EPC-interest for categorical data with an application to the Inglehart values ranking

ABSTRACT

The logic of measurement invariance testing is that groups may safely be compared when their measurement parameters are exactly equal: in that case, conclusions of substantive interest are uncontaminated by measurement differences. While this logic is sound, it does not follow that comparison is never warranted when measurement parameters are not exactly equal. Moreover, in practical applications exact equality is not often plausible. These observations have led to the concept of "approximate" measurement invariance, in which a certain, "small" amount of non-invariance is permitted. However, while these methods ensure that measurement differences are "small", even "small" measurement differences could, in principle, still contaminate the conclusions of interest. Conversely, those measurement differences allowed for may not necessarily affect the conclusions of interest.

This paper extends an alternative approach recently introduced in this journal: sensitivity analysis with the "EPC-interest". The EPC-interest estimates the change in parameters of substantive interest when freeing measurement invariance restrictions. Our contribution is threefold: first,

we extend the EPC-interest measure to models with categorical observed and latent variables. Second, the researcher can examine the impact of several violations of invariance at once. Third, we compare 49 countries from the 2010–2012 World Values Survey on materialism/postmaterialism values measured by three partial ranking tasks using multilevel latent class regression. Some corroboration for hypotheses on postmaterialism from the literature are found when using the EPC-interest, while certain findings contradict these hypotheses without its application.

The newly developed methods discussed in this paper have been implemented in commercial software for latent variable modeling. Program inputs and data for the examples discussed in this article are provided in the electronic appendix (`http://`).

1. INTRODUCTION

2. EPC-INTEREST

3. DATA

4. MODEL

5. RESULTS

Latent Gold Choice 5.0.0.14157

				EPC-interest for non-invariance of...					
				Set main effects			Set × Class effects		
				Set			Set		
		Est.	s.e.	1	2	3	1	2	3
Class 1	GDP	-0.035	(0.007)	-0.013	0.021	-0.002	**0.073**	**0.252**	0.005
Class 2	GDP	-0.198	(0.012)	-0.018	-0.035	0.015	-0.163	-0.058	0.002
Class 1	Women	0.013	(0.001)	-0.006	0.002	0.000	-0.003	0.029	0.002
Class 2	Women	-0.037	(0.001)	0.007	-0.003	0.002	-0.006	-0.013	0.002

Table 1:

				EPC-interest for non-invariance of...					
				Set main effects			Set × Class effects		
				Set			Set		
		Est.	s.e.	1	2	3	1	2	3
Class 1	GDP	-0.127	(0.008)	-0.015	-0.003	0.002			0.097
Class 2	GDP	0.057	(0.011)	-0.043	-0.013	0.002			0.161
Class 1	Women	0.008	(0.001)	-0.002	0.000	0.002			0.001
Class 2	Women	0.020	(0.001)	-0.007	-0.001	0.002			0.007

Table 2:

LL = -418609.9616

Number of parameters (Npar) 63

6. DISCUSSION

	Class 1	Class 2	Class 3
Class label	"Materialist"	"Postmater."	"Mixed"
Class size	0.569	0.213	0.218
Set 1			
1. Economic growth	2.1102	0.4837	0.4156
2. Strong defense	-0.5285	-1.4984	-0.9249
3. More say	-0.5519	1.4683	0.4643
4. More beauty	-1.0298	-0.4536	0.0449
Set 2			
1. Order in the nation	1.0016	-0.5898	0.0435
2. More say	-0.4592	0.6902	-0.2763
3. Rising prices	0.4281	-0.2269	0.3719
4. Freedom of speech	-0.9705	0.1266	-0.1390
Set 3			
1. Stable economy	2.0086	0.0789	0.1715
2. Humane society	-0.7919	0.4450	-0.0943
3. Ideas	-1.1402	-0.0593	-0.4550
4. Fight crime	-0.0765	-0.4646	0.3778

Table 3: Attribute parameter estimates for the final model.

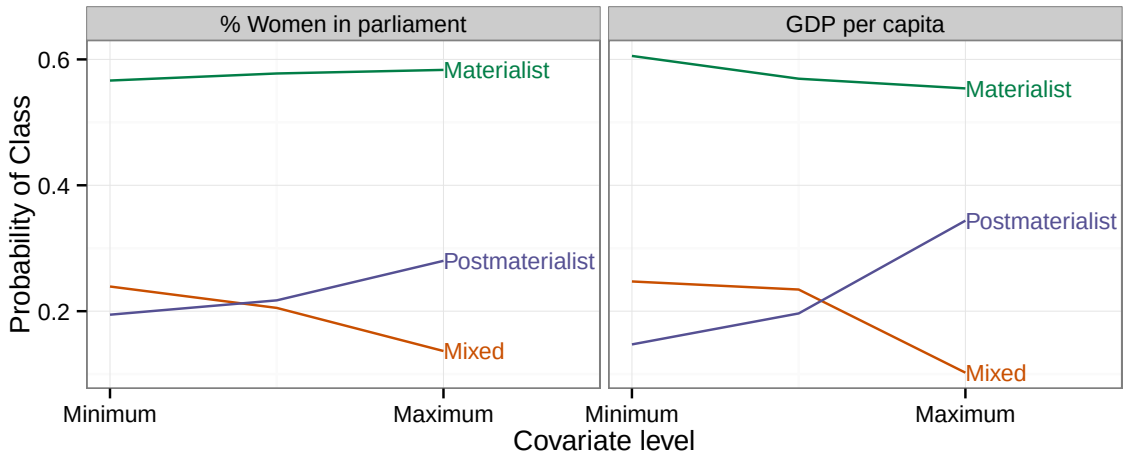

Figure 1: Estimated probability of choosing each class as a function of the covariates of interest under the final model.

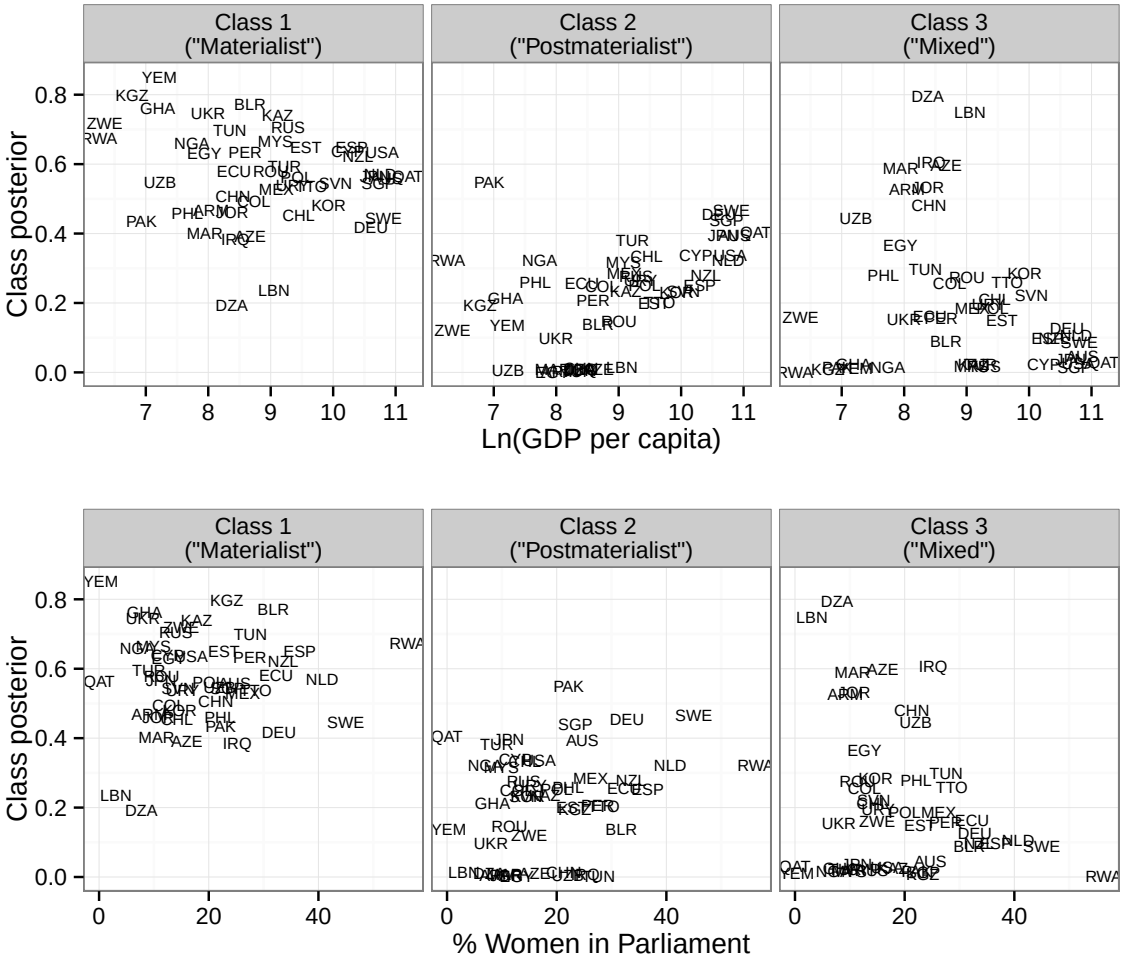

Figure 2:

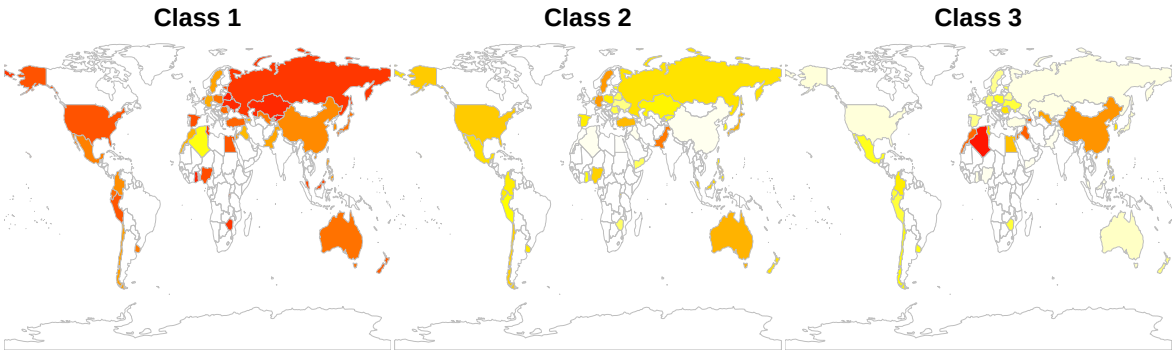

Figure 3: