000)
(Very) low income level	(base)					
Low- income level				0.009*** (0.002)	-0.006*** (0.002)	-0.002 (0.002)
Average income level				0.018*** (0.002)	-0.002 (0.002)	-0.016*** (0.002)
High income level				0.032*** (0.002)	0.005 (0.003)	-0.037*** (0.002)
(Very) high income level				0.054*** (0.002)	0.010*** (0.003)	-0.065*** (0.003)
Wave 2 (1990-1994)	(base)					
Wave 3 (1995-1998)	-0.008** (0.004)	-0.147*** (0.005)	0.155*** (0.004)	-0.006 (0.004)	-0.130*** (0.005)	0.136*** (0.004)
Wave 4 (1999-2004)	-0.007 (0.004)	-0.119*** (0.005)	0.126*** (0.004)	-0.000 (0.004)	-0.101*** (0.006)	0.101*** (0.005)
Wave 5 (2005-2009)	-0.018*** (0.004)	-0.110*** (0.005)	0.128*** (0.004)			
Constant	0.076*** (0.007)	0.924*** (0.007)			0.208*** (0.007)	0.791*** (0.007)
Observations	108,951	108,951	108,951	64,941	64,941	64,941
R-squared	0.474	0.349	0.303	0.455	0.372	0.344

Note: Dependent variables are archetypal scores (0-1) estimated for 137,505 respondents. SUR models are estimated separately for specification a and b. Models are estimated with country and time fixed effects. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1