

The level of equivalence in the ISSP 1999 and its implications on further analysis

Zucha, Vlasta

Veröffentlichungsversion / Published Version

Sammelwerksbeitrag / collection article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:

GESIS - Leibniz-Institut für Sozialwissenschaften

Empfohlene Zitierung / Suggested Citation:

Zucha, V. (2005). The level of equivalence in the ISSP 1999 and its implications on further analysis. In J. H. P. Hoffmeyer-Zlotnik, & J. Harkness (Eds.), *Methodological aspects in cross-national research* (pp. 127-146). Mannheim: GESIS-ZUMA. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-49155-2>

Nutzungsbedingungen:

Dieser Text wird unter einer Deposit-Lizenz (Keine Weiterverbreitung - keine Bearbeitung) zur Verfügung gestellt. Gewährt wird ein nicht exklusives, nicht übertragbares, persönliches und beschränktes Recht auf Nutzung dieses Dokuments. Dieses Dokument ist ausschließlich für den persönlichen, nicht-kommerziellen Gebrauch bestimmt. Auf sämtlichen Kopien dieses Dokuments müssen alle Urheberrechtshinweise und sonstigen Hinweise auf gesetzlichen Schutz beibehalten werden. Sie dürfen dieses Dokument nicht in irgendeiner Weise abändern, noch dürfen Sie dieses Dokument für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen.

Mit der Verwendung dieses Dokuments erkennen Sie die Nutzungsbedingungen an.

Terms of use:

This document is made available under Deposit Licence (No Redistribution - no modifications). We grant a non-exclusive, non-transferable, individual and limited right to using this document. This document is solely intended for your personal, non-commercial use. All of the copies of this documents must retain all copyright information and other information regarding legal protection. You are not allowed to alter this document in any way, to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public.

By using this particular document, you accept the above-stated conditions of use.

THE LEVEL OF EQUIVALENCE IN THE ISSP 1999 AND ITS IMPLICATIONS ON FURTHER ANALYSIS

VLASTA ZUCHA

Using the International Social Survey Programme (ISSP) for cross-national research high comparability of survey data is expected. The level of equivalence of the secondary data and its implications on research design have to be considered. In this paper equivalence of attitudes towards social inequality in the ISSP is tested by means of confirmatory factor analysis for Austria, Czech Republic and Germany. The research focuses on structural equivalence in cross-national research and examines whether the empirical construct is universal for the countries under investigation. The optimal level of equivalence for testing theories and understanding social realities on the empirical basis of the ISSP 1999 will be addressed. This study serves as example for the linkage of research design, level of equivalence and possible further analysis of quantitative data. For most studies in social sciences structural equivalence of variables might be adequate, depending on the purpose of an empirical study using the ISSP 1999 and on its research design.

1 Introduction

The rising interest in cross-cultural and cross-national research has been manifested in establishing various international survey programs. Some of them exist since the 1970s or 1980s, e.g. the Eurobarometer, the World Value Survey and the International Social Survey Programme. Furthermore new programs like the European Social Survey are established.

The ISSP is a large-scale survey program covering various topics over time and different nations. The data offers extensive opportunities for the analysis of different social phenomena. However, some users of the ISSP still do not pay enough attention on comparability of data. Procedures for testing comparability are seldom applied when using cross-national data for secondary analysis, because testing of several forms and levels of equivalence is time- and cost-intensive. In the context of comparability, implications on the research design have to be considered while using survey data for cross-national research.

The aim of the present paper is to show the level of equivalence achieved in the ISSP 1999 for three countries (Austria, Czech Republic and Germany) and to draw consequences for substantial analysis of the data. First, basic issues of cross-cultural research and standardised surveys are introduced. Second, the concept of equivalence in the context of cross-cultural survey research is discussed and an adequate definition of equivalence is chosen. The research question aims at construct equivalence in cross-national research. It examines whether the structure of the attitudinal variables is comparable for the countries under investigation. Relevant aspects of research design are linked to different levels of equivalence. Then the testing of structural equivalence of the ISSP-data is described. Finally, on the basis of this results conclusions on the usage of the ISSP 1999 are drawn. Types of analysis which can be applied on this data are deduced and implications on the research design for studies using this data are drawn.

2 Cross-Cultural Surveys and the Concept of Equivalence

In cross-cultural and cross-national research the comparison of nations and cultures gives opportunity e.g. for describing social phenomena in different groups or for testing theories in different settings. There are various possibilities for research design and several alternatives of how to treat “country” or “culture” in this context. High attention has to be paid to the implications of research design and the chosen type of study. In this part of the paper the purpose of a cross-cultural study will be linked to requirements in terms of comparability.

2.1 Research design and types of studies

Numerous typologies of studies as well as of analysis have been developed and described (Przeworski & Teune, 1982; Rokkan, 1972; Teune, 1990). The aim of the present paper is to investigate comparability of survey questions and to give recommendation for the use of the ISSP 1999. A basic typology of studies seems adequate. Generally it can be distinguished between studies which are designed for discovering similarities and studies primarily designed for finding differences between countries. To reproduce these general purposes and with regard to the basic issues of cross-national comparability in survey research the typology applied by Alwin et al. (1994) is chosen. It is a simplified version of the typology by Kohn (1989). Accordingly, there are two general principles and possibilities for using cross-national surveys – nation as *object* of analysis on the one hand and nation as *context* variable or as *unit of analysis* on the other hand.

Using nation as *object* of analysis the researcher is interested in the countries themselves and differences between countries. In this type of studies often descriptive information on the countries or their institutions is collected. If nation is applied as *context* variable or as

unit of analysis, social institutions and structures of the countries are investigated. Furthermore, relationships between social phenomena and different institutions are examined. Therefore, a classification of countries by different dimensions and potentially influencing analytic variables can be established to investigate the effects of context (Alwin et al., 1994). Obviously, this twofold typology of studies is analytic and in empirical research mixed types of studies are found.

The decision on how “country” is used in cross-national research and therefore which types of comparisons are made, has methodological implications on the demand of different levels of comparability of concepts and measurement. This results in strategies and standards which have to be followed during the whole research process. If data is used for secondary analysis (like the ISSP) it has to be decided for which purpose they are adequate. Before linking type of study and quality of data, the decision on the typology of equivalence in the context of this paper will be described.

2.2 The concept of equivalence

In addition to reliability and validity as basic issues of quality in national studies equivalence is discussed as another requirement in international research. Equivalence is a key concept and core-requirement in comparative and in cross-cultural research.

In literature, equivalence has been conceptualised in different ways. Many forms of equivalence are described and various definitions exist. Johnson (1998) found more than 50 different terms of equivalence and subsumed them into two different categories – *interpretive equivalence* and *procedural equivalence*. The former deals with similarities on the theoretical and interpretative level of concepts and considers if concepts can be meaningfully compared across different cultures. The latter refers to comparability of methods, measurement and administrative procedures.

In the present paper, the focus lies on the comparability of measurement instruments in international surveys and on equivalence of data which can be tested within the limits of secondary analysis. Thus, the focus lies on procedural equivalence according to the typology of Johnson (1998). As procedural equivalence includes all types of equivalence which refer to measurement, it is necessary to specify those forms of equivalence which can be tested in the phase of data analysis in more detail. In the present work a definition of van de Vijver (1998), who distinguishes three forms of equivalence on the level of measurement, is used:

“Equivalence refers to the measurement level characteristics that apply to cross-cultural score comparisons; three types of equivalence are defined: construct (identity of construct

across cultures), measurement unit (identity of measurement unit), and scalar equivalence (identity of measurement unit and scale origin).” (van de Vijver, 1998: 41)

These three types constitute a hierarchical scheme with *construct equivalence* (also known as and related to functional or structural equivalence) as the basic form of comparability and the lowest level of equivalence. It means that similar constructs are measured in each cultural group and describes the identity of constructs across cultures. *Measurement unit equivalence* is the next level of equivalence which is established if the measurement unit of the instrument is identical for each of the cultural groups. The highest level – *scalar or full score equivalence* – is reached only if the measurement scales have the same origin in all compared cultural groups (van de Vijver & Leung, 1997; van de Vijver, 1998; van de Vijver, 2003). This concept derives from psychometric research and therefore poses high requirements on survey data.

2.3 Research design and level of equivalence

While conducting a primary survey different strategies have to be applied during the whole research process to establish equivalence (Alwin et al., 1994; Harkness, 1998; Niedermayer, 1997; Przeworki & Teune, 1982). In different phases, for instance in the phase of translation or pretesting, some forms of equivalence can be tested by means of cognitive tests or statistical methods. In contrast, analysis of secondary data is limited to tests of equivalence in the phase of data analysis. Data is already collected and the researcher involved in secondary data analysis has to rely on documentation of the primary researcher or institute. In this case, equivalence can be tested *ex post*. Nevertheless the possibilities of testing are reduced in comparison to possibilities of testing comparability and establishing equivalence during a primary survey process.

Generally, it depends on the research design and the type of study, which level of equivalence has to be determined. If the empirical basis of a research project is secondary survey data, the level of equivalence has to be tested. This has to be considered, because there are wide consequences for further analysis of the data. The researcher has to conclude which type of analysis is appropriate, which kind of empirical work can be applied to the data and therefore which type of study is possible. This section will link and summarise the aspects of research design and levels of equivalence discussed so far.

The optimal level or form of equivalence depends on the research design and the purpose of the study. Tests of equivalence are time and cost intensive, therefore the level of comparability should be considered with regard to the type of comparison conducted in the particular study. Researchers interested in testing theories need another level of equivalence of data than researchers comparing social indicators between countries.

Many empirical studies use country as object of analysis. The purpose of these studies is primary descriptive and focuses on country-specific differences. If based on survey data, the type of analysis is variable-oriented and often frequencies and means are compared. This kind of studies is called *level-oriented*. Descriptive statistics or t-tests are the statistical methods applied in the phase of data analysis. In cross-cultural and cross-national research measurement equivalence is necessary if level-oriented studies and analysis are conducted.

On the contrary, if the primary research interest of cross-national studies lies on testing theories and relationships, the analysis is *structure-oriented*. Nation is applied as context variable or as unit of analysis to examine the generality of assumptions and results as well as relationships between social phenomena and institutions. The studies focus on similarities across countries. Analysing survey data in this context various structure-exploring or structure-confirming methods are applied, e.g. factor analysis, latent class analysis, cluster analysis, structural equation modelling and other structure-oriented statistical methods.

An overview of the twofold typology of studies and analysis as well as the linkage of the level of equivalence is given in Table 1. Different levels of comparability are demanded according to different types of studies and analysis.

Table 1 The Purpose of a Study and the Level of Equivalence

Principles of using surveys	Purpose of study	Type of study and of analysis	Level of equivalence
nation as object of analysis	descriptive, focus on differences	level-oriented studies	measurement equivalence
nation as context/ nation as unit	testing generality, testing relationships	structure-oriented studies	structural equivalence

Certainly, comparability in level-oriented studies is harder to establish, because measurement equivalence is a high requirement on the quality of data. Nevertheless, in social sciences the highest level of equivalence is not always needed, if the examination of relationships of social phenomena and the testing of general theories and assumptions is the purpose of a study.

3 Testing Structural Equivalence

Different methods to test and strategies to establish equivalence of measures during the whole research process have been introduced in literature. Furthermore a variety of methods for the examination of different forms and levels of equivalence in the phase of data analysis and within a secondary analysis exist (van de Vijver & Leung, 1997; Johnson, 1998; van Deth, 1998; Berry et al., 2002).

In this paper the focus lies on the basic level of comparability – on structural or construct equivalence. The examination tries to identify the similarity of structures across countries relying on the definition of van de Vijver & Leung (1997) and van de Vijver (2003). It is possible to test this form of equivalence in the phase of data analysis. Statistical methods which rely on the structure of variables and dimensions are appropriate and can be applied. Most frequently exploratory factor analysis or multidimensional scaling are used for this purpose.¹

The procedure of testing structural equivalence of attitudinal measures by means of *confirmatory factor analysis* is now described in detail. The research question aims at the structural aspects and dimensionality of variables and examines whether the construct underlying the attitudinal variables is universal for the countries under investigation or not. In comparison to exploratory factor analysis and multidimensional scaling it offers more flexibility and alternatives for modelling, but it is more complex, time-intensive and there are higher demands on sample size and data quality (e.g. on normal distribution of variables and on scale type of the variables).

Confirmatory factor analysis in a multiple group setting was first introduced by Jöreskog in 1971. It is a structure-confirming method which can be conducted simultaneously for several populations and it examines whether the hypothesised relationships between variables and factors can be found in the empirical data. It offers the possibility to test hypotheses about the relationship of variables and underlying dimensions simultaneously for two and more groups. Various fit-indices and a chi-square test offer orientation if and to which extent empirical data reflect the theoretical construct.

Different parameters of the empirical model can be set variant or invariant across groups and alternative models can be evaluated by means of fit-indices and the *chi-square differ-*

1 A detailed description of testing structural equivalence by means of exploratory factor analysis and multidimensional scaling can be found in Braun & Scott (1998), Welkenhuysen-Gybels & van de Vijver (2001) and Fontaine (2003).

ence test comparing chi-square statistics of the investigated groups. In detail, factor loadings, correlations between factors and measurement errors can be modelled across groups.

For this reason, confirmatory factor analysis can determine the extent of structural equivalence. Hierarchical hypotheses can be tested to evaluate the variance or invariance of the factor structure across groups. In general, the researcher can choose between two alternatives for testing structural equivalence: the bottom-up or the top-down procedure (van de Vijver, 2003). The first procedure starts with the assumption of lowest structural equivalence between groups, the second assumes the highest possible structural equivalence.

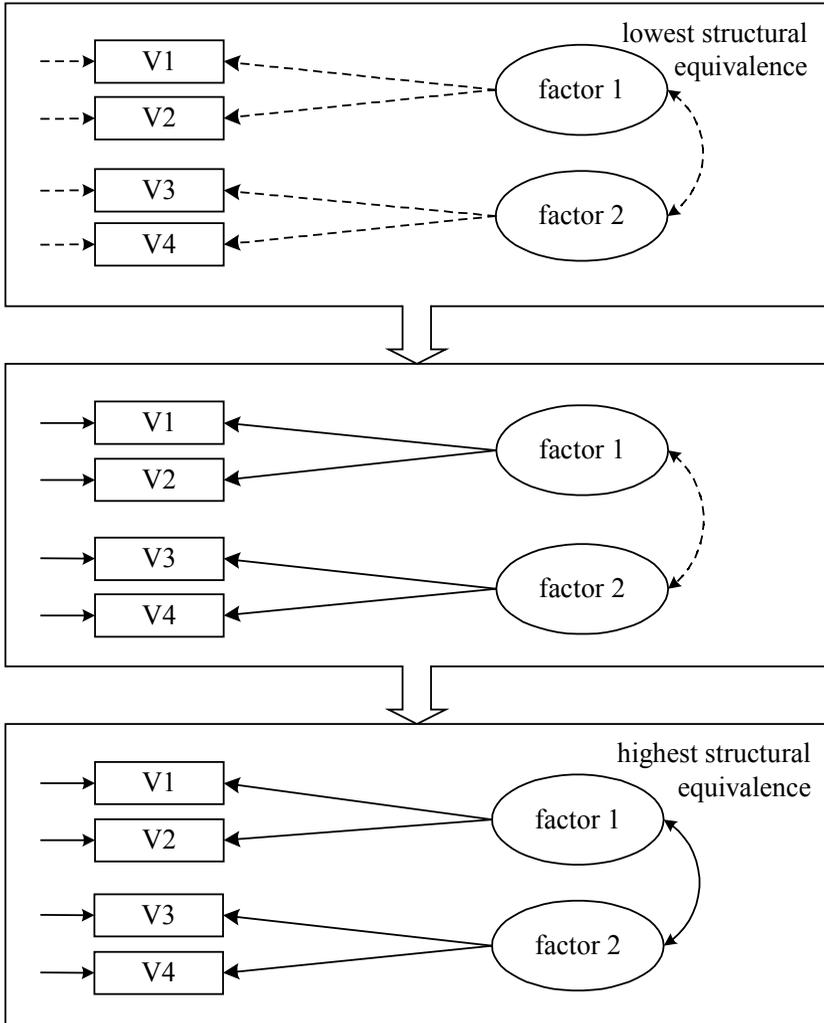
This paper reports on results obtained at the basis of the *bottom-up procedure*. The research questions in this context (indicating the hierarchical hypotheses for the confirmatory factor analysis) can be formulated as follows:

- Is the structure of relationships between items and factors comparable across countries, if factor loadings are not considered?
- If the structure of relationships between items and factors is equal across countries, are the factor loadings and measurement errors comparable across countries?
- If the factor loadings and measurement errors are equal across countries, are the correlations between latent variables comparable across countries?

The first question corresponds to the invariance of relationships and simultaneous variance of factor loadings. It investigates the lowest level of structural equivalence. The second question refers to the invariance of factor loadings and measurement errors. The third hypotheses examines the invariance of factor loadings, measurement errors and correlations between latent variables across all investigated groups or countries. It suggests the highest possible level of structural equivalence. These hypotheses and the process of testing structural equivalence through confirmatory factor analysis is charted in Figure 1 – it shows the process of the bottom-up procedure.

In the present paper structural equivalence of indicators of the ISSP 1999 will be tested. A simplified model of variables measuring attitudes toward social inequality will be introduced. Before testing, basic information on the ISSP and on the investigated items is given.

Figure 1 The Process of Testing Structural Equivalence by Means of Confirmatory Factor Analysis (Bottom-Up Procedure)



Note: The broken line indicates variance across countries in the multiple group analysis, the full line stands for invariance across countries.

4 Testing Structural Equivalence of the ISSP 1999

4.1 The ISSP 1999 and its attitudinal variables towards social inequality

The ISSP is a large-scale survey program conducted since 1983. It covers special topics over time and different nations. The surveys provides a wide range of topics, which are rotating and repeated within a period of several years.

The ISSP 1999 covers the special topic of social inequality and it was conducted in 26 countries. The attitudinal variables cover questions about career advancement by means of family background and networks, social advancement by means of effort, intelligence and corruption, legitimation of inequality, view on earnings and incomes, attitudes towards income inequality, better opportunities through income, social cleavages and conflicts among groups, current and past social position of the respondent, perceptions about and preferences of types of society and social position of the respondents (Harkness et al., 2002). The ISSP provides an opportunity to investigate the perception of social inequality. The possibilities to examine the „objective“ and structural level of inequality of a society are very limited, as this is not the primary purpose of the survey.

Testing of equivalence in the present paper is focused on an empirical core model, it does not include all attitudinal variables of the ISSP 1999. Table 2 contains the twelve selected items which are used for the empirical core model to test structural equivalence. The number of the variables in the ISSP-dataset is reproduced in the first column of the table, then the statements and the answering scales are described. The answering scales are five-point scales, asking for agreement/disagreement, justice/injustice or importance/un-importance.

Three countries were selected for the analysis of structural equivalence – Austria, the Czech Republic and Germany. The selection followed the most similar system design introduced by Przeworski & Teune (1982). These countries were selected, because they show a range of similarities, although cultural and historical differences have to be borne in mind:

- Two German-speaking countries contrast one country with a Slavic language. Although Germany and Austria share one language, comparability of measures can not be assumed *a priori*.
- Especially in the context of perception of social inequality the historical and ideological perspective is important. Country-specific differences in the concepts of equality and justice are to be expected, because of the communistic regime forming attitudes and values of the people in the former Czechoslovakia and the former German Democratic Republic for a period of forty years.

Table 2 Selected Items of the ISSP 1999

No.	Statements	Answering Scale
V9	Inequality continues to exist because it benefits the rich and powerful.	agree – disagree
V12	Inequality continues to exist because ordinary people don't join together to get rid of it.	agree – disagree
V34	Differences in income in [COUNTRY] are too large.	agree – disagree
V35	It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes.	agree – disagree
V39	People with higher incomes can buy better health care than people with lower incomes.	just – unjust
V40	People with higher incomes can buy better education for their children than people with lower incomes.	just – unjust
V50	Important for pay:* The number of years spent in education and training.	important – not important
V51	Important for pay:* Whether the job requires supervising others.	important – not important
V52	Important for pay:* What is needed to support a family.	important – not important
V53	Important for pay:* Whether the person has children to support.	important – not important
V54	Important for pay:* How well he or she does the job.	important – not important
V55	Important for pay:* How hard he or she works at the job.	important – not important

Source: ISSP 1999 Social Inequality III – Final Questionnaire.

* Important for pay: “In deciding how much people ought to earn, how important should each of these things be, in your opinion...?”

It was decided to split the German sample into “East” and “West” (according to “alte und neue Bundesländer”) and to treat the three countries as four groups in analysis. Thus the different historical developments of the Eastern and Western part of Germany could be better accounted for. Furthermore, the social and economic heterogeneity within Germany is considered by splitting.

4.2 Testing structural equivalence by means of confirmatory factor analysis

To examine cross-national comparability of attitudes towards social inequality confirmatory factor analysis is conducted simultaneously in all four investigated groups – Austria, Czech Republic, East-Germany and West-Germany. The analysis tries to identify the extent of similarity of structures across countries through setting different parameters variant or invariant.

Data

Confirmatory factor analysis as well as many other statistical procedures are based upon the assumption that variables are normally distributed. Problems of estimation can occur if the distribution of variables departs from multivariate normality. All variables selected from the ISSP dataset for the test of structural equivalence are ordered variables (ordinal level, 5-point scales). The tests for bivariate normality proved, that the normality assumption does not hold for the analysed variables. Ordered and non-normally distributed variables require special handling in structural equation modeling. Therefore, the analysis is based on polychoric correlations and asymptotic covariance matrices. For mathematical reasons, this procedure can be applied only on complete cases and listwise exclusion of missing values is obligatory.

Listwise deletion of missing values reduces the sample size in all countries by 20 percent on the average. This leads to a sample size of 432 respondents in East-Germany and 679 respondents in West-Germany. The Czech sample is reduced to 1.479 and the Austrian sample to 767 complete cases. The analysis of structural equivalence is provided with unweighted data. The parameters were estimated using the WLS-method (Weighted Least Squares). The confirmatory factor analysis was performed through LISREL 8.30, the matrices were produced with PRELIS 2.30.

The basic empirical model

Confirmatory factor analysis is used to test a hypothesised model so the researcher needs prior knowledge and hypotheses about relationships among variables and factors. For testing of structural equivalence of the ISSP an empirical model reproducing the underlying dimensions of attitudes towards social inequality was established. The model was specified due to considerations in literature and exploratory factor analysis.

Two concepts were taken as basic dimensions of the empirical model – *egalitarianism* and *individualism*. The twelve selected variables can be allocated according to this basic distinction of attitudes towards social inequality and (income) distribution. The results of an exploratory factor analysis show that the perception of egalitarianism and individualism is additionally split on two levels – the macro or group level and the micro or individual level. The combination of these dimensions results in four factors:

- Egalitarianism on macro or group level (EGAL_macro)
- Individualism on macro or group level (IND_macro)
- Egalitarianism on micro or individual level (EGAL_micro)
- Individualism on micro or individual level (IND_micro)

The first factor refers to inequality and income differences on societal and group level – in the following analysis the abbreviation EGAL_macro is used for this factor. The second dimension represents better individual opportunities through higher income which are manifested on a societal macro level (IND_macro). The following two dimensions are allocated on the micro or individual level – one referring to egalitarian views on earnings and income (EGAL_micro), the other to individualistic attitudes towards the allocation of income (IND_micro).

The hypothesized model of attitudes towards social inequality in the ISSP 1999 includes four latent variables and twelve manifest variables, but does not reach an acceptable fit in confirmatory factor analysis. Therefore it was slightly modified in such a way that the empirical model now consists of six latent variables and twelve manifest variables. The specification of the modified model is shown in Figure 2 which refers to the manifest variables, latent constructs and their interrelations.

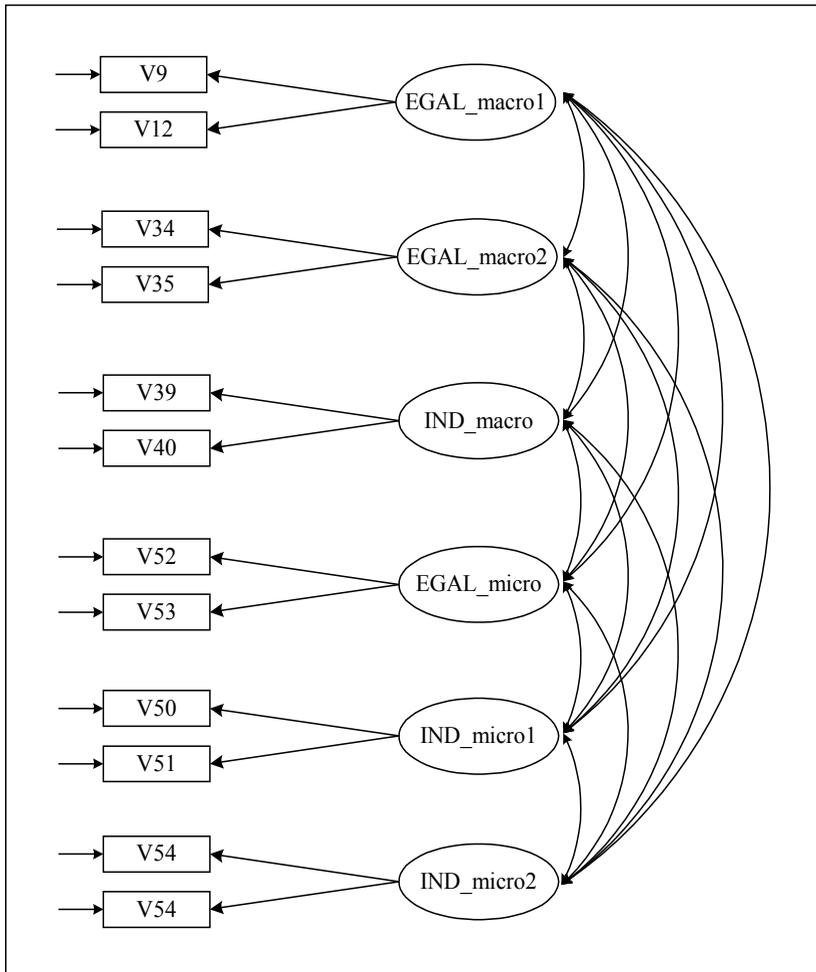
The variables V9 and V12 serve as indicators for egalitarianism on the macro level (EGAL_macro1), as well as the variables V34 and V35 (EGAL_macro2). The factor IND_micro was also split. The items V39 and V40 represent IND_macro and the questions V52 and V53 measure EGAL_micro. All latent variables are assumed to correlate with each other, measurement error variances are not correlated. In structural equation modelling, every latent variable has to be scaled. To determine the scale of the latent variables in the examined model, the latent variables were standardised (no reference variable was used).

The chi-square, degrees of freedom and fit-indices for all investigated groups are given in the table below.

Table 3 Fit of the Basic Empirical Model

country	χ^2	df	p	AGFI	CFI	RMSEA
Austria	66,520	39	,00391	,989	,997	,0304
Czech Republic	112,928	39	,00000	,990	,996	,0358
Germany East	68,868	39	,00222	,985	,995	,0422
Germany West	68,593	39	,00283	,988	,997	,0335

Figure 2 The Basic Conceptual Model for Testing Structural Equivalence By Means Of Confirmatory Factor Analysis



Testing structural equivalence – the results

In this section, confirmatory factor analysis in the multiple group setting will explore whether the same measurement model holds in the four groups (Austria, Czech Republic, East-Germany and West-Germany). Different parameters of the model will be set variant or invariant. In the present paper the *bottom-up procedure* is applied, therefore the test starts with the least restrictive hypothesis. The hierarchical hypotheses are formulated as follows:

- *H-form*: This basic and least restrictive hypothesis tests the common form of the factor model, where the invariance of the form and variance of parameters is assumed. In other words, the number of factors remains the same and the fixed, free and constraint parameters are set in same way across countries. If this common factor structure indicates an acceptable model-fit, the hypothesis holds and the next restrictive hypothesis can be tested.
- *H-load*: In this step the assumption of invariance of factor loadings and measurement error variances across countries is examined – these parameters are set equal in all groups.
- *H-structure*: Further invariance constraints are set on the correlations between the latent variables. The factor loadings, measurement error variances and correlations between factors are equal. If this assumption holds the highest level of structural equivalence is achieved.

The hierarchy of invariance refers to invariance of form and invariance of parameters in consecutive steps. To evaluate the progress the models and hierarchical hypotheses are compared with the *chi-square difference test*. This test compares the less restrictive model with the more restrictive model and demonstrates if the more restrictive hypothesis should be accepted or rejected.

Starting with the assumption of the same form, but variant paths for all countries the chi-square difference test was performed for the factor model of the ISSP 1999 described in Figure 2. The results of the multiple group confirmatory factor analysis of the first model (H-form) is compared to the model corresponding to hypothesis H-load. In the model H-form the structure is equal across all groups (Austria, Czech Republic, East- and West-Germany) and all parameters are variant. In the model H-load factor loadings and measurement error variances are set invariant over all groups. Fit-indices, chi-square, degrees of freedom and the chi-square difference test are summed up in Table 4. The chi-square difference test is significant ($\chi^2\text{Diff} = 129,140$; $\text{dfDiff} = 72$) and indicates that the factor loadings and measurement error variances should not be set equal across all groups.

Table 4 Chi-Square Difference Test: Multiple Group Confirmatory Factor Analysis

hypothesis	GFI	CFI	RMSEA	χ^2	df	p ^{a)}	χ^2 Diff	dfDiff	Sign. ^{b)}
H-form	,995	,996	,0351	316,906	156	,00000	-	-	-
H-load	,993	,994	,0338	446,047	228	,00000	129,140	72	s.

^{a)} The p-value indicates, if data significantly differ from the model.

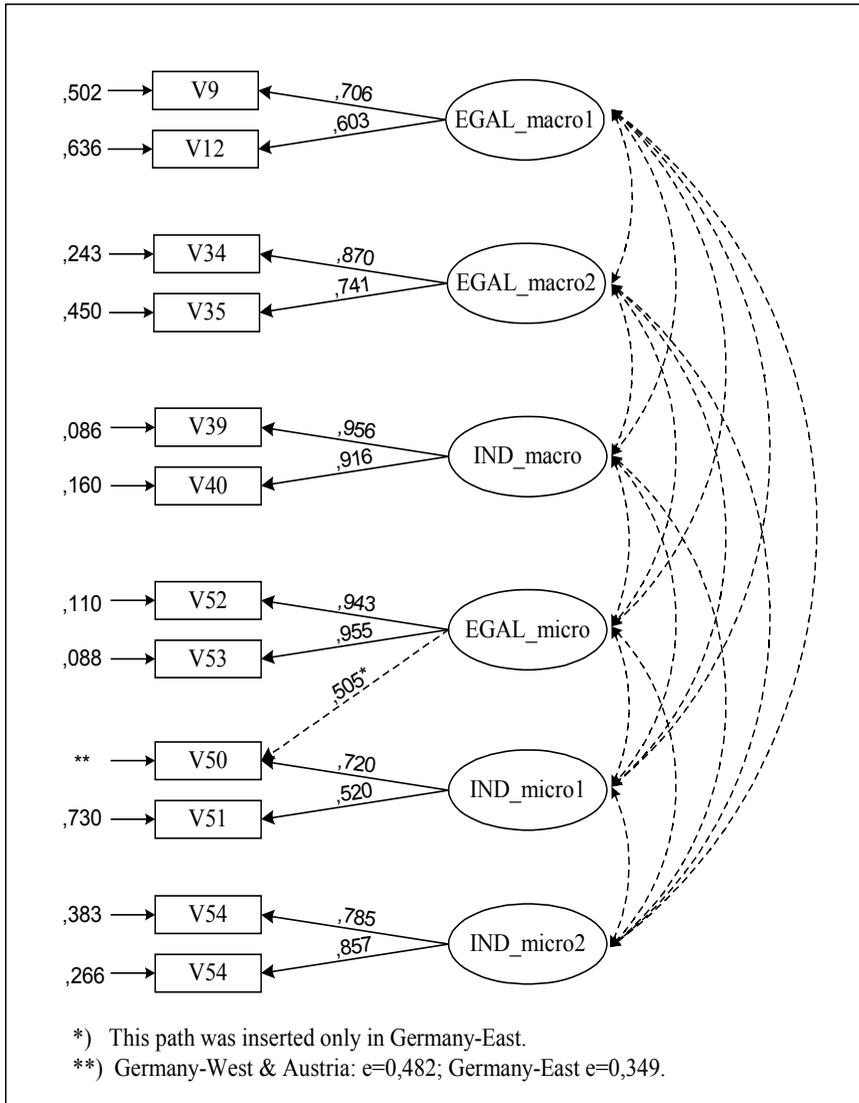
^{b)} This column shows if a model differs significantly from the less restrictive model (“s.” means “significant”, “n.s.” means “not significant”).

On the one hand, the model of H-form shows an acceptable model-fit, on the other hand the model corresponding to H-load is significantly worse than the first model. For this reason testing has to go into more detail. Consequently, the extent of structural equivalence “lies in between” and the testing can be proceeded for different groups of countries and/or different dimensions.

Various models which lie between the previously tested H-form and H-load were calculated and compared. Different post hoc model modifications were performed by setting systematically specific paths variant and invariant. Finally, an acceptable model with a high level of equivalence was found including the groups Austria, East- and West-Germany. The form of the final model remains the same as of the previous model, only in East-Germany one supplementary path was set which is not replicated in the other two groups. The basis hypothesis is now referred to as H-form2. The more restrictive hypothesis is H-load2 and the most restrictive hypothesis indicating highest level of equivalence is H-structure2.

The parameter estimates (factor loadings and measurement error variances) of the final model (H-load2) are reported in Figure 3, which shows the extent of structural equivalence of the tested model of the ISSP 1999. Factor loadings and measurement error variances are equal in Austria, East-Germany and West-Germany. Only in East-Germany a supplementary path is set between the variable V50 and the factor EGAL_micro.

Figure 3 Structural Equivalence between Germany-West, Austria and Germany-East (Hypothesis “H-load2”)



This paper reports the results of the final model which shows the highest possible number of invariant parameters in the three groups Austria, East-Germany and West-Germany. Fit-indices, chi-square, degrees of freedom and the chi-square difference test of the models corresponding to the hypotheses H-form2 and H-load2 are reported in Table 5. The test indicates that the chi-square difference is not significant and the model H-load2 is an acceptable alternative.

Table 5 Chi-Square Difference Test: Multiple Group Confirmatory Factor Analysis of the Modified Model (V50 – EGAL_micro), Germany-West, Austria and Germany-East

hypothesis	GFI	CFI	RMSEA	χ^2	df	p	χ^2 Diff	dfDiff	Sign.
H-form2	,992	,997	,0326	192,968	116	,00001	-	-	-
H-load2	,989	,997	,0275	240,194	163	,00008	47,226	47	n.s.
H-structure2	,983	,994	,0360	349,078	193	,00000	108,884	30	s.

Level of structural equivalence

The extent of structural equivalence varies depending on which countries or groups are compared. Factor structures of Austria and West-Germany are highly equivalent. Only a few parameters – correlations between some latent variables – have to stay invariant. As well, high structural equivalence is found between Austria, East- and West-Germany. Although, in East-Germany one factor of the model (EGAL_micro) seems under-identified.

Comparing four groups tested in this paper, highest structural equivalence can not be assumed. The four groups (Austria, Czech Republic, East- and West-Germany) show structural equivalence, although the lowest level. Only the form of the factor model is equal and therefore lowest structural equivalence is assumed. The data should be analysed and compared carefully across all four groups (see below). Furthermore, the Czech factor model seems to be under-identified.

5 Implications on Usage of the ISSP 1999

A secondary analysis of the ISSP-data from 1999 was conducted, in which equivalence of attitudes towards social inequality was tested for four groups – for Austria, the Czech Republic, East- and West-Germany. After choosing the framework of structural equivalence confirmatory factor analysis was applied to test cross-cultural comparability of measures and data. Research focused on structural equivalence in cross-national research and examined whether the construct is universal for the countries under investigation. Lowest structural equivalence was found between all countries, highest structural equivalence of the examined ISSP-data can be assumed between Austria, East- and West-Germany.

Before drawing conclusions, some limitations of the presented study should be mentioned. Construct equivalence was tested only in the framework of secondary analysis, therefore it has to focus on a relative small number of variables and rely on methods which can be applied after data collection. Then, the evaluation was conducted only by means of statistical methods – other forms of evaluation could be applied in addition, e.g. cognitive methods.

Conclusions and implications on the usage of the ISSP 1999 can be drawn if the three countries or four groups are involved in a comparative, cross-national study design. First, the analysis of construct equivalence suggests structure-oriented analysis to be appropriate. If level-oriented analysis is applied on this data descriptive measures of the attitudinal variables should not be compared between all countries. Especially the Czech data is limited to the lowest level of construct equivalence and therefore, measurement equivalence cannot be assumed. Only highest level of measurement equivalence permits to compare level-oriented measures across groups. Possible types of analysis which can be applied on the ISSP-data depend on which countries are compared.

Second, the limitations with regard to type of analysis imply conclusions on the type of study and on research design. Depending on the examined countries the researcher can use nation as context variable as well as nation as unit. This kind of study can be conducted with all countries analysed in this paper – Austria, Czech Republic and Germany. Whereas, if a research design is chosen where nation is used as object of analysis, attention has to be paid to the Czech Republic. Measurement equivalence is not established in the ISSP-data for this country, therefore cross-national comparison of frequencies, means and other descriptive, level-oriented measures should be avoided or presented carefully.

To sum up, the testing of attitudinal questions of the ISSP 1999 detected (at least the lowest level of) structural equivalence in three countries. Survey data shows the optimal level of equivalence for testing theories and understanding complex social realities. Depending on the purpose of an empirical study and research design, for most studies in social sciences structural equivalence might be adequate and sufficient.

References

- Alwin, D. F., M. Braun, J. A. Harkness, and J. Scott. 1994. "Measurement in Multi-National Surveys." Pp. 26-39 in *Trends and Perspectives in Empirical Social Research*, edited by Borg, I., and P. Ph. Mohler. Berlin, New York: Walter de Gruyter.
- Berry, J. W., Y. H. Poortinga, M. H. Segall, and P. R. Dasen. 2002. *Cross-Cultural Psychology: Research and Applications*. Cambridge, New York, Port Melbourne, Madrid, Cape Town: Cambridge University Press.
- Braun, M., and J. Scott. 1998. "Multidimensional Scaling and Equivalence: Is having a job the same as working?" Pp. 129-144 in *Cross-Cultural Survey Equivalence*, edited by Harkness, J. A. ZUMA-Nachrichten Spezial, Nr. 3. Mannheim: ZUMA.
- Fontaine, J. 2003. "Multidimensional Scaling." Pp. 235-246 in *Cross-Cultural Survey Methods*, edited by Harkness, J. A., F. J. R. van de Vijver, and P. Ph. Mohler. Hoboken, New York: Wiley Interscience.
- Harkness, J. A. (Ed.). 1998. *Cross-Cultural Survey Equivalence*. ZUMA-Nachrichten Spezial, Nr. 3. Mannheim: ZUMA.
- Harkness, J. A., E. Scholz, and S. Stadler. 2002. *ISSP 1999 Germany. Social Inequality III*. ZUMA Report on the German Study. ZUMA Methodenbericht.
- ISSP 1999. *Social Inequality III, Final Questionnaire*. ZA No. 3430, secretariat version.
- Johnson, T. P. 1998. "Approaches to Equivalence in Cross-Cultural and Cross-National Survey Research." Pp. 1-40 in *Cross-Cultural Survey Equivalence*, edited by Harkness, J. A. ZUMA-Nachrichten Spezial, Nr. 3. Mannheim: ZUMA.
- Jöreskog, K. G. 1971. „Simultaneous factor analysis in several populations.” *Psychometrika* 36:409-426.
- Kohn, M. L. 1989. „Introduction.” Pp. 17-31 in *Cross-national research in sociology*, edited by Kohn, M. L. Newbury Park, London, New Delhi: SAGE.
- Niedermayer, O. 1997. "Vergleichende Umfrageforschung: Probleme und Perspektiven." Pp. 89-102 in *Vergleichende Politikwissenschaft. Ein einführendes Studienhandbuch*, edited by Berg-Schlosser, D., and F. Müller-Rommel. Opladen: Leske + Budrich.
- Przeworski, A., and H. Teune. 1982. *The logic of comparative social inquiry*. Malabar, Florida: Krieger.
- Rokkan, S. 1972. *Vergleichende Sozialwissenschaften. Die Entwicklung der interkulturellen, inter-gesellschaftlichen und inter-nationalen Forschung. