Assessing Political Trust Measurement Equivalence: A longitudinal European analysis

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1. Introduction

Ever since the 1960's, high levels of political trust are regarded as fundamental for the good functioning of democratic regimes. The level of trust citizens place in their political system has therefore been subject of extensive debate. More recently the main concern has been directed to the general view that democracies are going through a widespread crisis of confidence. But even though this potential decline of political trust had the merit of spurring the debate and consensus regarding its importance, the fact is that the theoretical status of the concept political trust is still quite dubious (Hooghe and Zmerli, 2011). This is most evident in the measurement of political trust, where we can find an incredibly large number of different operationalisations of the concept. While there is extended agreement that individuals' political trust can relate to distinct objects of the political system (Easton, 1965; Dalton, 2004; Marien, 2011), we often find studies using only trust in political institutions or any other object of the political system, while other studies use more political objects combined. To make matters worse, besides this inconsistency regarding political trust operationalisation, in a context where most research is based on cross-national comparisons, little attention has been directed to the intrinsic issue of survey measurement error that threatens the soundness of the conclusions.

This paper focuses on the measurement of the political trust concept. More concretely, the aim is to answer the following question: which measurement model of political trust performs better across European countries. For this paper, we use data from six rounds of the European Social Survey and conduct a multiple group confirmatory factor analysis (MGCFA) to test the different levels of measurement invariance.

2. Previous work and considerations

Most research dedicated to the political trust concept can be divided as either assessing the determinants or investigating the consequences of political trust. However, much less attention has been dedicated to the analytical procedure and methodological shortcomings of political trust research. While it is true that limitations are in the very nature of all survey research, there are some procedures that have been generally followed without much critical sense when it comes to political trust. Often, as most surveys do not have the same political trust indicators, researchers follow one of the following strategies: single-issue measurement or index construct. In the case of the former, usually researchers choose one item asking about trust and consider it as a reliable indicator of the political trust concept (Hetherington and Rudolph 2008; Newton 2001; Rudolph and Evans 2005; van der Meer 2010). Common critics to this approach highlight the fact that with only one survey item it is not possible to determine either the validity or reliability of the measure, making correction for measurement error therefore unviable. Furthermore, political trust is often recognized as a multi dimensional phenomenal, and a single survey measurement item is not able to capture this dimensionality.

The other, probably more generally used approach is to use sum scores or averages of survey indicators measuring trust in several political institutions, such as the parliament, parties or politicians, just to name a few. There is an abundance of examples which illustrate this approach, even though it is also not without its critics (Mishler and Rose 2001; Bovens and Wille 2008; Brewer et al. 2005; Catterberg and Moreno 2006; Hendriks 2009; Marien and Hooghe 2011; van der Brug and van Praag 2007). Amongst the critiques, first we find that scholars typically produce these sum scores or averages of survey indicators measuring trust in a variety of political institutions without a real explanation of why choosing them (Schneider, 2016). But even though this is a

recurrent practice, there are serious methodological shortcomings which also need to be attended. Namely, when unweighted sum or composite score models are used, each indicator is assumed to contribute equally to the latent construct. However, research has shown that validity coefficients for trust indicators vary and as a consequence, not correcting for these unequal weights while composing sum scores can yield unreliable findings, particularly in regression coefficients (Saris and Gallhofer, 2007). Another point worthy of discussion is that when a composite score model is put together, usually it is assumed to be free of measurement errors. This assumption is also usually extended to include group differences, assuming that measurement works equally between groups which ends up being especially problematic since one of the mains goals of political trust research is to draw meaningful conclusions across countries. When comparing groups, we need to bear in mind that besides true differences in the political trust construct, results can be affected by measurement error caused by assuming that the same measurement model holds in all the groups or that the measurement is understood the same by respondents is all groups. It should be mention that besides these, there are also other potential sources of measurement error such as method effects, survey question translations or social desirability bias which can also affect surveys.

In order to face these potential caveats, testing for equivalence or invariance of measurement is becoming more and more widespread in several social sciences. Also in the field of political trust, there is a growing number of studies that introduce this kind model testing (Hooghe, 2011; Allum et al, 2011; Coromina and Davidov, 2013; Marien, 2011; Schneider, 2016; Turper and Aarts, 2015; André, 2014).

3. Case selection and data

The vast majority of measurement invariance testing regarding the political trust construct uses data from the European Social Survey (ESS). Not without good reason as the ESS is a relatively long source of data, consisting of seven rounds so far, including almost all European countries in most of the rounds and with particular focus in gathering comparable high quality data. Furthermore, it has also maintained the same battery of questions regarding political trust since the 2004 ESS second round¹. This battery of questions consists of seven indicators, measuring the respondent's trust on a 0

¹ The only difference is that the "trust in politicians" indicator was only introduced in the second round.

to 10 response scale, where 0 means no trust and 10 complete trust in the following political institutions:

- 1. Trust in Parliament
- 2. Trust in Political Parties
- 3. Trust in Politicians
- 4. Trust in the Legal System
- 5. Trust in the Police
- 6. Trust in the European Parliament
- 7. Trust in the United Nations

Our interest in this paper is whether measurement equivalence holds in most of the countries included in the ESS. However, both because there are some countries which took part in the ESS that are not members of the European Union and because our interest in national institutions, we decided to use only the latter first 5 indicators, therefore excluding both trust in the UN and the European Parliament.

4. Analytical Strategy

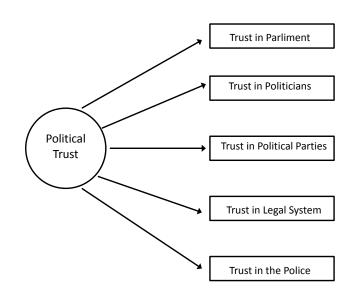
We use Multiple Group Confirmatory Factor Analysis (MGCFA) to determine whether measurement invariance holds. Measurement invariance, also commonly referred to as "equivalence", is usually associated with three progressively stricter levels: configural, metric and scalar invariance. Configural invariance means the factorial structure is the same for all groups, and this in a "bottom-up" approach is the first step of the analysis. Metric invariance requires the factor loadings of the indicator variables to be equivalent across groups. Once this set of restrictions is proven to hold, then the unstandardized relationships between the latent construct and any other variables can be meaningfully compared across groups. Finally, scalar invariance when established allows the latent variable means to be compared. However, in order to achieve this stage of invariance, in addition to the factor loading, also the indicator intercepts must be invariant across groups. When all the factor loadings or intercept are invariant, we can say full invariance has been reached. Nevertheless, some authors have also discussed the possibility of partial metric or scalar invariance, arguing that full invariance is not a necessary condition for groups to be compared when partial invariance is verified (Steenkamp and Baumgartner, 1998). Partial invariance means that at least two indicators of each latent construct are invariant across groups. If this is the case, groups can still be compared under a latent variable framework.

An MGCFA model is analyzed for the countries that took part in the ESS from round 2 to round 7 (2004, 2006, 2008, 2010, 2012, 2014). For estimation, we use the maximum likelihood estimator of Lavaan (Rosseel, 2012), an R package for structural equation modeling. For model evaluation and testing, we rely on JRule for R, named "MiPowerFit" (Pornprasertmanit, 2016) based on the procedure developed by Saris, Satorra and van der Veld (2009). Saris et al. (2009) showed that the commonly used evaluation procedures for structural equation models cannot be trusted as test statistics and fit indices are unequally sensitive for different misspecifications. They propose rather than testing the model as a whole, to test it at the parameter level by using the modification index (MI) as test statistic for detection of misspecifications in combination with the expected parameter change (EPC) and the power of the test. JRule has the advantage of taking into account both type I and type II errors (i.e. analysis of the power), but also to test the misspecifications at the parameter level (i.e. test if each specific parameter is misspecified and do not test the model as a whole). The criterion for misspecifications must be set by the researcher. For this study, following Saris, Satorra and van der Veld (2009), we aimed at detecting deviations of 0.1 in the loadings and approximately 5% of the scale for the intercepts. This means a threshold for the intercepts of 0.6 for the 11 point scale. For reasons of conformity with the general literature in this issue, other goodness-of-fit indices, namely: root mean square error of approximation (RMSEA) and comparative fit index (CFI) are also reported. Here we follow the criteria defined by Coromina and Davidov (2013) of RMSEA values of 0.06 or lower as indication of acceptable fit and values higher than 0.90 acceptable for CFI.

5. Measurement Models

As mentioned before, there is no definitive model of political trust generally accepted in the literature. Quite the contrary, there is a vast number of survey items used without theoretical contextualization or debate. Given this scenario, we decided to put forward three models based on the available indicators and on the theoretical debate. All the models are subject to measurement equivalence testing and results are reported below. The first model we dwell on is illustrated in Figure 1. This is a one-dimensional model where all the items are part of political trust (Hooghe and Marien 2013; Marien and Hooghe 2011; Newton and Zmerli 2011; Quintelier and Hooghe 2011; Zmerli 2006). This model considers that all the items are equally strong indicators of political trust.

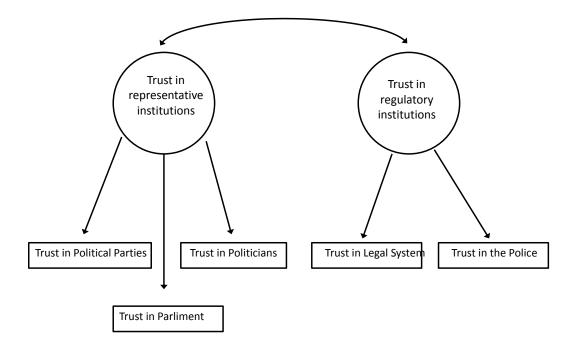
Figure 1 – Model 1



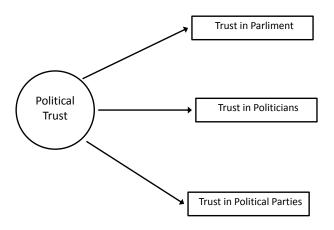
In the second model, presented in Figure 2, we distinguish between representative and regulatory institutions. This conception is support by some literature that argues that political trust has a multi-dimensional structure (Brug and Praag, 2007; Rothstein and Stolle, 2008). In particular, Rothstein and Stolle (2008) argue that a distinction should be made between what they called partisan and neutral and order institutions. While the first is based on representational institutions such as the parliament, politicians and political parties, the latter is closer to institutions such as the army, the police and the legal system. A somewhat similar result was also presented by Allum *et al.* (2011), finding political trust to be a multi-dimensional concept mainly in the same line with Rothstein and Stolle (2008), with the addition of an international dimension comprised by trust in the United Nations and the European Parliament. Based on this earlier

research, in model 2 we distinguish political trust in two latent concepts: trust in representative institutions and trust in regulatory institutions. The first concept has trust in parliament, political parties and politicians as indicator and the second concept is measure by trust in the legal system and trust in the police.

Figure 2 – Model 2



Finally, Figure 3 presents the third model of political trust that we proceed to test. Here we go back to the assumption that political trust is an unidimensional concept but reduce the number of indicators to three, reporting trust in representative institutions represented by the following institutions: parliament, politicians and political parties. We expect these three indicators to load on a single latent concept because theoretical and empirical research has shown that trust in representative institutions forms a one-dimensional construct (Hooghe and Marien 2013; Marien and Hooghe 2011; Newton and Zmerli 2011; Quintelier and Hooghe 2011; Zmerli 2006; Turper and Aarts, 2015).



6. Results: Model 1

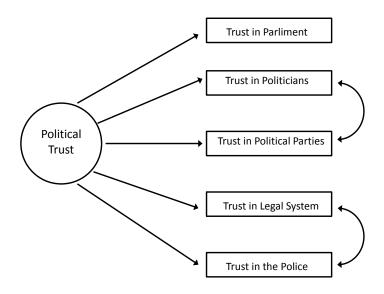
We start the analysis by testing the measurement equivalence of the political trust construct testing model 1 across the participating countries of each of the ESS rounds from 2004 to 2014. Table 1 shows the fit of the models for configural invariance. We find very much the same results for this model in all rounds of the ESS.

	X^2	DF	RMSEA	CFI
Round 2	13905.860	125	0.250	0.888
Round 3	13684.166	115	0.261	0.880
Round 4	20272.406	145	0.275	0.874
Round 5	18319.447	135	0.272	0.884
Round 6	17396.732	145	0.259	0.894
Round 7	12986.286	105	0.259	0.888

Table 1 – Model 1 fit

The model with the five indicators loading on one factor has a bad fit in all rounds, with no fit index getting even close to an acceptable value. With this preliminary evaluation in mind, we look for potential misspecifications by running JRule for all the rounds. Here too the results are very similar in all rounds. A series of correlated errors is recurrent amongst certain indicators for practically all countries in the six ESS rounds under analysis. JRule indicates that a correlated error (CE) between political parties and politicians as well as a CE between police and legal system must be included in the model. This is not completely unexpected as previous research as pointed consistently in this direction (André, 2015; Schneider, 2016). It is only when we include the discussed CE that the model becomes satisfactory, as we can see in Table 2. Figure 4 shows model 1 with the correlated errors added.

Figure 4 – Model 1 with correlated errors



However, even after including the correlated errors, the structure of the model did not hold in several countries. This is the case for round 2 of Ukraine and Slovakia, Israel and Russia in round 4, and Israel in round 6 and 7. Going forward, we now turn to metric invariance testing. After relaxing some equality constraints, the model reaches metric invariance with no more relevant misspecifications and mostly acceptable fit statistics in all rounds (Table 2).

	X^2	DF	RMSEA	CFI				
Round 2								
Configural	341.670	69	0.047	0.998				
Metric	1060.018	152	0.058	0.992				
Scalar	6820.349	235	0.125	0.943				
	F	Round 3						
Configural	365.922	69	0.050	0.997				
Metric	857.505	145	0.053	0.994				
Scalar	5338.463	220	0.116	0.955				
	F	Round 4						
Configural	470.541	81	0.052	0.997				
Metric	1575.853	175	0.067	0.990				
Scalar	9357.929	269	0.137	0.938				
	F	Round 5						
Configural	546.795	81	0.056	0.997				
Metric	1153.240	176	0.055	0.994				
Scalar	8114.264	271	0.126	0.950				
	F	Round 6						
Configural	389.412	84	0.045	0.998				
Metric	1341.646	186	0.059	0.993				
Scalar	9286.309	285	0.134	0.942				
Round 7								
Configural	326.003	60	0.050	0.998				
Metric	871.929	134	0.055	0.993				
Scalar	4578.293	208	0.108	0.960				

Table 2 – Model 1 with correlated errors fit indexes

In the annex we have included Table 4 and Table 5 with country and round information for metric and scalar invariance for this model. There we can see that most of the countries that took part in the ESS can be compared in terms of relationships of political trust with other variables, as most are full or at least partially metric invariant. As for scalar invariance, the scenario is pretty much the same (Table 5). The model fit deteriorates, as expected, but the country conclusions do not change. The large majority of countries can have their latent means compared when using the model under analysis. The other visible patterns is that Round 3 seems to have a lot more not invariant groups than the other rounds, and that Finland has recurrent misspecifications issue with the trust in the police indicator, causing to be partially invariant three out of six ESS rounds.

Model 2

In model 2, trust in parliament, politicians and parties load on one latent concept, while legal system and police load on another distinct concept. Using JRule, we identified countries with multiple misspecifications. Much like the previous model, also here JRule indicates a correlated error between political parties and politicians in several countries. However, due to the structure of this model, we cannot add the suggested correlated error to our model. The other strategy would be to drop from the analysis the countries that show this misspecification. However, when this is done we seen that the misspecification is pointed out for every country. Therefore, we must discard this model.

Model 3

In model 3, we go back to a uni-dimensional model of political trust. The indicators are trust in parliament, political parties and politicians. Because the latent concept only has three indicators, there are not enough degrees of freedom to test configural invariance. As such, we must start directly with the metric invariance testing. The fit statistics are presented in Table 3.

As in the previous models, some countries had to be removed. This was the case of Spain and Turkey in round 2; Spain in round 3; and Turkey in round 4. When comparing with the previous model, we see that the countries that had to be taken out are not the same. After removing these problematic groups, this model reaches full metric invariance in all the ESS rounds we analyzed with the exception of round 4, where both Switzerland and Estonia are partially metric invariant (see annex, table 6). As expected, the model fit is worse when it comes to scalar invariance. However, JRule does not indicate any relevant misspecifications and therefore we can conclude that with the exception of round 4 that is partially invariant, full scalar invariance is established for all the remaining rounds of the ESS (Table 7).

Table 3 – Model 3 fit statistics

	X ²	DF	RMSEA	CFI					
Round 2									
Metric	279.163	44	0.055	0.997					
Scalar	2722.237	88	0.129	0.968					
	ŀ	Round 3							
Metric	297.129	42	0.059	0.997					
Scalar	2491.201	84	0.127	0.968					
	ŀ	Round 4							
Metric	721.679	54	0.081	0.994					
Scalar	4144.814	106	0.143	0.961					
	ŀ	Round 5							
Metric	401.689	52	0.060	0.997					
Scalar	3148.537	104	0.126	0.971					
	I	Round 6							
Metric	246.796	56	0.043	0.998					
Scalar	3459.081	112	0.129	0.969					
	Round 7								
Metric	189.280	40	0.045	0.998					
Scalar	2323.210	80	0.123	0.971					

7. Conclusions

Even though interest in comparative political trust has been growing, there is still a lot to do when it comes to measurement validity and cross-national equivalence. The most used approach to measure political trust consists of taking average sums of sets of indicators without much theoretical justification. In this paper, we have shown that this approach is inappropriate by performing measurement invariance analysis of the ESS data since 2004 until 2014.

We tested three models of political trust, finding out that institutions such as the police or the legal system tend to be perceived as different of other political institutions like the parliament, politicians and political parties. The measurement model with these correlations was proven to be invariant across the majority of countries in all the ESS rounds. This can be seen as good news, as it reassures that comparisons of relationships and means of the political trust construct can be meaningfully compared in the majority of countries taking part in the ESS. Coefficient estimates and means can be compared under the structural equation modeling framework. However, this is not the case when researchers put together sum average scores of indicators as sum scores may be used for meaningful comparisons only when full scalar invariance holds (Saris and Gallhofer 2007) and cannot detect variations of factor loadings, indicators' intercepts or correlated errors. Thus, the results of comparisons based on such scores may be inaccurate, and might lead to incorrect conclusions when full invariance and the absence of correlated errors are not supported by the data. In this case, and only when it comes to the ESS data, our third model is likely the best option as it has shown an even higher level of invariance without the need to introduce correlated errors.

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Annex

Table 4 - Measurement Invariant and Partially metric invariant countries for model 1

Countries	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Invariant Rounds
Austria	Ι	Ι	-	_	-	Ι	3/3
Albania	-	-	-	_	Ι	-	1/1
Belgium	Ι	Ι	Ι	Ι	I	Ι	6/6
Bulgaria	-	P	I	I	I	-	3/4
Croatia	-	-	I	I	-	-	2/2
Cyprus	_	Ι	I	I	Ι	-	4/4
Czech	Р	-	I	I	I	Ι	4/5
Republic	-		1	-	-	1	175
Denmark	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Estonia	Ι	Р	Ι	Ι	Ι	Ι	5/6
Finland	Р	Р	Ι	Ι	Ι	Р	3/6
France	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Germany	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Greece	Ι	-	Ι	Ι	-	-	3/3
Hungary	Ι	Р	Ι	Ι	Ι	Ι	5/6
Iceland	Ι	_	_	_	Ι	-	2/2
Ireland	I	Ι	Ι	Ι	I	Ι	6/6
Israel		_	N	I	I	N	2/4
Italy	_	_	-	-	I	-	1/1
Kosovo	_	-	-	_	I	-	1/1
Latvia	_	_	Ι	Ι	I	Ι	4/4
Luxembourg	Ι	_	-	-	-	-	1/1
Netherlands	I	Ι	Ι	Ι	Ι	Ι	6/6
Norway	I	I	I	I	I	I	6/6
Poland	I	I	I	I	I	I	6/6
Portugal	P	I	I	I	I	I	5/6
Romania		_	I	-	_	-	1/1
Russia	-	Р	N	Ι	Ι	_	2/4
Slovakia	N	P	I	I	I	_	3/5
Slovenia	Ι	P	I	I	I	Р	4/6
Spain	I	I	I	I	I	I	6/6
Sweden	I	I	I	I	I	I	6/6
Switzerland	I	I	I	I	I	I	6/6
Turkey	P	-	I	-	-	-	1/2
Ukraine	N	Р	I	Ι	Ι	_	3/5
United	I	I	I	I	I	Ι	6/6
Kingdom				•			0,0

Note: I – Invariant; P – Partial Invariant; N – not invariant; - did not participate in the ESS

Countries	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Invariant Rounds
Austria	Ι	Ι	-	-	-	Ι	3/3
Albania	-	-	-	-	Ι		1/1
Belgium	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Bulgaria	-	Р	Ι	Ι	Ι	-	3/4
Croatia	-	-	Ι	Ι	-	-	2/2
Cyprus	-	Ι	Ι	Ι	Ι	-	4/4
Czech Rep	Р	-	Ι	Ι	Ι	Ι	4/5
Denmark	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Estonia	Ι	Р	Ι	Ι	Ι	Ι	5/6
Finland	Р	Р	Ι	Ι	Ι	Р	3/6
France	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Germany	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Greece	Ι	-	Ι	Ι	-	-	3/3
Hungary	Ι	Р	Ι	Ι	Ι	Ι	5/6
Iceland	Ι	-	-	-	Ι		2/2
Ireland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Israel	-	-	N	Ι	Ι	N	2/4
Italy	-	-	-	-	Ι	-	1/1
Kosovo	-	-	-	-	Ι	-	1/1
Latvia	-	-	Ι	Ι	Ι	Ι	4/4
Luxembourg	Ι	-	-	-	-	-	1/1
Netherlands	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Norway	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Poland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Portugal	Р	Ι	Ι	Ι	Ι	Ι	5/6
Romania	-	-	Ι	-	-	-	1/1
Russia	-	Р	N	Ι	Ι	-	2/4
Slovakia	N	Р	Ι	Ι	Ι	-	2/5
Slovenia	Ι	Р	Ι	Ι	Ι	Р	4/6
Spain	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Sweden	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Switzerland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Turkey	Р	-	Ι	-	-	-	1/2
Ukraine	N	Р	Р	Ι	Ι	-	2/5
United	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Kingdom						1 500	

Table 5 – Measurement Invariant and Partially s	scalar invariant countries for model 1
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Note: I – Invariant; P – Partial Invariant; N – not invariant; - did not participate in the ESS

Countries	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Invariant Rounds
Austria	Ι	Ι	-	-	-	Ι	3/3
Albania	-	-	-	-	Ι	-	1/1
Belgium	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Bulgaria	-	Ι	Ι	Ι	Ι	-	4/4
Croatia	-		Ι	Ι	-	-	2/2
Cyprus	-	Ι	Ι	Ι	Ι	-	4/4
Czech	Ι	-	Ι	Ι	Ι	Ι	5/5
Republic							
Denmark	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Estonia	Ι	Ι	Р	Ι	Ι	Ι	5/6
Finland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
France	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Germany	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Greece	Ι	-	Ι	Ι	-	-	3/3
Hungary	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Iceland	Ι	-	-	-	Ι	-	2/2
Ireland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Israel	-	-	Ι	Ι	Ι	Ι	4/4
Italy	-	-	-	-	Ι	-	1/1
Kosovo	-	-	-	-	Ι	-	1/1
Latvia	-	-	Ι	Ι	Ι	Ι	4/4
Luxembourg	Ι	-	-	-	-	-	1/1
Netherlands	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Norway	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Poland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Portugal	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Romania	-	-	Ι	-	-	-	1/1
Russia	-	Ι	Ι	Ι	Ι	-	4/4
Slovakia	Ι	Ι	Ι	Ι	Ι	-	5/5
Slovenia	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Spain	N	N	Ι	Ι	Ι	Ι	4/6
Sweden	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Switzerland	Ι	Ι	Р	Ι	Ι	Ι	5/6
Turkey	N	-	N	-	-	-	1/2
Ukraine	I	Ι	I	Ι	Ι	-	5/5
United	I	I	I	I	I	Ι	6/6
Kingdom							

Table 6 - Measurement Invariant and Partially metric	c invariant countries for model 3
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Note: I - Invariant; P - Partial Invariant; N - not invariant; - did not participate in the ESS

Countries	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Invariant Rounds
Austria	Ι	Ι	-	-	-	Ι	3/3
Albania	-	-	-	-	Ι	-	1/1
Belgium	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Bulgaria	-	Ι	Ι	Ι	Ι	-	4/4
Croatia	-		Ι	Ι	-	-	2/2
Cyprus	-	Ι	Ι	Ι	Ι	-	4/4
Czech	Ι	-	Ι	Ι	Ι	Ι	5/5
Republic							
Denmark	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Estonia	Ι	Ι	Р	Ι	Ι	Ι	5/6
Finland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
France	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Germany	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Greece	Ι	-	Ι	Ι	-	-	3/3
Hungary	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Iceland	Ι	-	-	-	Ι	-	2/2
Ireland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Israel	-	-	Ι	Ι	Ι	Ι	4/4
Italy	-	-	-	-	Ι	-	1/1
Kosovo	-	-	-	-	Ι	-	1/1
Latvia	-	-	Ι	Ι	Ι	Ι	4/4
Luxembourg	Ι	-	-	-	-	-	1/1
Netherlands	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Norway	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Poland	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Portugal	Ι	Ι	Ι	Ι	Ι	Ι	6/6
Romania	-	_	Ι	_	-	-	1/1
Russia	-	Ι	Ι	Ι	Ι	-	4/4
Slovakia	Ι	Ι	Ι	Ι	Ι	-	5/5
Slovenia	I	I	I	I	I	Ι	6/6
Spain	N	N	I	I	I	I	4/6
Sweden	I	I	I	I	I	I	6/6
Switzerland	I	I	P	I	I	I	5/6
Turkey	N	-	N	-	-	-	1/2
Ukraine	I	Ι	I	Ι	Ι	-	5/5
United	I	I	I	I	I	Ι	6/6
Kingdom	· ·		· ·				0,0

Table 7 – Measurement Invariant and Partially scalar invariant countries for model 3

Note: I - Invariant; P - Partial Invariant; N - not invariant; - did not participate in the ESS