



The Index of Emancipative Values Measurement Model Misspecifications

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Introduction

- ❖ Emancipative value orientations are associated with the increase in support for democracy (Inglehart and Welzel 2003; Welzel, Inglehart and Klingemann 2003; Welzel and Inglehart 2006) tolerance for minorities (Andersen and Fetner 2008) and gender equality (Inglehart and Norris 2003; Bergh 2007; Alexander and Welzel 2011).
- ❖ Self-expression and emancipative value orientations were proved to
 - maintain interpersonal trust (Welzel 2010)
 - lead to decline in violence, both domestic (Welzel 2010; Welzel and Deutsch 2012) and international (Inglehart, Puranen and Welzel 2015).
- ❖ Values change also contributes to:
 - democratization (Welzel 2006; Welzel 2007; Inglehart and Welzel 2010)
 - secularization (Inglehart and Appel 1989; Inglehart and Norris 2003) across the world.

Previous Findings

Post-materialist values

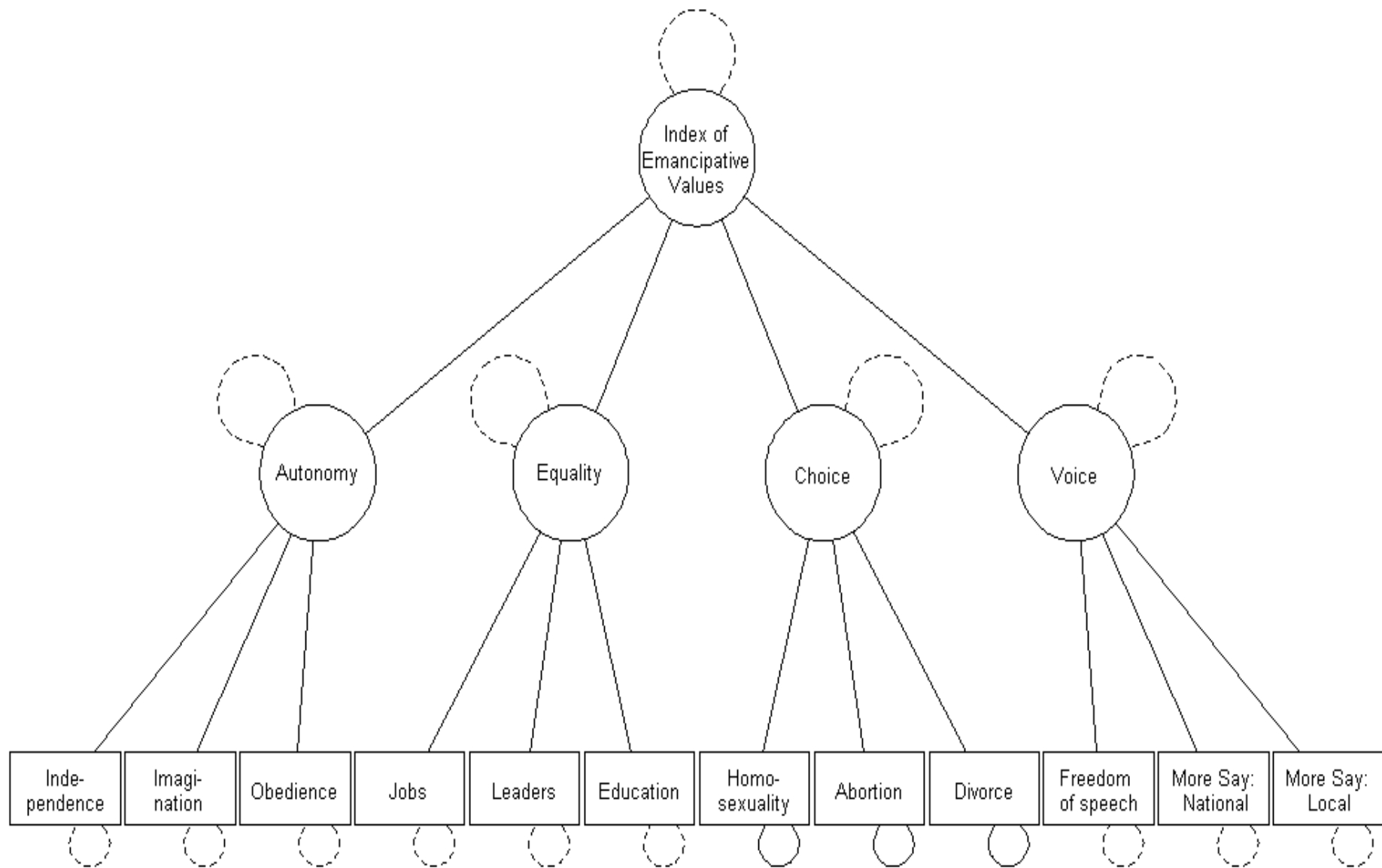
- ❖ Mackintosh (1998 ASR): non-unidimensionality, differential item functioning
- ❖ Sacchi (1998): multi-dimensionality
- ❖ Davis, Dowley and Silver (1999): multi-dimensionality and different between-sub-indices correlation patterns in cross-national perspective
- ❖ Moors (2007), Moors and Vermunt (2007): multi-dimensionality
- ❖ Ippel, Gellisen and Moors (2013): cross-national non-invariance

