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Testing the Measurement Invariance of Political Trust across the Globe. A Multiple Group Confirmatory Factor Analysis

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Abstract

Today, comparative social scientists have ample survey data to test the generalizability of theories related to political trust. Unless its measurement invariance has been established, they run the risk of drawing invalid conclusions though. Based on different sets of items and dimensional models, previous studies have yielded diverging results regarding the measurement invariance of political trust in Europe and former Soviet countries. Using a set of six items and contrasting three competing dimensional models, this study tests the measurement invariance of political trust across the globe in 32 electoral and liberal democracies. It uses multiple group confirmatory factor analysis and draws on data from the World Values Survey (wave 6, 2010-2014). Configural invariance of a revised two-dimensional model of trust in implementing and representative political institutions was established in 19 democracies when excluding trust in civil service. Full invariance of this model was established in three post-communist countries in eastern and southeastern Europe. The results corroborate that the measurement invariance of political trust must not be assumed. Conceptually, they provide reason to infer that, by and large, people in democracies have a two-dimensional construct of political trust. Methodologically, they manifest that trust in civil service is an ambiguous item, which is not as meaningfully related to the construct of political trust as other items.

Keywords: measurement equivalence, measurement invariance, multiple group confirmatory factor analysis, political trust, trust in political institutions

Introduction

Today more than ever, comparative social scientists can test the generalizability of theories pertaining to the changes, sources, and consequences of political trust thanks to the growing availability of cross-national survey data (Braun, 2013; Zmerli & van der Meer, 2017). This is a decisive, but not a conclusive step forward. Unless the comparability of political trust measures has been established, inferences about the generalizability of political trust theories across the globe may be invalid (Davidov, Meulemann, Cieciuch, Schmidt, & Billiet, 2014).

The issue of comparability results from the fact that people's political trust is a construct. As such, it is a latent property of individuals that cannot be measured directly (Jackman, 2008). Cross-national researchers therefore have to rely on observed measures such as survey items pertaining to trust in different political objects. According to the 'response process model' (Tourangeau, Rips, & Rasinski, 2000), answers to these items allow inferences about people's underlying construct of political trust. Based on this assumption, studies commonly use political trust items to create additive or averaged index scores (see for example Catterberg & Moreno, 2006; Chang & Chu, 2006).

While indices are a common and convenient measurement instrument, the index scores are not necessarily comparable across countries and over time. A key to valid comparisons is to establish the invariance of the measurement instrument. "The general question of invariance of measurement is one of whether or not, under different conditions of observing and studying phenomena, measurement operations yield measures of the same attributes" (Horn & Mcardle, 1992, p. 117). Various forms of bias may systematically distort the invariance of measures (van de Vijver & Tanzer, 2004). For example, asking about people's trust in a political institution such as civil service may be biased because civil service's responsibilities and tasks differ across countries. Or, owing to the translation of the response scales, the difference between 'a great deal of trust' as opposed to 'quite a lot of trust' may not be judged in the same way by respondents from different countries, thereby biasing their responses.

Because of these potential biases, it is essential to test the measurement invariance of the political trust items beforehand. The goal is to determine whether and

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to what extent the proposed measurement model matches the observed structure of the data, thereby supporting the assumption that political trust can be measured across countries by a common set of items using the same number of latent factors (Milfont & Fischer, 2010). If measurement invariance is not tested beforehand, comparisons of observed differences in means may not reflect actual differences in people's average level of political trust and regression coefficients may suggest false relationships. In addition, true country-specific or temporal differences may be obscured (Chen, 2008). Either way, using political trust indices without testing for measurement invariance may lead to invalid conclusions regarding the changes, sources, and consequences of political trust (Ariely & Davidov, 2012; Vandenberg & Lance, 2000).

The lack of a common measurement model of political trust complicates such a test. First, there is no common set of political trust items and second, there is no agreement on the dimensionality of political trust.[1] This is best exemplified by previous cross-country exploratory studies (see Table 1). They reach different conclusions regarding the dimensionality of political trust depending on the estimation method and specifications, the design (pooled or country-specific), and the items used. This lack of consensus hampers valid comparisons.

Recently, several researchers tested the measurement invariance of political trust in European and former Soviet countries by means of multiple group confirmatory factor analysis. This method provides a stringent test because every element of the measurement model (not just the number of factors) is specified beforehand and the model outputs allow researchers to discern the reasons for invariance in detail (Brown, 2006). The studies tested and supported different dimensional models of political trust. Whereas some show that it is a single-dimensional construct, others provide evidence that a two-dimensional model of political trust in representative and implementing institutions reaches different levels of measurement invariance, depending on the countries of analysis and the chosen items (see Table 2).

Given these diverging measures and results, the question of the appropriate measurement model of political trust remains subject to debate. In addition, previous measurement invariance tests of political trust have focused on European and former Soviet countries, neglecting Asia, Africa, and Latin America. The purpose of this article is to determine: To what extent can the measurement invariance of political trust be established across the globe and if so, based on which measurement model?

1 The issue of comparability is further exacerbated by the fact that there is no uniform wording and response scale for political trust items.

Table 1 Previous Cross-Country Exploratory Analyses of the Dimensionality of Political Trust

author(s)	survey	time point/ period	countries	method	trust in							
					gov-ern-ment	parlia-ment	politi-cians	pol. parties	civil service	courts/ legal system	the police	the army
Hooghe & Kern (2015)	ESS	2002-2010	30 (Europe)	principal component analysis (pooled across countries and time)								
Rogge & Kittel (2014)	ESS	2008, 2010	29 (Europe)	principal component analysis (separately for each time point; pooled across countries)								
Lu (2014)	Asia Barometer Survey WVS	2006-2008 2005-2007	5 (Brazil, Russia, India, China, South Africa)	principal component analysis ((1) separately for each country but pooled over time; (2) pooled across countries and time)								
Braun (2013) (1)	EVS/WVS	1994-1999 2005-2007 2008	14 southern, eastern and southeastern European countries	principal component analysis (pooled by country groups; separately for each time point)								

Table 1 continued

author(s)	survey	time point/ period	countries	method	trust in							
					gov-ern-ment	parlia-ment	politi-cians	pol. parties	civil service	courts/ legal system	the police	the army
Zmerli (2013) (2)	ESS	2002, 2004, 2006	European countries (# varies by year)	principle component analysis (separately for each time point and country); specifies no. of components								
Marien (2011a)	ESS	2006, 2008	23 (Europe)	principal component analysis (pooled across countries and time)								
Newton & Zmerli (2011)	WVS	2005-2007	22 democracies	principal component analysis (pooled across countries)								
Oskarsson (2010)	ESS	2002, 2004	23 (Europe)	principal component analysis (pooled across countries)								
Rose & Mishler (2010)	NEB	1993-2004	14 post-Communist countries	principal component analysis (pooled across countries and time)								

Table 1 continued

author(s)	survey	time point/ period	countries	method	trust in							
					gov-ern-ment	parlia-ment	politi-cians	pol. parties	civil service	courts/ legal system	the police	the army
Slomczynski & Janicka (2009)	ESS	2006	23 (Europe)	factor analysis (pooled across countries and separately per country)								
Listhaug & Ringdal (2008)	ESS	2004	24 (Europe)	factor analysis (separately per country); specify no. of factors								
Zmerli & Newton (2008) (3)	ESS US CID	2002-2003 2006	23 (Europe), US	principal component analysis (separately for each country)								
Denters et al. (2007)	CID	1999-2002	13 (Europe)	factor analysis (pooled across countries); specify no. of factors								
Zmerli et al. (2007) (4)	CID	1999-2002	13 (Europe)	principal component analysis (separately for each country)								

Table 1 continued

author(s)	survey	time point/ period	countries	method	trust in							
					gov-ern-ment	parlia-ment	politi-cians	pol. parties	civil service	courts/ legal system	the police	the army
Lühiste (2006)	NBB	2001	3 (Latvia, Lithu-ania, Estonia)	principal com-ponent analysis (pooled across countries)								
Zmerli (2004) (3)	ESS	2002	21 (Europe)	principal com-ponent analysis (separately for each country)								
Fuchs et al. (2002) (5)	WVS	1995-1997	6 (Europe), US	factor analysis (pooled across countries); specify no. of factors								

Note. the analyses also include items measuring trust in (1) the press and unions; (2) European Parliament; (3) European Parliament and the UN; (4) municipal board; (5) 14 additional items measuring political support; the shading of the cells indicates the dimensional structure found in the analyses. Own compilation.

Table 2 Previous Multiple Group Confirmatory Factor Analyses of Political Trust

author(s)	survey	time point/ period	number of countries	level of measurement invariance reached	trust in										
					politicians (1)	political parties (2)	government (3)	parliament (4)	courts (5)	police (6)	regional government (7)	local government (8)	army (9)	EU parliament (10)	UN (11)
Coromina & Davidov (2013)	ESS	2002-2008	7 3	partial metric; partial scalar											
Marien (2011b)	ESS	2004 2006 2008	23 21 22	partial metric	ϕ_{21}	ϕ_{21}			ϕ_{65}	ϕ_{65}					
Marien (2017)	ESS	2012	23	partial scalar	ϕ_{21}	ϕ_{21}			ϕ_{65}	ϕ_{65}					
Schaap & Scheepers (2014)	ESS	2010	19	scalar*	ϕ_{21}	ϕ_{21}									
Ariely (2015)	EVS	2008	32	metric											
Schneider (2017)	LITS II	2010	23	metric											
Schneider (2017)	LITS II	2010	21	partial scalar											
Schneider (2017)	LITS II	2010	29	partial scalar						ϕ_{96}			ϕ_{96}		
Schneider (2017)	LITS II	2010	35	partial metric											
André (2014)	ESS	2008	22	partial scalar	ϕ_{21}	ϕ_{21}			ϕ_{65}	ϕ_{65}				ϕ_{1110}	ϕ_{1110}

Note. the shading of the cells shows the factor structure of political trust in the model tested by the author(s). ϕ indicates an error covariance between the respective items. For example, ϕ_{96} indicates an error covariance between trust in the army and trust in the police. * the analysis focused on the invariance of trust in the police. Own compilation.

The study extends previous analyses in several ways. First, it tests the measurement invariance of political trust on a global scale in 32 electoral and liberal democracies. Second, the analysis provides a detailed debate and conclusion regarding the dimensionality of the construct of political trust. Third, it discusses the suitability of the available items for cross-national comparisons in detail. Overall, the article's conclusions and recommendations can be used to inform future cross-national studies of political trust.

Since "any equivalence procedure can only be implemented successfully if an unambiguous specification of the concept is available" (van Deth, 2013, p. XXI), the article begins by defining political trust and by outlining three competing dimensional models of political trust. The subsequent section describes the research design and the three alternative measurement models of political trust that follow from the dimensional models. In the analysis section, the measurement invariance test of political trust is presented. The article concludes by outlining the implications of the findings and recommendations for the comparative study of political trust.

Competing Dimensional Models of Political Trust

Political trust can be defined as people's positive anticipatory expectation that, despite uncertainty, the conduct of the political trustee in question will be in line with their normative expectations (Miller & Listhaug, 1990; Möllering, 2006).[2] Researchers generally agree that trust in different political trustees such as parliament, the judiciary, and government can be distinguished theoretically (Levi & Stoker, 2000). They disagree on the empirical dimensionality of citizens' construct of political trust, though, resulting in three competing dimensional models.

The first dimensional model proposes a distinction between trust in political authorities and trust in political institutions. Building on Easton's (1975) classic model of political support, several researchers advocate that the two are related but separate dimensions of political trust (Dalton, 2004; Denters, Gabriel, & Torcal, 2007; Norris, 2011). First and foremost, they assume that people perceive abstract and specific trustees separately: Abstract political institutions are characterized by rules that define relationships among political roles, thereby prescribing and constraining the interactions of political actors in general over time; specific politi-

2 To date, there is no commonly accepted definition of political trust. Some conceptualize it as a kind of supportive behavior (Fisher, van Heerde, & Tucker, 2010) whereas others regard it as an attitude (Miller & Listhaug, 1990). Relatedly, the elements of the definitions of political trust that they stipulate do not coincide. Furthermore, some researchers state that the term 'trust' can 'travel' to political institutions without overstretching its conceptual core (Fuchs, Gabriel, & Völkl, 2002). Others maintain that 'trust' in political institutions should be referred to as 'confidence' (Hardin, 2000).

cal incumbents enact and interpret these roles within a particular period of time (March & Olsen, 1989). Second and consequently, while people may not trust the current political incumbents, they do not necessarily doubt that the conduct of the political institution in question will be in line with their normative expectations once the incumbents are no longer in office. At the same time, the two dimensions are related because incumbents affect the perception of the institutions. Proponents of this dimensional model assert that the distinction should be maintained all the same because it may yield more valid insights on the changes, sources, and consequences of political trust (Dalton, 2004; Norris, 2011).

According to the second dimensional model, the distinction between trust in representative and implementing political institutions is more plausible. Several researchers assume that citizens' political trust has two dimensions because people broadly categorize the responsibilities and characteristics of the work of political institutions into two groups. On the one hand, representative political institutions such as political parties, government, and parliament serve to make collectively binding decisions. By and large, their work is characterized by political controversies and competition. On the other hand, implementing political institutions such as the courts and police are responsible for maintaining order and implementing the law. On the whole, political partisanship is less prominent in their daily work (Gabriel, 1999; Pickel & Walz, 1995; Rothstein & Stolle, 2003). Within this group of researchers, there is disagreement regarding the attribution of trust in civil services, though. According to some, it is affected by people's overall trust in implementing political institutions as civil services serve to enact government policies (Gabriel, 1999). According to others, civil service officials may be perceived as agents of government precisely because they implement its laws, thereby politicizing the perception of the trustee (Rothstein & Stolle, 2008). This in turn may cause people to attribute it to their overall trust in representative political institutions. Leaving aside these differences, proponents of this two-dimensional model generally argue that trust in representative and implementing political institutions is related because the latter act on the basis of laws that were drafted and adopted by the former (Fuchs et al., 2002).

Still others have proposed a third, single-dimensional model of political trust. Some state that it especially applies to citizens in newly established democracies who have not had sufficient experience to distinguish between representative and implementing political institutions (Mishler & Rose, 1994). Others maintain that this model also holds in established democracies. This may be because individuals learn to trust at an early age and generalize this socialization experience to the political realm. People's generalized trust attitude is assumed to 'spill up' to political institutions (Mishler & Rose, 2001). Another line of argument suggests that political trust is "a comprehensive assessment of the political culture that is prevalent within a political system" (Hooghe 2011, p. 275). As a system characteristic,

political culture is assumed to impact political actors and institutions alike. As a result, people evaluate political objects and form political trust 'en bloc'. Therefore people are expected to trust political trustees to a greater or lesser extent without making more fine-grained distinctions.

These competing dimensional models suggest three alternative measurement models of political trust for the measurement invariance test. Depending on the dimensional model, the number of latent factors as well as the relational structure between the latent factors and observed items of political trust differ. These dimensional models were therefore translated into measurement models for the analysis.

Research Design

Operationalization

The analysis of the measurement invariance of political trust is based on data from the most recent wave of the World Values Survey (WVS). The WVS is the largest non-commercial, cross-national, time-series survey of public opinion and value preferences. Its most recent wave (wave 6, 2010-2014) covers 57 countries around the world and includes a number of items measuring trust in different political trustees, thereby permitting a measurement invariance test of political trust across the globe (World Values Survey, 2017). Since there is no common set of political trust items, the items that were used most frequently in previous studies of the dimensionality of political trust were selected from those available in the WVS (see Tables 1 and 2): trust in the police, the courts, the government, political parties, parliament, and civil service. The items are measured on an ordinal scale with four response categories. For each of the political trustees, WVS respondents were asked to indicate "how much confidence [they] have in that organization: a great deal of confidence, quite a lot of confidence, not very much confidence, or none at all". The same items were administered to the respondents in the respective national languages. This reduces the chance that the measurement invariance test reflects differences in item-wording rather than actual differences in respondents' construct of political trust across countries. The original data were recoded to include only one kind of missing value and to range from 0 (none at all) to 3 (a great deal of trust).

Case Selection

The study analyzed the measurement invariance of political trust in electoral and liberal democracies. Non-democratic states were excluded because citizens' relationship with and the functional interaction of political trustees such as government and the courts differ in these countries. These differences may impact the way

the construct of political trust develops in people's minds in democracies and non-democracies (Mishler & Rose, 1997).[3] This assumption is substantiated by Schneider's (2017) as well as Schaap and Scheepers' (2014) analysis of the measurement invariance of political trust in European and former Soviet countries. They found that a greater level of measurement invariance could be established once former Soviet autocracies were excluded from the analysis. The study at hand therefore focused on democracies in order to eliminate this possible source of measurement non-equivalence.

The countries included in the study were selected based on Polity IV (Center for Systemic Peace, 2016). Polity IV comprises indicators of institutional autocracy and democracy (Marshall, Gurr, & Jaggers, 2015). Countries' polity score can range from -10 (fully autocratic) to +10 (fully democratic). In line with the threshold provided on the Polity IV website (Marshall & Gurr, 2014), countries were included if their polity score was six or higher in the year the survey was conducted as well as four years prior to this year.

The final sample consisted of 32 countries with 46,315 respondents. The selected countries as well as the sample sizes and missings per item are listed in Table A1 in the appendix.[4] The survey samples are representative of the countries' adult population (World Values Survey, 2017).

3 As Breustedt and Stark (2015) argue, in authoritarian countries it is difficult for citizens to distinguish political institutions because of the lack of a system of checks and balances. In addition, as elections are infrequent or inconsequential, political institutions become mainly associated with the political incumbents. Therefore, people in authoritarian states most likely develop their trust in different political trustees in tandem. According to Rivetti and Cavatorta (2017), political trust in democratic regimes is positive whereas in authoritarian regimes it is negative: "whereas positive political trust can be defined as trust in ethical, legal or just actions undertaken by the ruling authority, negative trust can be defined as trust in the fact that the authority will act predictably" (Rivetti & Cavatorta, 2017, p. 60). Still, political trust in authoritarian countries is not necessarily devoid of positive normative expectations. People's normative expectations of political trustees may simply differ in authoritarian countries. Either way, measures of political trust in democracies and autocracies are not likely to be equivalent as responses to the same items are susceptible to construct bias.

4 Table A1 reports the original sample sizes. Most items have less than 5% missing per country. Two issues stand out: Trust in civil service has > 5% missing in nine countries, 18.4% of the cases for trust in government are missing in Lebanon, and Japan is the country with the largest amount of missing data. Cases were dropped if they had missings on all six items for the analysis. Respondents from the WVS wave 6 survey in India, conducted in 2012, were excluded because the wave 6 data file also includes a more recent Indian survey sample from 2014. 'Pairwise present' was used to handle missing data (Asparouhov & Muthén, 2010).

Method

The measurement invariance (MI) of political trust was tested using multiple group confirmatory factor analysis (MGCFA). Alternative methods include item response theory and latent class analysis (Davidov et al., 2014; Kankaraš, Vermunt, & Moors, 2011; Millsap, 2011). The study used MGCFA because it is a widely applied method to test MI and because previous studies of the MI of political trust used this method.

The analysis was conducted in three stages. Because there is no agreed upon measurement model of political trust, first, confirmatory factor analysis (CFA) was used to determine the model fit of the three alternative models derived from the dimensional models outlined above in each of the 32 countries. The best-fitting model served as the baseline model in the second step, the simultaneous analysis of MI across countries by means of MGCFA. Based on these empirical results as well as theoretical considerations, in the third step, this measurement model was revised and subsequently tested for MI.

Consonant with the three dimensional models described earlier, three measurement models were developed as possible baseline models for the MI test (see Figures 1 to 3).[5] Civil service was specified to load on trust in representative institutions in line with previous exploratory analyses (see Table 1). None of the models included any error correlations. In the two-dimensional models, the latent factors were assumed to correlate.

The study took account of the ordinal measurement scale of the items. Lubke and Muthén (2004) have shown that treating ordered-categorical data as continuous may yield estimates that suggest that the factor structure found in different countries differs when, in fact, it is equivalent. To circumvent this issue, the study followed a common approach to estimate latent variable models for ordered-categorical items – the latent response variable model (Muthén & Asparouhov, 2002).

This approach is outlined briefly as it affects the way MI tests are conducted. As indicated in Figures 1 to 3, the model estimation based on the latent response variable model assumes that the latent factor(s) of political trust (ξ_i) cause(s) the variance and covariance among latent response variables of political trust in six different political trustees (χ^*_i). The latent response variables are taken to have a continuous and normally distributed scale. Their relationship with the latent factor(s) is understood to be linear. Thus, as in standard MGCFA with continuous items, each latent response variable has a factor loading (λ_i), an intercept (τ_i), and an error term. The latent response variables are assumed to be the unobserved

5 Some researchers have distinguished between trust in political actors, representative political institutions, and implementing political institutions (Denters et al., 2007; Gabriel, 1999). This three-dimensional model could not be tested because of the limited number of survey items available in the WVS.

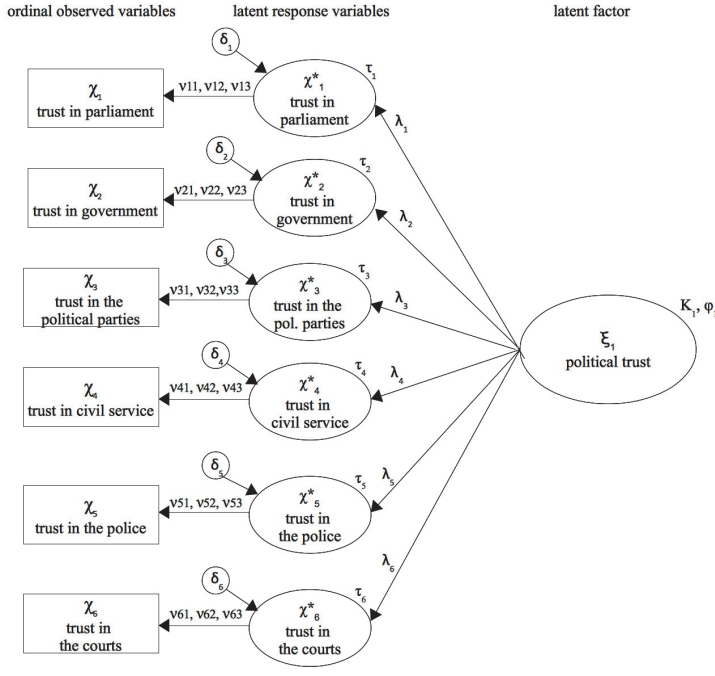

Figure 1 Single-dimensional measurement model of political trust. Adapted from Davidov et al. (2011) and Poznyak et al. (2014). ξ (ksi): latent factor, κ (kappa): latent mean, φ (phi): factor variance, λ (lambda): factor loading, χ* (chi): latent response variable, τ (tau): intercept, δ (delta): error variance, χ (chi): observed variable, ν (nu): threshold.

latent counterparts of the observed ordered-categorical items of political trust (χ_i). The continuous nature of the latent response variables is roughly captured by the ordered-categorical response scale of the respective observed items. Each pair of response categories of the items represents a section of the continuous scale of the corresponding latent response variable. Each section therefore ends with a threshold (ν_{ij}). As a result, each latent response variable is related to its corresponding observed item through a set of thresholds, whereby the number of thresholds corresponds to the number of response categories minus one. Since the political trust items have four ordered response categories, the latent response variables each have three thresholds. That is to say, if χ_1 represents the ordinal item of trust in parliament and χ^*_1 stands for the latent response variable of trust in parliament, χ^*_1 reflects the amount of political trust needed to select a certain response category of χ_1. An observed response of '0' (none at all) in trust in parliament is expected if the level of χ^*_1 is less than or equal to the first threshold ν_{11}. If χ^*_1 is greater than ν_{11} but less than or equal to the second threshold ν_{12}, the predicted response is '1' (not very

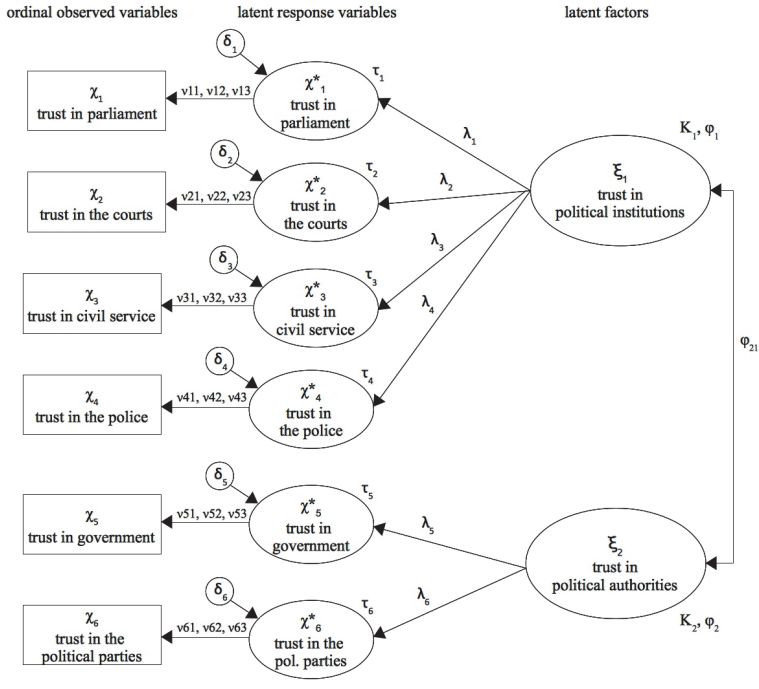

Figure 2 Two-dimensional measurement model of trust in political authorities and political institutions. Adapted from Davidov et al. (2011) and Poznyak et al. (2014). ξ (ksi): latent factor, κ (kappa): latent mean, φ (phi): factor variance, λ (lambda): factor loading, χ* (chi): latent response variable, τ (tau): intercept, δ (delta): error variance, χ (chi): observed variable, ν (nu): threshold.

much confidence). If the latent response variable of trust in parliament χ^*_1 is greater than ν_{12} but less than or equal to the third threshold ν_{13}, the predicted response is '2' (quite a lot of confidence). $\chi^*_1 > \nu_{13}$ corresponds to a response of '3' (a great deal of confidence) (Byrne, 2012; Kline, 2016; Millsap & Yun-Tein, 2004; Muthén & Asparouhov, 2002).

Accounting for the ordinal nature of the political trust items affects the parameters that have to be invariant across countries in order for MI to hold and, relatedly, the levels of MI that can be tested. The invariance of factor loadings, intercepts, and (unlike in the case of continuous variables) thresholds has to be considered (Davidov, Datler, Schmidt, & Schwartz, 2011; Millsap & Yun-Tein, 2004). Researchers can test to what extent these parameters are invariant by applying increasingly restrictive equality constraints in MGCFA and examining the respective model fit by means of goodness-of-fit indices. In the case of ordered-categorical data, only two levels of MI are tested, namely configural and full MI (Davidov et al., 2011).

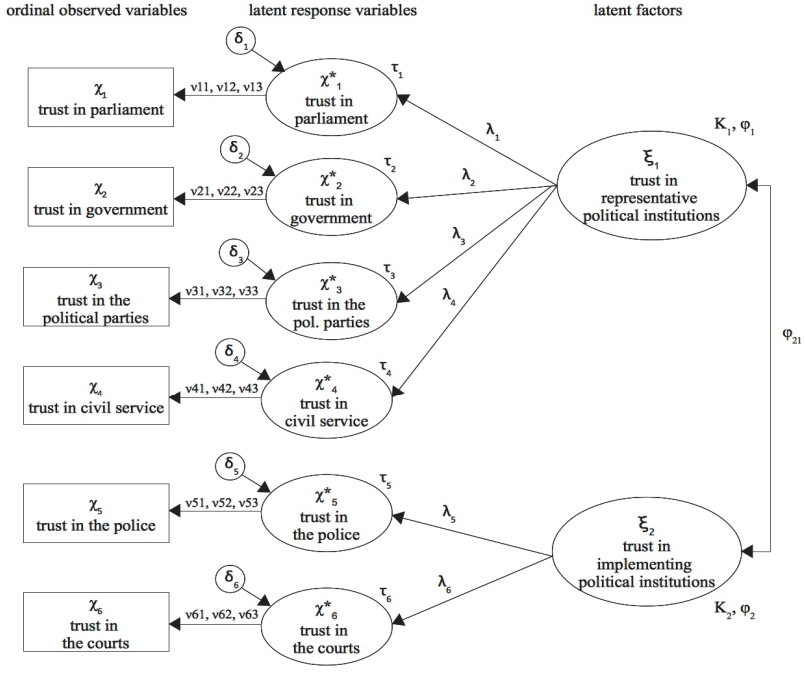

Figure 3 Two-dimensional measurement model of trust in representative and implementing political institutions. Adapted from Davidov et al. (2011) and Poznyak et al. (2014). ξ (ksi): latent factor, κ (kappa): latent mean, φ (phi): factor variance, λ (lambda): factor loading, χ* (chi): latent response variable, τ (tau): intercept, δ (delta): error variance, χ (chi): observed variable, ν (nu): threshold.

When testing for configural invariance, the estimated parameters are allowed to differ across countries. The test shows whether the number of factors and the pattern of fixed and free item factor loadings is the same across countries (Vandenberg & Lance, 2000). If this model fits the data, it may be inferred that people in different countries respond to political trust items with the same construct in mind (Chen, 2008). If not, country-specific measures may be required (Pendergast, von der Embse, Kilgus, & Eklund, 2017). Configural invariance is a prerequisite for full MI. Full MI requires the unstandardized factor loadings, intercepts, and thresholds to be equal (Davidov et al., 2011). If full MI is supported by the data, it can be inferred that the items measure the same latent construct, albeit with different degrees of precision because the error variances and covariances were not constrained to be equal (Kline, 2016). In addition, full MI implies that people in the

respective countries use the response scale in the same manner (Poznyak, Meulemann, Abts, & Bishop, 2014).[6]

The ordered-categorical nature of the data has a bearing on the appropriate choice of the method of estimation. As Brown (2006) notes, ignoring the fact that the data may be non-normally distributed could lead to incorrect parameter estimates, standard errors, and test statistics. The analyses were therefore run with the mean- and variance-adjusted weighted least squares (WLSMV) estimator in Mplus (Version 8) using the raw data. This estimator provides robust standard errors and (more) accurate estimates of factor loadings as well as corrected model test statistics. As Beauducel and Herzberg (2006) showed, it is superior to maximum likelihood estimation especially when the number of response categories is small, as in the case of the present study.

In order to conduct MI analyses, the scale of the latent factors has to be defined. Because latent factors are unobserved, they have no definite metric scale. In MGCFA, there are two common ways to establish this scale – the reference indicator method and the fixed factor method. When using the latter, the factor variances of the latent factors are fixed to one in all countries. This assumes that the factor variances are equal across countries. When applying the former, one factor loading per latent factor is fixed to one in all countries. Here the assumption is that this factor loading is invariant (Byrne, 2012). With regard to political trust, there is no evidence to justify either assumption. In this study, the reference indicator method was used because it was more straightforward to make a case for using single reference indicators.[7]

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6 Unlike in the case of continuous data, the invariance of factor loadings alone does not establish comparability of the political trust measure because the item probability curves depend on the factor loadings, intercepts, and thresholds (Davidov et al., 2011; Muthén & Asparouhov, 2002). As a result, only two levels of measurement invariance were tested unlike in previous measurement invariance tests of political trust (Table 2). See Bowen and Masa (2015) for a summary of arguments in favor and against this practice.

7 In order to choose appropriate reference indicators, two exploratory factor analyses (EFA) were carried out per country (principal axis extraction; promax rotation). In the single-factor EFA, trust in parliament was the marker item in 22 out of 32 countries. In the two-factor EFA, in 28 out of 32 countries, trust in parliament was the item that loaded most strongly on one latent factor and in 17 out of 32 countries, trust in the police was the marker item of the other latent factor. Consequently, trust in parliament was used as the reference indicator in the single-dimensional model and trust in parliament as well as trust in the police were used as reference indicators in the two-dimensional model of trust in implementing and representative institutions. Trust in parliament and trust in government were used as reference indicators in the two-dimensional model of trust in political authorities and institutions. Trust in government was chosen because the author deemed it more likely that government is perceived in a comparable manner across countries compared to political parties because its structure and functions are more similar, differences notwithstanding. Table A2 in the appendix includes a robust-

Depending on the level of MI tested, additional parameters have to be fixed in order for the measurement model to be identified. The choice depends in part on the computer program and the model parameterization. Mplus was chosen because of its flexibility when testing the invariance of ordered-categorical items (Millsap & Yun-Tein, 2004). In practice, thresholds (ν_i) and intercepts (τ_i) cannot be estimated simultaneously. By default, Mplus fixes all intercepts of the latent response variables to zero, thereby allowing researchers to test the MI of thresholds (Davidov et al., 2011). In addition, Mplus offers two parameterization methods – delta and theta parameterization. Unlike delta parameterization, theta parameterization includes error variances for the latent response variables (δ) as estimated parameters (Muthén & Muthén, 1998-2017). This study used theta parameterization as previous MGCFAs (see Table 2) indicated that the error variances of some of the items might be correlated. In order to identify the measurement models, the following parameters were fixed. In the configural invariance model, one factor loading per latent factor as well as the error variances were fixed to one and the factor means were fixed to zero in all countries. In the full MI model, one factor loading per latent factor was fixed to one in all countries and the remaining factor loadings as well as the thresholds were constrained to be equal. In addition, the error variances were fixed to one and the factor means were fixed to zero in the reference country[8] and freely estimated in the other countries (Muthén & Muthén, 1998-2017).

The overall fit of the measurement models to the data was evaluated according to several criteria. X^2 as the classic fit index indicates exact fit between the estimated model parameters and the observed data. While this is informative, it is an unduly strong assumption for real-world data. In addition, X^2 is sensitive to sample size (Byrne, 2012; Meade, Johnson, & Braddy, 2008). Consequently, the goodness of fit evaluation was informed by the X^2 results but focused on three additional fit indices: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis-Index (TLI). The 90% confidence interval of the RMSEA is provided to show how precise its point estimates are (MacCallum, Browne, & Sugawara, 1996). Following Yu (2002), the following cut-off criteria were used: TLI $\geq$0.95, CFI $\geq$0.96, and RMSEA $\leq$ 0.05.

The analysis also considered focal areas of ill fit. The proportion of variance of the indicator explained by the latent factor ('R-Square' in Mplus) was used to evaluate whether the items were meaningfully related to the respective latent factor. The extent of the correlation between the latent factors was taken into account to determine discriminant validity between the latent factors in case of the two-dimensional models of political trust (Brown, 2006). In addition, the study followed a dual modal two-pronged strategy proposed by Byrne and van de Vijver (2010).

ness test for Model A of the MGCFA (see Table 7). The analysis was not sensitive to the selection of these reference indicators.

8 Model C2: Australia; Model C3: Poland.

They suggest looking for patterns of misspecification that indicate that individual items, individual countries or groups of countries are the reason for measurement non-invariance. Modification indices, which approximate how much the model fit (X^2) would improve if the constrained or fixed parameter in question was freely estimated, can be used to discern such patterns (Brown, 2006). Because of X^2's sensitivity to sample size, it was considered in tandem with the respective expected parameter of change (EPC) value. Overall, these criteria provided information on the fit of the measurement models as well as how to revise the measurement models in order to establish full invariance.

Analysis

Establishing the Baseline Model of Political Trust

The first step in testing the MI of political trust on a global scale was to establish the baseline model. Tables 3 to 5 present the overall goodness-of-fit indices for each of the three alternative measurement models tested separately in 32 countries. In terms of CFI and TLI, the two-factor model of trust in political authorities and political institutions yielded the worst fit. As shown in Table 3, the two indices were above the recommended cut-off value in only five out of 32 countries. The RMSEA did not support the model in any of the countries. The latent covariance matrix of the factors was not positive definite in six countries. In all six countries, this was because the latent factor correlation was estimated to have an out of range value (> 1.0), signifying model misspecification because some or all of the items of one latent factor were more strongly related to some or all of the items of the other latent factor (Brown, 2006). In comparison, the single-factor model of political trust fit the data better (see Table 4). The CFI and TLI indicated good model fit in eight out of 32 countries. Finally, the two-factor model of trust in implementing and representative political institutions fit the data best (see Table 5). In 28 out of 32 countries, the CFI and TLI were above the recommended cut-off values. Furthermore, only in this model was the RMSEA smaller than 0.05 in two countries and its confidence interval indicated a good precision of this point estimate.

Table 3 Fit Measures for the Two-Factor Confirmatory Factor Analysis of Trust in Political Authorities and Political Institutions

country	n	χ^2 (df)	p-value	CFI	TLI	RMSEA (90% CI)	summary
all countries	46315	17403.165 (8)	0.00	0.953	0.912	0.217 (0.214-0.219)	
Argentina	1025	330.017 (8)	0.00	0.956	0.917	0.198 (0.180-0.217)	
Australia	1453	336.644 (8)	0.00	**0.966**	0.936	0.168 (0.153-0.184)	
Brazil	1486	the latent variable covariance matrix is not positive definite					
Chile	999	the latent variable covariance matrix is not positive definite					
Colombia	1509	the latent variable covariance matrix is not positive definite					
Cyprus	999	437.876 (8)	0.00	0.941	0.890	0.232 (0.214-0.251)	
Estonia	1531	781.502 (8)	0.00	0.948	0.902	0.251 (0.237-0.266)	
Georgia	1185	759.328 (8)	0.00	**0.965**	0.935	0.282 (0.265-0.299)	
Germany	2043	715.828 (8)	0.00	**0.960**	0.925	0.208 (0.195-0.221)	
Ghana	1552	the latent variable covariance matrix is not positive definite					
India	1578	149.767 (8)	0.00	0.880	0.774	0.106 (0.092-0.121)	
Japan	2350	1467.502 (8)	0.00	**0.975**	**0.954**	0.279 (0.267-0.291)	(√)
Lebanon	1183	68.742 (8)	0.00	**0.979**	**0.961**	0.080 (0.063-0.098)	(√)
Malaysia	1299	the latent variable covariance matrix is not positive definite					
Mexico	2000	410.193 (8)	0.00	**0.972**	0.947	0.159 (0.146-0.172)	
Netherlands	1849	818.027 (8)	0.00	**0.982**	**0.967**	0.234 (0.221-0.248)	(√)
New Zealand	812	236.709 (8)	0.00	**0.962**	0.930	0.188 (0.167-0.209)	
Peru	1206	291.760 (8)	0.00	**0.971**	0.945	0.171 (0.155-0.189)	
Philippines	1200	438.337 (8)	0.00	0.940	0.888	0.212 (0.195-0.229)	
Poland	957	304.620 (8)	0.00	**0.968**	0.939	0.197 (0.178-0.216)	
Romania	1488	742.378 (8)	0.00	**0.960**	0.924	0.248 (0.233-0.264)	
Slovenia	1060	298.563 (8)	0.00	**0.980**	**0.963**	0.185 (0.167-0.203)	(√)
South Africa	3477	973.607 (8)	0.00	**0.971**	0.946	0.186 (0.177-0.196)	
South Korea	1198	the latent variable covariance matrix is not positive definite					
Spain	1180	287.923 (8)	0.00	0.943	0.894	0.172 (0.155-0.190)	
Sweden	1205	516.348 (8)	0.00	0.948	0.902	0.230 (0.213-0.247)	
Taiwan	1204	224.002 (8)	0.00	**0.976**	**0.956**	0.150 (0.133-0.167)	(√)
Trinidad and Tobago	994	503.494 (8)	0.00	**0.960**	0.926	0.250 (0.231-0.268)	
Turkey	1593	528.707 (8)	0.00	0.951	0.909	0.202 (0.188-0.217)	
Ukraine	1500	934.882 (8)	0.00	**0.968**	0.941	0.278 (0.263-0.293)	
United States	2205	1429.113 (8)	0.00	0.931	0.871	0.284 (0.272-0.296)	
Uruguay	995	431.481 (8)	0.00	0.943	0.893	0.231 (0.212-0.249)	

Note. WLSMV estimator (theta parameterization), pairwise present was used to handle missing data (Asparouhov & Muthén, 2010), df = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis-Index, RMSEA = root mean square error of approximation, 90% CI = 90% confidence interval, parameter of fit values above the recommended thresholds (Yu, 2002) are in bold, summary (√) indicates that two out of three fit indices are above the recommended thresholds, summary √ indicates that CFI, TLI, and RMSEA are above the recommended thresholds. Data are from the World Values Survey 2010-2014, 32 countries.

Table 4 Fit Measures for the Single-Factor Confirmatory Factor Analysis of Political Trust

country	n	χ^2 (df)	p-value	CFI	TLI	RMSEA (90% CI)	summary
all countries	46315	18131.958 (9)	0.00	0.951	0.919	0.209 (0.206-0.211)	
Argentina	1025	339.428 (9)	0.00	0.954	0.924	0.189 (0.172-0.207)	
Australia	1453	342.404 (9)	0.00	**0.965**	0.942	0.160 (0.145-0.174)	
Brazil	1486	467.487 (9)	0.00	0.947	0.911	0.185 (0.171-0.200)	
Chile	999	194.345 (9)	0.00	**0.977**	**0.962**	0.144 (0.126-0.161)	(√)
Colombia	1509	603.427 (9)	0.00	0.951	0.919	0.209 (0.195-0.224)	
Cyprus	999	478.871 (9)	0.00	0.936	0.893	0.229 (0.211-0.246)	
Estonia	1531	803.514 (9)	0.00	0.946	0.911	0.240 (0.226-0.254)	
Georgia	1185	804.307 (9)	0.00	**0.963**	0.938	0.273 (0.257-0.289)	
Germany	2043	739.886 (9)	0.00	0.959	0.931	0.199 (0.187-0.212)	
Ghana	1552	519.222 (9)	0.00	0.931	0.885	0.191 (0.177-0.205)	
India	1578	158.753 (9)	0.00	0.873	0.788	0.103 (0.089-0.117)	
Japan	2350	1593.134 (9)	0.00	**0.973**	**0.956**	0.274 (0.262-0.285)	(√)
Lebanon	1183	81.557 (9)	0.00	**0.975**	**0.959**	0.083 (0.067-0.099)	(√)
Malaysia	1299	878.559 (9)	0.00	0.955	0.925	0.273 (0.258-0.288)	
Mexico	2000	411.296 (9)	0.00	**0.972**	**0.953**	0.149 (0.137-0.162)	(√)
Netherlands	1849	891.088 (9)	0.00	**0.981**	**0.968**	0.230 (0.218-0.243)	(√)
New Zealand	812	245.580 (9)	0.00	**0.961**	0.935	0.180 (0.161-0.200)	
Peru	1206	294.694 (9)	0.00	**0.971**	**0.951**	0.162 (0.147-0.178)	(√)
Philippines	1200	437.427 (9)	0.00	0.940	0.901	0.199 (0.183-0.215)	
Poland	957	319.692 (9)	0.00	**0.966**	0.944	0.190 (0.172-0.208)	
Romania	1488	768.958 (9)	0.00	0.958	0.930	0.238 (0.224-0.253)	
Slovenia	1060	339.944 (9)	0.00	**0.978**	**0.963**	0.186 (0.170-0.203)	(√)
South Africa	3477	1041.826 (9)	0.00	**0.969**	0.949	0.182 (0.172-0.191)	
South Korea	1198	814.982 (9)	0.00	**0.964**	0.940	0.273 (0.258-0.289)	
Spain	1180	395.232 (9)	0.00	0.922	0.870	0.191 (0.175-0.207)	
Sweden	1205	546.657 (9)	0.00	0.945	0.908	0.223 (0.207-0.239)	
Taiwan	1204	222.983 (9)	0.00	**0.977**	**0.961**	0.141 (0.125-0.157)	(√)
Trinidad and Tobago	994	546.575 (9)	0.00	0.957	0.928	0.245 (0.228-0.263)	
Turkey	1593	570.242 (9)	0.00	0.948	0.913	0.198 (0.184-0.212)	
Ukraine	1500	1003.718 (9)	0.00	**0.966**	0.943	0.271 (0.257-0.286)	
United States	2205	1479.265 (9)	0.00	0.929	0.882	0.272 (0.261-0.284)	
Uruguay	995	442.719 (9)	0.00	0.942	0.903	0.220 (0.203-0.238)	

Note. WLSMV estimator (theta parameterization), pairwise present was used to handle missing data (Asparouhov & Muthén, 2010), df = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis-Index, RMSEA = root mean square error of approximation, 90% CI = 90% confidence interval, parameter of fit values above the recommended thresholds (Yu, 2002) are in bold, summary (√) indicates that two out of three fit indices are above the recommended thresholds, summary √ indicates that CFI, TLI, and RMSEA are above the recommended thresholds. Data are from the World Values Survey 2010-2014, 32 countries.

Table 5 Fit Measures for the Two-Factor Confirmatory Factor Analysis of Political Trust in Implementing and Representative Political Institutions

country	n	χ^2 (df)	p-value	CFI	TLI	RMSEA (90% CI)	summary
all countries	46315	4004.959 (8)	0.000	**0.989**	**0.980**	0.104 (0.101-0.107)	(√)
Argentina	1025	25.885 (8)	0.001	**0.998**	**0.995**	**0.047** (0.027-0.067)	√
Australia	1453	149.490 (8)	0.00	**0.985**	**0.972**	0.110 (0.095-0.126)	(√)
Brazil	1486	278.099 (8)	0.00	**0.969**	0.941	0.151 (0.136-0.166)	
Chile	999	195.118 (8)	0.00	**0.977**	**0.956**	0.153 (0.135-0.172)	(√)
Colombia	1509	522.132 (8)	0.00	0.958	0.921	0.206 (0.192-0.222)	
Cyprus	999	82.736 (8)	0.00	**0.990**	**0.981**	0.097 (0.078-0.116)	(√)
Estonia	1531	221.914 (8)	0.00	**0.986**	**0.973**	0.132 (0.117-0.147)	(√)
Georgia	1185	316.563 (8)	0.00	**0.986**	**0.973**	0.180 (0.164-0.198)	(√)
Germany	2043	128.285 (8)	0.00	**0.993**	**0.987**	0.086 (0.073-0.099)	(√)
Ghana	1552	168.182 (8)	0.00	**0.978**	**0.960**	0.114 (0.099-0.129)	(√)
India	1578	129.277 (8)	0.00	0.897	0.807	0.098 (0.084-0.113)	
Japan	2350	117.045 (8)	0.00	**0.998**	**0.997**	0.076 (0.064-0.089)	(√)
Lebanon	1183	28.580 (8)	0.00	**0.993**	**0.987**	**0.047** (0.029-0.066)	√
Malaysia	1299	556.899 (8)	0.00	**0.972**	0.947	0.230 (0.214-0.246)	
Mexico	2000	211.765 (8)	0.00	**0.986**	**0.973**	0.113 (0.100-0.126)	(√)
Netherlands	1849	213.724 (8)	0.00	**0.995**	**0.992**	0.118 (0.105-0.132)	(√)
New Zealand	812	48.940 (8)	0.00	**0.993**	**0.987**	0.079 (0.059-0.101)	(√)
Peru	1206	102.030 (8)	0.00	**0.990**	**0.982**	0.099 (0.082-0.116)	(√)
Philippines	1200	187.409 (8)	0.00	**0.975**	**0.953**	0.137 (0.120-0.154)	(√)
Poland	957	96.655 (8)	0.00	**0.990**	**0.982**	0.108 (0.089-0.127)	(√)
Romania	1488	195.538 (8)	0.00	**0.990**	**0.981**	0.126 (0.111-0.141)	(√)
Slovenia	1060	56.482 (8)	0.00	**0.997**	**0.994**	0.076 (0.058-0.095)	(√)
South Africa	3477	467.079 (8)	0.00	**0.986**	**0.975**	0.128 (0.119-0.139)	(√)
South Korea	1198	564.953 (8)	0.00	**0.975**	**0.953**	0.241 (0.224-0.258)	(√)
Spain	1180	156.665 (8)	0.00	**0.970**	0.944	0.125 (0.109-0.143)	
Sweden	1205	98.056 (8)	0.00	**0.991**	**0.983**	0.097 (0.080-0.114)	(√)
Taiwan	1204	112.167 (8)	0.00	**0.989**	**0.979**	0.104 (0.087-0.121)	(√)
Trinidad and Tobago	994	102.419 (8)	0.00	**0.992**	**0.986**	0.109 (0.091-0.128)	(√)
Turkey	1593	204.398 (8)	0.00	**0.982**	**0.966**	0.124 (0.110-0.139)	(√)
Ukraine	1500	108.100 (8)	0.00	**0.997**	**0.994**	0.091 (0.076-0.107)	(√)
United States	2205	537.652 (8)	0.00	**0.974**	**0.952**	0.173 (0.161-0.186)	(√)
Uruguay	995	54.921 (8)	0.00	**0.994**	**0.988**	0.077 (0.058-0.097)	(√)

Note. WLSMV estimator (theta parameterization), pairwise present was used to handle missing data (Asparouhov & Muthén, 2010), df = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis-Index, RMSEA = root mean square error of approximation, 90% CI = 90% confidence interval, parameter of fit values above the recommended thresholds (Yu, 2002) are in bold, summary (√) indicates that two out of three fit indices are above the recommended thresholds, summary √ indicates that CFI, TLI, and RMSEA are above the recommended thresholds. Data are from the World Values Survey 2010-2014, 32 countries.

At the same time, the inspection of focal areas of ill fit of the CFAs of the two-factor model of trust in implementing and representative political institutions suggested several items and countries of concern. X^2 strongly varied across countries, ranging from 564.953 in South Korea to 25.885 in Argentina (see Table 5). The standardized correlation coefficient between the two latent factors was > .85 in five countries, indicating low discriminant validity (see Table 6). These aspects point to possible countries as a reason for measurement non-invariance. As for the items, 'trust in civil service' was the item with the lowest proportion of explained variance in 21 countries (see Table 6). In addition, the modification and expected parameter change indices recommended a positive cross-loading between the latent factor 'trust in implementing political institutions' and the item 'trust in civil service' in 17 countries. In 13 countries, this modification index value was the largest among all suggested cross-loadings between a latent factor of political trust and a political trust item (see Table 6). This indicates that 'trust in civil service' is an ambiguous item not as meaningfully related to the construct of political trust as the other items. Furthermore, in 22 countries, the modification and expected parameter change indices for error co-variances pointed out that the model fit would improve if a cross-loading were added between 'trust in parliament' and 'trust in political parties'. This modification index was the largest value for suggested error correlations in nine countries (see Table 6).

Based on these results, the two-factor model of trust in implementing and representative political institutions was chosen as the baseline model for the MGCFA. The focal areas of ill fit informed its revision for the MI test across countries.

Table 6 Focal Areas of Ill Fit in the Two-Factor Confirmatory Factor Analysis of Political Trust in Implementing and Representative Political Institutions per Country

	focal areas of ill fit			
country	political trust item with the lowest explained variance	largest modification index for cross-loadings between a latent factor of political trust and a political trust item*	largest modification index for error correlation*	factor correlation >.85
Argentina	police	---	parliament and police (neg.)	
Australia	police	ξ2 **and civil service**	**parliament and political parties**	
Brazil	**civil service**	ξ2 and government	**parliament and political parties**	
Chile	police	ξ2 and government	government and police	x
Colombia	police	ξ2 and government	government and court	x
Cyprus	**civil service**	ξ2 and government	civil service and parliament	
Estonia	**civil service**	ξ2 **and civil service**	**parliament and political parties**	
Georgia	**civil service**	ξ2 **and civil service**	civil service and police	
Germany	**civil service**	ξ2 **and civil service**	civil service and police	
Ghana	**civil service** and political parties	ξ2 and government	government and court	
India	political parties	ξ2 and government	**parliament and political parties**	
Japan	court	ξ2 **and civil service**	political parties and government	
Lebanon	**civil service**	---	parliament and government (neg.)	
Malaysia	**civil service**	ξ2 and government	**parliament and political parties**	x
Mexico	police	ξ2 and government	government and court	
Netherlands	**civil service**	ξ2 **and civil service**	civil service and police	
New Zealand	**civil service**	ξ2 and political parties (neg.)	political parties and court (neg.)	

Table 6 continued

country	focal areas of ill fit			
	political trust item with the lowest explained variance	largest modification index for cross-loadings between a latent factor of political trust and a political trust item*	largest modification index for error correlation*	factor correlation >.85
Peru	police	ξ_2 and government	government and court	
Philippines	**civil service**	ξ_2 and government	government and court	
Poland	police	ξ_2 **and civil service**	**parliament and political parties**	
Romania	**civil service**	ξ_2 **and civil service**	civil service and police	
Slovenia	police	---	civil service and parliament	
South Africa	**civil service**	ξ_2 and government	government and court	x
South Korea	**civil service**	ξ_2 and government	**parliament and political parties**	
Spain	**civil service**	ξ_2 **and civil service**	political parties and government	
Sweden	**civil service**	ξ_2 **and civil service**	civil service and court	
Taiwan	**civil service**	ξ_2 and government	**parliament and political parties**	x
Trinidad and Tobago	**civil service**	ξ_2 **and civil service**	civil service and court	
Turkey	political parties	ξ_2 **and civil service**	civil service and government (neg.)	
Ukraine	**civil service**	ξ_2 and government	**parliament and political parties**	
United States	**civil service**	ξ_2 **and civil service**	civil service and police	
Uruguay	**civil service**	ξ_2 and government	government and court	

Note. ξ_2 = latent factor of trust in implementing political institutions, * positive expected parameter change unless otherwise indicated, (neg.) = expected parameter change is negative

Table 7 Fit Measures for the Multiple Group Confirmatory Factor Analysis of Political Trust

Model	χ^2 (df)	p-value	CFI	TLI	RMSEA (90% CI)
Model A (all items and countries)					
1. Configural invariance	6457.907 (256)	0.00	**0.987**	**0.976**	0.129 (0.127-0.132)
Model B (excluding trust in civil service)					
1. Configural invariance	3915.855 (128)	0.00	**0.991**	**0.978**	0.143 (0.139-0.147)
Model C1 (excluding trust in civil service, correlated error between trust in parliament and trust in political parties)					
1. Configural invariance	919.890 (96)	0.00	**0.998**	**0.994**	0.077 (0.073-0.082)
Model C2 (excluding trust in civil service, correlated errors between trust in parliament and trust in political parties, including Australia, Brazil, Cyprus, Estonia, Georgia, Germany, Ghana, India, Japan, New Zealand, Philippines, Poland, Romania, Slovenia, South Korea, Sweden, Trinidad & Tobago, Ukraine, Uruguay)					
1. Configural invariance	235.782 (57)	0.00	**0.999**	**0.998**	**0.048 (0.042-0.055)**
2. Full invariance	5430.023 (255)	0.00	**0.980**	**0.985**	0.123 (0.120-0.126)
Model C3 (excluding trust in civil service, correlated errors between trust in parliament and trust in political parties, including Poland, Romania, Slovenia)					
2. Full invariance	115.991 (31)	0.00	**0.998**	**0.998**	**0.048 (0.039-0.058)**

Note. WLSMV estimator (theta parameterization), pairwise present was used to handle missing data (Asparouhov & Muthén, 2010), df = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis-Index, RMSEA = root mean square error of approximation, 90% CI = 90% confidence interval, parameter of fit values above the recommended thresholds (Yu, 2002) are in bold. Data are from the World Values Survey 2010-2012, 32 countries.

Testing the Measurement Invariance of Political Trust

Table 7 presents the results of the MI test of political trust in 32 democracies across the globe. Initially, the configural invariance of the baseline model was tested (Model A). While the CFI and TLI indicated good model fit, the RMSEA was well above the cut-off criterion. Paying heed to the focal areas of ill fit that were discerned in the single-country CFAs (see Tables 5 and 6), trust in civil service was

excluded from the measurement model (Model B). This improved the CFI and TLI somewhat and the X^2 notably.

Again based on the findings from the single-country CFAs, errors of trust in parliament and trust in political parties were then allowed to correlate (Model C1). This error correlation indicates that the two measurement errors are systematically related because some of the shared variance of the two items is due to another common outside cause. Substantively, most likely, this is because political parties play a major role in parliament unlike in the other political institutions. The model adjustment considerably improved the X^2, the CFI and TLI as well as the RMSEA. The latter remained above the recommended cutoff criterion, however.

Based on the results of Model C1, 13 countries were excluded because of model fit issues – eight countries because the factor correlation exceeded .85[9], two countries because the cross-loading between trust in parliament and trust in political parties was not significant (Argentina)[10] or negative (Spain) and three countries because the highest modification index indicated ill specification owing to a missing cross-loading between the latent factor trust in implementing institutions and trust in political parties (Netherlands: 158.388, Turkey: 69.156), and trust in government and trust in the courts (USA: 161.571) (Model C2). Model C2 – including 19 electoral and liberal democracies – reached configural invariance. In all of these countries, the model fit the data well: the unstandardized factor loadings and error correlation were significant at the .05 level; the size of the completely standardized factor loadings was substantial and their direction positive, as expected; the completely standardized factor correlations were all <.85; the error variances were positive and the modification indices were all < 26. Model C2 did not reach full invariance, however.[11]

When the data do not support full invariance, researchers have several options (Davidov, Dülmer, Schlüter, Schmidt, & Meulemann, 2012). A popular strategy is to test for partial MI, that is, to test for the equivalence of some but not all factor loadings and thresholds (Byrne, Shavelson, & Muthén, 1989). Previous MI tests of political trust have commonly opted for this solution (see Table 2). Especially in large-N studies, however, discerning patterns in modification indices to determine which parameters should be estimated freely becomes increasingly unwieldy (Byrne & van de Vijver, 2010).

Another, hitherto unexplored alternative to this data-driven solution in MI tests of political trust is a theory-driven strategy. Byrne and van de Vijver (2010) suggest testing the MI of subsamples of countries clustered according to a theoreti-

9 Chile, Colombia, Lebanon, Malaysia, Mexico, Peru, South Africa, and Taiwan.

10 This cross-loading was also non-significant in Lebanon.

11 In addition, in Model C2 the residual covariance matrix was not positive definite in Japan. The residual variance for trust in government was negative, indicating that the estimated factor loading did not fit the data well.

cally meaningful criterion. With regard to political trust, the post-communist countries are a case in point. Shortly after the end of the Cold War, Mishler and Rose (1994) argued that citizens in these countries cannot clearly distinguish between political trustees because they lack experience with them. From the perspective of political socialization theory, one could argue that almost three decades of democratic socialization have refined, and possibly diversified, people's construct of political trust in former communist countries in Europe more (Klingemann, Fuchs, & Zielonka, 2006). Inspired by these arguments, the MI of political trust was tested for the subsample of six post-communist European democracies in this study (Model C3). Full invariance of the model was supported by the data from Poland, Romania, and Slovenia. These results indicate that Mishler and Rose's (1994) general verdict no longer holds.[12] What is more, this brief demonstration of a theory-driven strategy to establish MI shows that similar tests for other subsets of countries could add to our insights on existing theoretical assumptions about the reasons for MI of political trust or lack thereof.

Insights and Recommendations for Future Political Trust Research

This article set out to answer to what extent the MI of political trust can be established in 32 democracies across the globe by means of MGCFA and if so, based on which measurement model. The single-country analyses showed that the data supported the two-dimensional model of trust in implementing and representative political institutions best. In the MGCFA, this model was not equivalent across all 32 democracies, however, because of three sources of bias (van de Vijver & Tanzer, 2004). First, item bias of 'trust in civil service' affected the model fit. Second, construct bias was apparent: The latent factor of trust in representative institutions did not sufficiently account for the shared variance between trust in parliament and trust in political parties in all countries. 'Trust in civil service' was therefore dropped and an error covariance was added to the measurement model in order to measure the construct of political trust in a more valid manner. Configural invariance of this revised two-dimensional model was established in 19 democracies. Additional revisions may be required in order to successfully remedy construct bias in the remaining 13 countries. Third, while the revised measurement model was fully invariant in three post-communist countries in eastern and southeastern Europe, the results suggest that method bias prevented full invariance in the other countries. Non-invariance of factor loadings and the thresholds indicate that the respondents did not use the response scale in the same manner.

12 See Schaap and Scheepers (2014) for a similar finding.

These results support previous studies and contradict others. They are in line with authors who distinguish between political trust in implementing and representative institutions conceptually (see for example Gabriel, 1999). Likewise, the analysis corroborates those empirical studies that found political trust to be two-dimensional (see Tables 1 and 2). Like previous analyses (see for example Braun, 2013 in Table 1), it also empirically reflects the ambiguity of the position of trust in civil service in the two dimensions of political trust described at the beginning of the article. The study does not, however, correspond to MGCFA that established MI of a single-dimensional model of political trust in Europe. This may be because the items used were not identical.

The results of this study underline that measurement invariance of political trust must not be assumed when testing theories about the changes, sources or consequences of political trust. Comparative political trust researchers can enhance the validity of their research findings on the generalizability of political trust theories by specifying the measurement model appropriately and carefully selecting the political trust items and countries. The findings therefore remind comparative researchers to use the ample cross-national survey data available methodically.

The findings are also informative for the future conceptualization of political trust. They provide reason to infer that, by and large, people in democracies across the globe have a two-dimensional construct of political trust. More conceptual work is needed, however, to identify the pertinent political trustees within these dimensions across countries.

In addition, the study contributes to insights regarding the valid measurement of political trust. Because the item 'trust in civil service' is apparently not as meaningfully related to the construct of political trust as the other items, future studies should carefully consider whether to include it. On a more general note, the study criticized the fact that there is no common set of comparable items to measure political trust. Such a set is crucial, however, because the content of the measured construct may be altered depending on the chosen items (Byrne & van de Vijver, 2010). Lack thereof impedes the cumulation of research on political trust.

A number of questions follow from this study. Future comparative research on political trust could study the reasons for the apparent bias. Do country-specific response tendencies affect MI and if so, why do they occur with items of political trust? Why is it so difficult to measure civil service in a comparable manner across countries? Last but not least, the study raises questions about the sources of political trust. The error covariance between trust in parliament and political parties indicates that they are not exclusively determined by people's overall level of trust. This could imply that their sources are more trustee-specific than those of the overall construct of political trust. Overall, the results of the study suggest that, in democracies, political trust is neither a single-dimensional construct nor a blanket judgment.

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Appendix

Table A1 Country-Specific Sample Sizes and Missings per Item

country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing
Argentina	1030	police	13	1.3	Australia	1477	police	25	1.7	Brazil	1486	police	6	0.4
		court	17	1.7			court	37	2.5			court	5	0.3
		government	20	1.9			government	29	2.0			government	15	1.0
		pol. parties	36	3.5			pol. parties	31	2.1			pol. parties	16	1.1
		parliament	46	4.5			parliament	38	2.6			parliament	35	2.4
		civil service	40	3.9			civil service	36	2.4			civil service	12	0.8
Chile	1000	police	11	1.1	Colombia	1512	police	5	0.3	Cyprus	1000	police	4	0.4
		court	15	1.5			court	23	1.5			court	17	1.7
		government	15	1.5			government	12	0.8			government	18	1.8
		pol. parties	14	1.4			pol. parties	18	1.2			pol. parties	14	1.4
		parliament	22	2.2			parliament	26	1.7			parliament	13	1.3
		civil service	30	3.0			civil service	14	0.9			civil service	10	1.0
Estonia	1533	police	14	0.9	Georgia	1202	police	40	3.3	Germany	2046	police	21	1.0
		court	54	3.5			court	111	9.2			court	53	2.6
		government	21	1.4			government	53	4.4			government	45	2.2
		pol. parties	60	3.9			pol. parties	58	4.8			pol. parties	64	3.1
		parliament	41	2.7			parliament	58	4.8			parliament	68	3.3
		civil service	45	2.9			civil service	54	4.5			civil service	44	2.2

Table A1 continued

country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing
Ghana	1552	police	0	0.0	India	1581	police	4	0.3	Japan	2443	police	144	5.9
		court	0	0.0			court	3	0.2			court	254	10.4
		government	0	0.0			government	4	0.3			government	277	11.3
		pol. parties	0	0.0			pol. parties	4	0.3			pol. parties	333	13.6
		parliament	0	0.0			parliament	4	0.3			parliament	322	13.2
		civil service	0	0.0			civil service	4	0.3			civil service	338	13.8
Lebanon	1200	police	43	3.6	Malaysia	1300	police	1	0.1	Mexico	2000	police	1	0.05
		court	57	4.7			court	1	0.1			court	20	1.0
		government	221	18.4			government	2	0.2			government	5	0.2
		pol. parties	80	6.7			pol. parties	2	0.2			pol. parties	3	0.1
		parliament	85	7.1			parliament	1	0.1			parliament	25	1.2
		civil service	53	4.4			civil service	1	0.1			civil service	29	1.4
Netherlands	1902	police	63	3.3	New Zealand	841	police	39	4.6	Peru	1210	police	7	0.6
		court	78	4.1			court	55	6.5			court	17	1.4
		government	89	4.7			government	81	9.6			government	22	1.8
		pol. parties	102	5.4			pol. parties	73	8.7			pol. parties	29	2.4
		parliament	133	7.0			parliament	76	9.0			parliament	14	1.2
		civil service	132	6.9			civil service	111	13.2			civil service	22	1.8
Philippines	1200	police	1	0.1	Poland	966	police	50	5.2	Romania	1503	police	27	1.8
		court	2	0.2			court	80	8.3			court	91	6.1
		government	2	0.2			government	38	3.9			government	50	3.3
		pol. parties	0	0.0			pol. parties	60	6.2			pol. parties	65	4.3
		parliament	1	0.1			parliament	56	5.8			parliament	62	4.1
		civil service	1	0.1			civil service	73	7.6			civil service	57	3.8

Table A1 continued

country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing
Slovenia	1069	police	22	2.1	South Africa	3531	police	99	2.8	South Korea	1200	police	4	0.3
		court	50	4.7			court	129	3.7			court	4	0.3
		government	29	2.7			government	112	3.2			government	3	0.2
		pol. parties	31	2.9			pol. parties	128	3.6			pol. parties	6	0.5
		parliament	26	2.4			parliament	132	3.7			parliament	6	0.5
		civil service	32	3.0			civil service	193	5.5			civil service	4	0.3
Spain	1189	police	17	1.4	Sweden	1206	police	7	0.6	Taiwan	1238	police	50	4.0
		court	24	2.0			court	34	2.8			court	87	7.0
		government	18	1.5			government	21	1.7			government	68	5.5
		pol. parties	25	2.1			pol. parties	34	2.8			pol. parties	90	7.3
		parliament	55	4.6			parliament	32	2.7			parliament	96	7.8
		civil service	42	3.5			civil service	220	18.2			civil service	69	5.6
Trinidad and Tobago	999	police	24	2.4	Turkey	1605	police	21	1.3	Ukraine	1500	police	0	0.0
		court	75	7.5			court	47	2.9			court	0	0.0
		government	48	4.8			government	41	2.6			government	0	0.0
		pol. parties	56	5.6			pol. parties	52	3.2			pol. parties	0	0.0
		parliament	69	6.9			parliament	62	3.9			parliament	0	0.0
		civil service	106	10.6			civil service	64	4.0			civil service	0	0.0

Table A1 continued

country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing	country	n	item (trust in)	missings	percent missing
United States	2232	police	37	1.7	Uruguay	1000	police	18	1.8					
		court	44	2.0			court	57	5.7					
		government	45	2.0			government	33	3.3					
		pol. parties	44	2.0			pol. parties	53	5.3					
		parliament	62	2.8			parliament	64	6.4					
		civil service	50	2.2			civil service	96	9.6					

Note. Data are from the World Values Survey 2010-2012. Own compilation.

Table A2 Comparison of Configural Invariance Results with Different Reference Indicators for Model A

reference indicator	χ^2 (df)	p-value	CFI	TLI	RMSEA (90% CI)
trust in parliament and trust in police	6457.907 (256)	0.00	0.987	0.976	0.129 (0.127-0.132)
trust in parliament and trust in court	6481.266 (256)	0.00	0.987	0.976	0.130 (0.127-0.132)
trust in political parties and trust in police	6453.700 (256)	0.00	0.987	0.976	0.129 (0.127-0.132)
trust in political parties and trust in court	6471.272 (256)	0.00	0.987	0.976	0.130 (0.127-0.132)
trust in government and trust in police	6454.196 (256)	0.00	0.987	0.976	0.129 (0.127-0.132)
trust in government and trust in court	6485.580 (256)	0.00	0.987	0.976	0.130 (0.127-0.132)
trust in civil service and trust in police	6459.617 (256)	0.00	0.987	0.976	0.129 (0.127-0.132)
trust in civil service and trust in court	6490.506 (256)	0.00	0.987	0.976	0.130 (0.127-0.132)
factor variance=1/factor mean=0	6457.732 (256)	0.00	0.987	0.976	0.129 (0.127-0.132)

Note. WLSMV estimator (theta parameterization), pairwise present was used to handle missing data (Asparouhov & Muthén, 2010), df = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis-Index, RMSEA = root mean square error of approximation, 90% CI = 90% confidence interval. Data are from the World Values Survey 2010-2012, 32 countries.