Survival vs. Self-Expression and Traditional vs. Secular-Rational values

- ❖ Hermann Dülmer (2012 LSCR Summer School): cross-national non-invariance
- ❖ Alemán and Woods (CPS 2015): poor fit, non-invariance

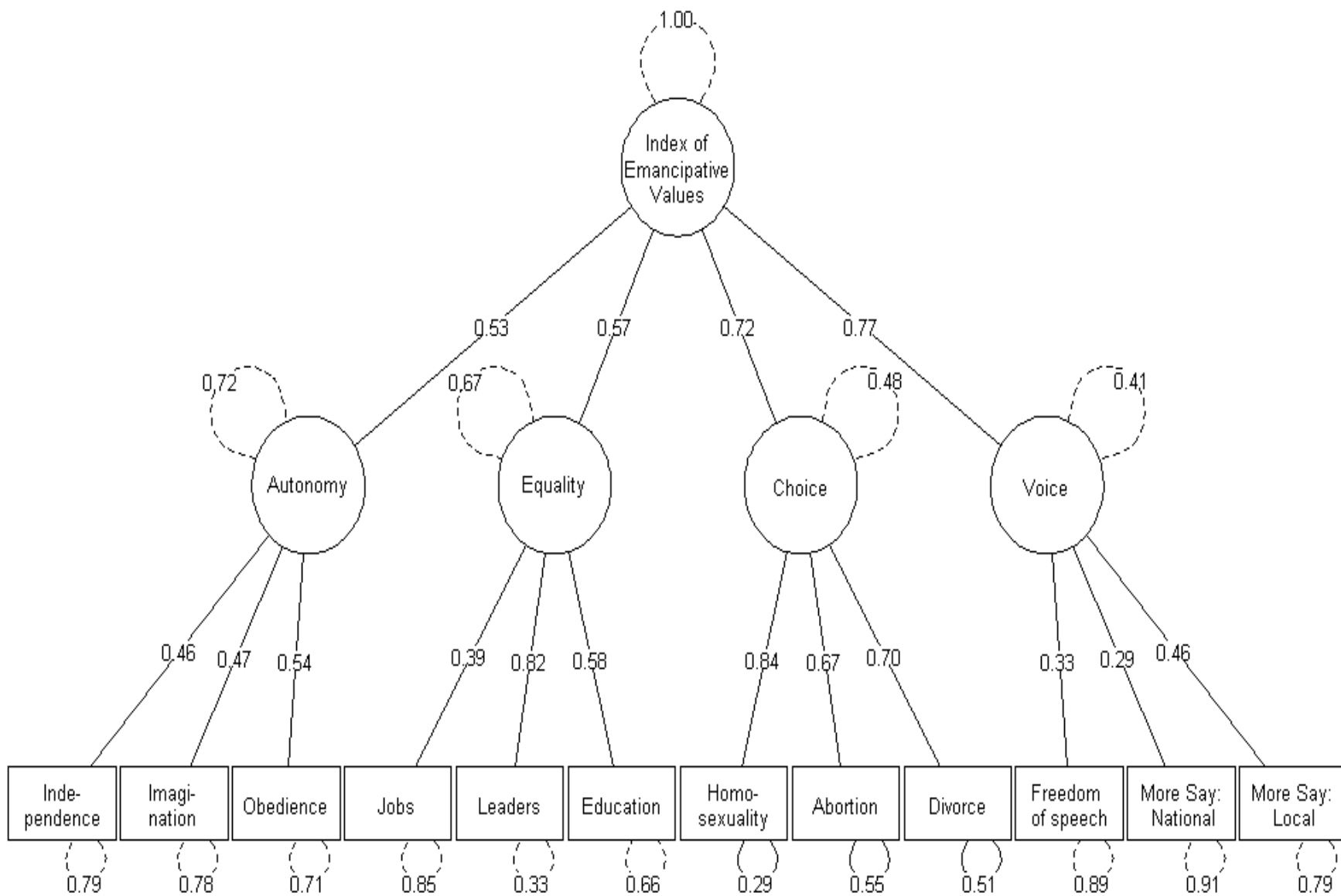
Emancipative values

- ❖ Kirill Zhirkov (2014 LSCR Summer School): non-invariance
- ❖ Alemán and Woods (CPS 2015): poor fit, non-invariance



Index Construction

- ❖ Measured with 12 variables from the WVS
- ❖ Four first-order constructs
- ❖ One second-order construct
- ❖ 9 categorical and 3 approximately continuous (those defining the *Choice*) indicators.
- ❖ All indicators are rescaled to 0-1 range.
- ❖ The index is an average of all item-specific scores (also within 0-1).
- ❖ The purpose of the index of emancipative values (henceforth EVI) is to detect the evolutionary change in values across the world.



CFA of 12 variables from WVS

3th- 6th waves (1995-2014)

Variable	Factor	Pooled	Round 3	Round 4	Round 5	Round 6
Independence	Independence	0.459	0.554	0.512	0.398	0.466
Imagination	Independence	0.472	0.544	0.391	0.543	0.414
Obedience	Independence	0.542	0.566	0.560	0.546	0.520
Jobs	Equality	0.387	0.368	0.441	0.340	0.387
Leaders	Equality	0.817	0.710	0.819	0.838	0.864
Education	Equality	0.583	0.608	0.568	0.647	0.533
Homosexuality	Choice	0.844	0.780	0.761	0.878	0.858
Abortion	Choice	0.671	0.562	0.618	0.743	0.706
Divorce	Choice	0.700	0.664	0.615	0.742	0.720
Speech	Voice	0.329	0.362	0.234	0.384	0.278
Say_nat	Voice	0.292	0.437	0.386	0.224	0.218
Say_local	Voice	0.458	0.447	0.560	0.466	0.388
Autonomy	EVI	0.532	0.628	0.413	0.543	0.495
Equality	EVI	0.572	0.610	0.492	0.593	0.549
Choice	EVI	0.718	0.690	0.744	0.724	0.742
Voice	EVI	0.766	0.746	0.602	0.851	0.791

Note: Entries are standardized factor loadings. All estimates are significant at 0.001 level. Variable intercepts, thresholds and variances are not shown.

CFA of 12 variables from WVS: Model Fit

3th- 6th waves (1995-2014)

	Pooled	Round 3	Round 4	Round 5	Round 6
N	218592	48759	41551	57849	70433
Scaled CFI	0.902	0.856	0.892	0.922	0.897
Scaled TLI	0.871	0.810	0.858	0.897	0.864
Scaled RMSEA	0.047	0.058	0.049	0.046	0.047

Note: Models were estimated in an R package lavaan. Estimation method used was WLSMV (robust version of DWLS). N = number of observations used. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. RMSEA = Root Mean Standard Error of Approximation. P-value RMSEA < 0.05 = probability that RMSEA is lesser than 0.05.

Measurement Invariance

Configural

- ❖ Loading patterns are the same across groups

Metric

- ❖ Factor loadings are equal across groups

Scalar

- ❖ Item intercepts are equal across groups

Tests for longitudinal invariance of the Index of Emancipative Values

WVS 3th- 6th waves (1995-2014)

Model	Degrees of Freedom	χ^2	Scaled χ^2	Scaled CFI	Scaled TLI	Scaled RMSEA	P(scaled RMSEA < 0.05)	Satorra-Bentler LRT p-value
Configural	181	20402.155	25445.459	0.902	0.857	0.051	0.045	NA
Equal: Loadings	216	28049.062	29291.324	0.887	0.862	0.050	0.897	0.000
Equal: Loadings and Intercepts	225	29304.117	30772.989	0.881	0.861	0.050	0.706	0.000
Equal: Loadings, Intercepts, and Thresholds	276	36712.062	39972.867	0.846	0.852	0.051	0.000	0.000
Partial: Loadings	205	24499.262	26892.300	0.896	0.866	0.049	1.000	0.000
Partial: Loadings and Intercepts	211	25047.601	27588.016	0.894	0.867	0.049	1.000	0.000
Partial: Loadings, Intercepts, and Thresholds	253	27181.060	30778.179	0.881	0.876	0.047	1.000	0.000
Second-Order Configural	254	26197.922	29944.909	0.885	0.880	0.046	1.000	NA
Second-Order Equal: Loadings	272	33558.099	32420.946	0.875	0.879	0.047	1.000	NA
Second-Order Equal: Loadings and Intercepts	280	36067.797	34565.297	0.867	0.874	0.047	1.000	NA
Second-Order Partial: 2*Loadings	265	30565.812	32110.505	0.876	0.877	0.047	1.000	NA
Second-Order Partial: 2*Loadings and 2*Intercepts	271	33587.014	33633.598	0.870	0.874	0.047	1.000	NA

Note: Models were estimated in an R package *lavaan*. Estimation method used was WLSMV (robust version of DWLS). N = number of observations used. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. RMSEA = Root Mean Standard Error of Approximation. P-value RMSEA < 0.05 = probability that RMSEA is lesser than 0.05. Satorra-Bentler LRT p-value is a p-value for Satorra-Bentler Chi-Square Difference test.

CFA of 12 variables for ten cultural zones (2010-2014)

Variable	Factor	Islamic East	Indic East	Sinic East	Orthodox East	Old West	Reformed West	New West	Returned East	Latin America	sub-Saharan Africa
Independence	Autonomy	0.256	0.639	0.137	0.404	0.558	0.444	0.280	0.787	0.316	0.533
Imagination	Autonomy	0.325	0.193	0.439	0.249	0.436	0.494	0.401	0.413	0.297	0.342
Obedience	Autonomy	0.915	0.327	0.457	0.812	0.588	0.619	0.465	0.079	0.406	0.625
Jobs	Equality	0.545	0.347	0.339	0.368	0.246	–	-0.116	–	0.118	0.338
Leaders	Equality	0.770	0.773	0.727	0.705	0.886	0.749	0.745	0.642	0.877	0.881
Education	Equality	0.292	0.528	0.720	0.569	0.640	0.864	0.794	0.704	0.590	0.441
Homosexuality	Choice	0.623	0.707	0.793	0.515	0.831	0.806	0.875	0.651	0.774	0.813
Abortion	Choice	0.874	0.760	0.664	0.766	0.714	0.783	0.722	0.793	0.557	0.903
Divorce	Choice	0.456	0.745	0.786	0.739	0.665	0.832	0.685	0.786	0.704	0.670
Speech	Voice	0.245	–	0.283	–	0.325	–	0.121	–	–	-0.337
Say_nat	Voice	0.268	n.s.	0.449	0.409	0.180	0.447	-0.109	0.645	0.582	0.849
Say_local	Voice	0.498	n.s.	0.559	0.431	0.587	0.711	0.302	0.260	0.406	0.214
Autonomy	EVI	0.416	0.145	0.597	n.s.	0.296	0.704	0.832	0.554	0.460	0.562
Equality	EVI	0.505	0.127	0.525	0.304	0.384	0.614	0.560	0.419	0.229	0.066
Choice	EVI	0.340	1.000	0.630	0.686	0.768	0.616	0.803	0.781	0.769	0.651
Voice	EVI	0.785	n.s.	0.572	0.449	0.785	0.260	0.977	n.s.	0.336	0.246

Notes: Entries are standardized factor loadings. All estimates are significant at 0.05 level (except those marked as n.s. = non-significant). Loadings in bold are those lower than 0.32. Variable intercepts, thresholds and variances are not shown.

CFA of 12 variables for ten cultural zones (2010-2014)

Model Fit

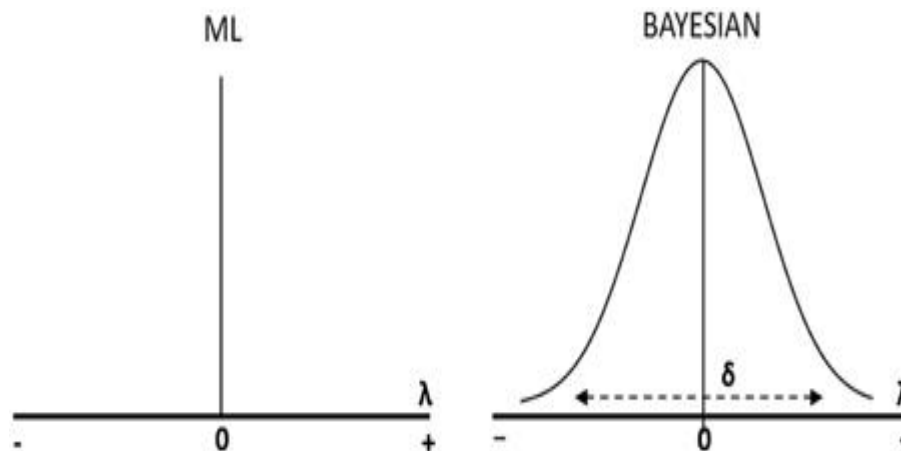
	Islamic East	Indic East	Sinic East	Orthodox East	Old West	Reformed West	New West	Returned East	Latin America	sub-Saharan Africa
N	18027	8453	8181	14842	2189	5154	4550	3568	11439	9869
CFI	0.847	0.924	0.885	0.913	0.919	0.946	0.942	0.875	0.966	0.908
TLI	0.798	0.898	0.848	0.881	0.894	0.922	0.924	0.818	0.953	0.878
RMSEA	0.043	0.030	0.037	0.036	0.040	0.036	0.033	0.052	0.024	0.036

Notes: Models were estimated in MPLUS version 7.11. Data were weighted. Estimation method used was WLSMV. N = number of observations used. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. RMSEA = Root Mean Standard Error of Approximation.

The Concept of Approximate Invariance

- ❖ The trick is to permit “small” differences between group-specific parameters instead of fixing those differences exactly to zero
- ❖ The model fit can be evaluated based on the posterior predictive p-value (PPP) and the confidence interval (CI) for the difference between the observed and replicated chi-square values (those including zero indicate well-fitting models). PPP should be higher than zero and, in ideal, close to 0.5.

Difference in parameter estimation between Maximum Likelihood (ML) and the Bayesian approach (see van de Schoot et al., 2013; Zercher et al. 2015).



Assessing Invariance of the *Choice* (6th WVS wave)

Across Cultural Zones (10 zones)

Exact Approach: NO

- ❖ Configural: RMSEA = 0.000, CFI = 1.000
- ❖ Metric: RMSEA = 0.126, CFI = 0.909
- ❖ Scalar: RMSEA = 0.196, CFI = 0.561

Approximate approach: YES

- ❖ Prior mean = 0; prior variance = 0.01:
- ❖ The PPP = 0.117, and the CI is [-16.047; 65.894].

Across Countries (60 countries)

Approximate approach: YES

- ❖ Prior mean = 0; prior variance = 0.05 (that is, 95% of all deviations are within the range [-0.447; 0.447])
- ❖ The PPP = 0.035, and the CI is ([-7.567; 183.778]).

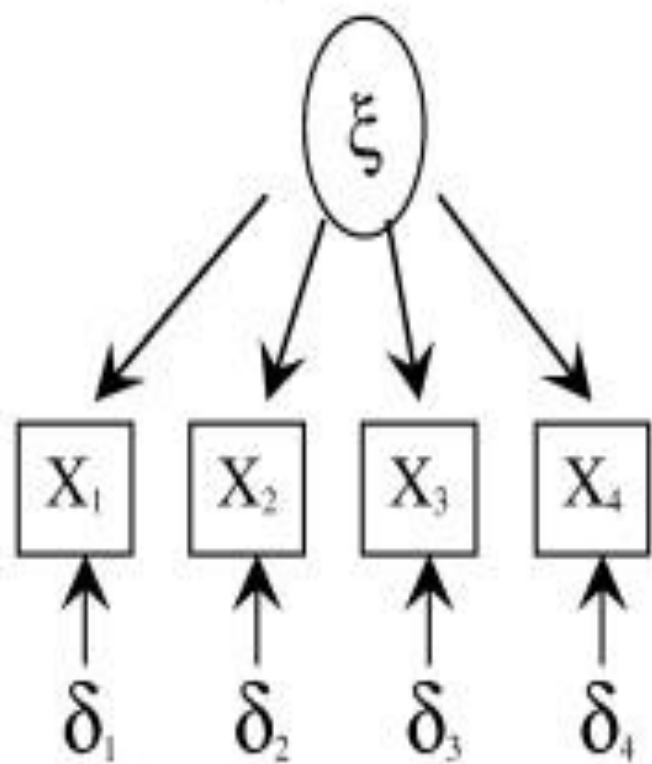
Welzel and Inglehart's defense (W&I, forthcoming in CPS)

Inglehart and Welzel themselves have pointed out very explicitly a number of times “the variable and ... weak inter-item coherence of our value constructs at the individual level within countries” (Inglehart and Welzel 2003; 2005: 231-244; Welzel 2013: 74-79, 110-112; Welzel and Inglehart, forthcoming).

However, they argue that:

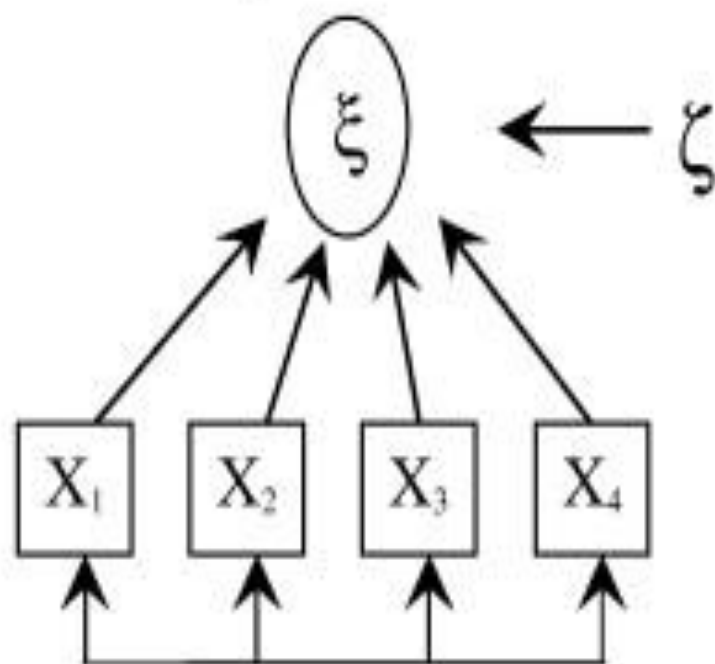
- (1) The EVI is designed to reflect and to explain mainly country-level associations and phenomena. Individual-level properties of the measurement instrument say nothing about the aggregate-level properties of that instrument:
- (2) The index of emancipative values was designed according to the compository (formative) logic, not the dimensional (reflective) logic. From the compository logic's point of view, external validity is a much more important criterion of measurement quality, and the internal coherence of the latent construct if not of importance at all.
- (3) Cross-national non-invariance does not *per se* make country-level scores incomparable. It is only the case when non-invariance eliminates the respective construct's associations with its theoretically expected correlates.
- (4) Cross-national consistency differences in emancipative values are themselves an aspect of the modernization process: these differences are induced by cognitive mobilization. Cultural tradition contributes much less than cognitive mobilization to emancipative values' internal consistency.

Effect Model (Reflective indicators)



$$\begin{aligned} X_1 &= \lambda_1 \xi + \delta_1 \\ X_2 &= \lambda_2 \xi + \delta_2 \\ X_3 &= \lambda_3 \xi + \delta_3 \\ X_4 &= \lambda_4 \xi + \delta_4 \end{aligned}$$

Causal Model (Formative indicators)



$$\xi = \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 X_4 + \zeta$$

Formative Interpretation of the EVI

The index of emancipative values is designed

“to measure *overall* performances across a defined field of emancipation... and the dimensionality of the *partial* performances is simply no point of consideration.”

This explicitly implies that the index

- (1) refers to an ideal, rather than empirical benchmark
- (2) measures only how far (in the aggregate) individual responses to selected survey items in different countries are from the normative standard of emancipative values

Whether the EVI is a Truly Formative Measure?

Law et al. (1999):

- ❖ Reflective measurement (*latent model*): multidimensional construct exists at a deeper level than its dimensions
- ❖ Formative measurement (*aggregate model*): (a) multidimensional construct exists at the same level as its dimensions and (b) is defined as a combination of its dimensions.
- ❖ Formative measurement (*profile model*): (a) multidimensional construct exists at the same level as its dimensions and (b) could not be defined as a combination of its dimensions.

Coltman et al. (2008):

- ❖ The formative measurement is recommended when the observed indicators are not highly correlated (collinear)

Whether the EVI is a Truly Formative Measure? (ctd.)

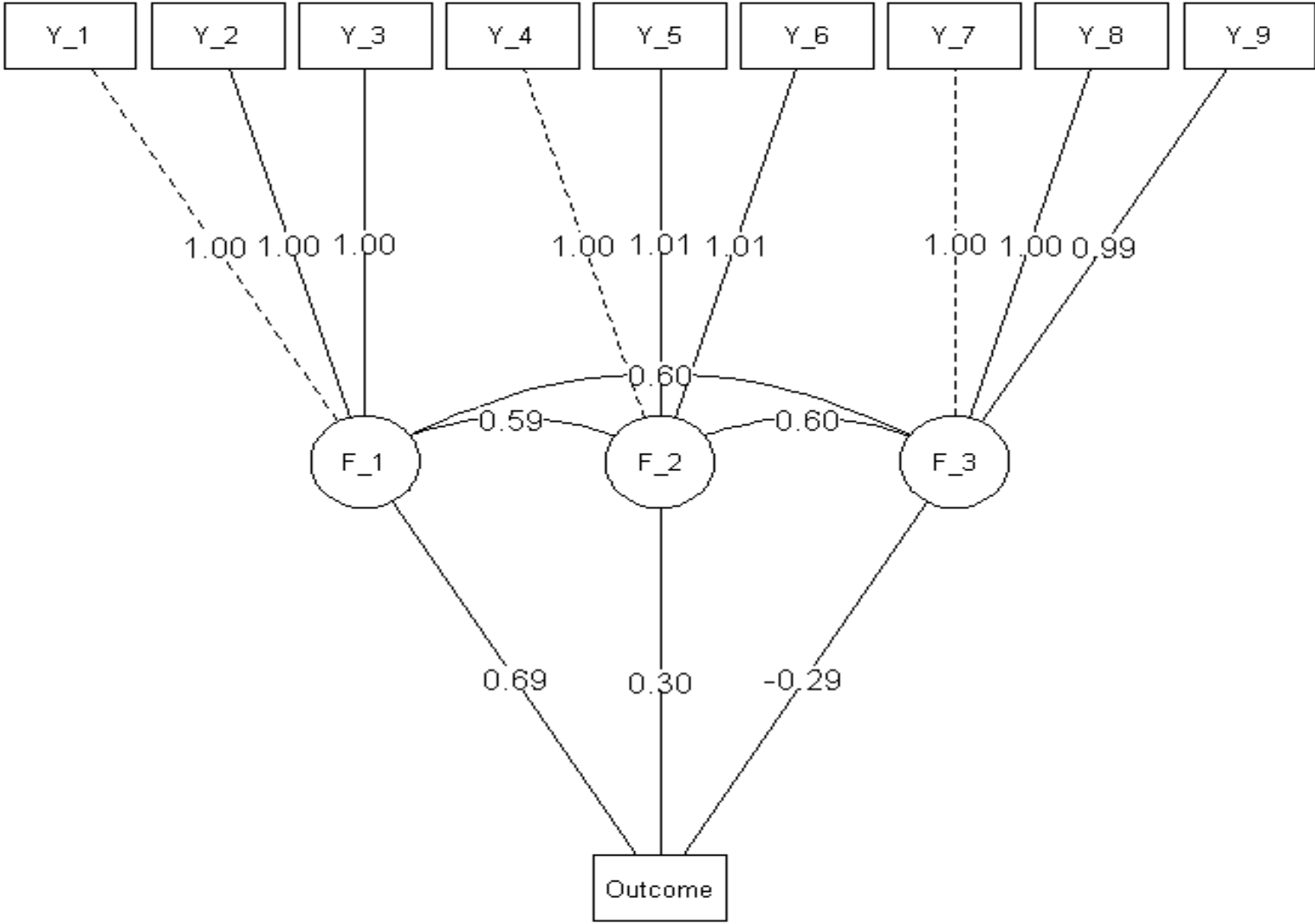
Thought experiment:

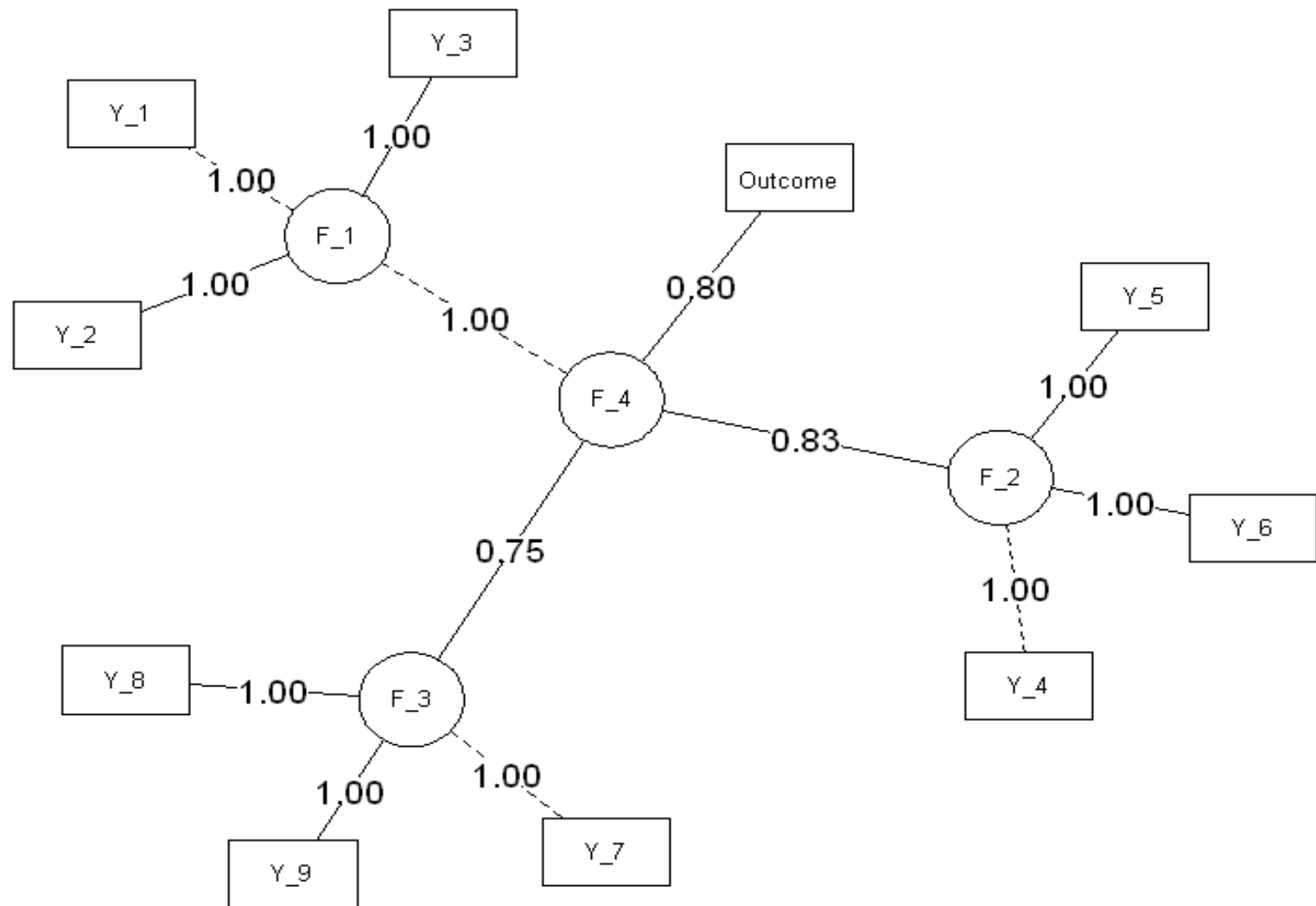
- ❖ World economy is worsening
- ❖ WVS funding is reduced
- ❖ WVS next round questionnaire is reduced as well
- ❖ Indicators defining one particular component of the EVI are excluded

Whether one can make an approximate inference about country mean scores on that unobserved values component relying on the observed scores on other components of emancipative values?

Whether one can make an inference about at least a sign of association between that unobserved values component and some other country-level characteristic of interest?

Whether the latter inference will change substantially if one suddenly gets score on the missed value component and then re-conduct the analysis?





Composite
Score

0.61

Outcome

Simulated Example (N = 200000)

True (three-factor) model:

- ❖ RMSEA = 0.000; CFI = 1, TLI = 1, the outcome's $R^2 = 0.353$
- ❖ Regression coefficients are 0.69, 0.30, and -0.29 respectively

Single second-order factor model:

- ❖ RMSEA = 0.046; CFI = 0.977, TLI = 0.967; $R^2 = 0.324$
- ❖ Regression coefficient = 0.80

Regression on the aggregate score:

- ❖ RMSEA = 0.000; CFI = 1, TLI = 1, $R^2 = 0.198$
- ❖ Regression coefficient = 0.61

What can We Learn From the Simulated Example?

- ❖ Misspecified models may fit data well.
 - ❖ They also may have high explanatory power.
 - ❖ They may obscure true models, especially when have a strong theoretical justification.
-
- Indirect evidence of model misspecification (relatively poor fit, modification indices, non-invariance, etc.) should be taken seriously: the evidence may indicate the presence of a better model – better not only in purely statistical terms, but also substantially.

Pairwise Correlations between Effective Democracy and Various Components of Emancipative Values

	Choice (latent means)	Choice	Autonomy	Equality	Voice	Emancipative Values Index
	Pearson's ρ					
	0.672***	0.757***	<i>0.219</i>	0.721***	0.559***	0.762***
	Spearman's ρ					
Effective Democracy Index	0.624***	0.641***	<i>0.260</i>	0.722***	0.565***	0.712***
	Kendall's τ					
	0.454***	0.478***	0.174	0.534***	0.389***	0.523***

Notes: Entries are pairwise correlations between Alexander, Inglehart and Welzel's (2012) Effective Democracy Index (EDI) and various components of emancipative values. Choice (latent means) = country mean scores on the Choice value dimension, computed using MGCFA with approximate Bayesian invariance. Choice, Autonomy, Equality, and Voice are country mean scores on the respective components of the Emancipative Values Index. They and the EVI country mean scores as well, are computed as Welzel (2013: 63-69) describes. The EDI is updated for 2014 and rescaled so that the theoretical minimum is 0 and the maximum 1. All values scores are computed using the data from the 6th wave of the WVS (2010-2014; 60 countries surveyed).

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$. Correlations in italic are marginally significant at the 0.1 level

Regressing Effective Democracy on Various Components of Emancipative Values

	Effective Democracy Index (2014)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Voice	2.109*** (0.414)			0.553 (0.413)		0.323 (0.500)		
Autonomy		0.947 (0.579)	-0.200 (0.412)		0.438 (0.415)			
Choice			1.516*** (0.180)	1.306*** (0.215)			0.968*** (0.231)	
Equality					1.862*** (0.242)	1.756*** (0.353)	0.953*** (0.310)	
Index of Emancipative Values								2.733*** (0.305)
Constant	-0.230 (0.124)	0.023 (0.218)	-0.017 (0.147)	-0.183 (0.098)	-0.749*** (0.184)	-0.627*** (0.131)	-0.415*** (0.121)	-0.639*** (0.116)
N	59	60	60	59	60	59	60	59
Adjusted R ²	0.301	0.028	0.560	0.572	0.514	0.507	0.622	0.573

Notes: Entries are non-standardized OLS regression coefficients with standard errors in parentheses. The dependent variable is Alexander, Inglehart and Welzel's (2012) Effective Democracy Index (EDI). Choice, Autonomy, Equality, and Voice are country mean scores on the respective components of the Emancipative Values Index. They are computed as Welzel (2013: 63-69) describes. The EDI is updated for 2014 and rescaled so that the theoretical minimum is 0 and the maximum 1. All values scores are computed using the data from the 6th wave of the WVS (2010-2014; 60 countries surveyed). Test statistics for heteroskedasticity (Breush-Pagan test), multicollinearity (variance inflation factors), and influential cases (Bonferroni p-values for Studentized residuals) reveal no violations of ordinary least squares (OLS) assumptions, except model 5 and 6, for which Breush-Pagan test is significant. Re-estimation of these models with heteroscedasticity corrected standard errors gives the same substantial results. *** P < 0.001; ** P < 0.01; * P < 0.05

Whether values change is monotonic?

One country has a mean of 0.75 in the *Choice*, and a mean of 0.25 in the *Autonomy*

Another country has a mean of 0.25 in the *Choice*, and a mean of 0.75 in the *Autonomy*

Both countries' means in the *Voice* and the *Equality* are equal

Which country is more emancipatory?

Shift or Convergence?

- ❖ Different actual values profiles exist in different countries.
- ❖ Shift to emancipative values is not monotonic in respect to the particular components of those values
- ❖ The internal coherence of emancipative values increases along with the increase in the mean scores on those values.
- ❖ Weighting country-specific coherence on emancipative values by country-specific mean score on emancipative values may produce a more plausible indicator of the societal modernization, that may serve as a reasonable trade-off between formative measurement, normative orientation of the concept of emancipative values, and the empirically observed values patterns.

Suggestions for future research

- ❖ Identify a set of countries invariant on the *Choice*
- ❖ Investigate associations between particular values dimensions and other variables of interest
- ❖ Shorten the index of emancipative values
- ❖ Test the convergence-based interpretation of the phenomenon of values change empirically

Thank you for attention!

This report was presented at the 5th LCSR International Annual Conference “Cultural and Economic Changes under Cross-national Perspective”.

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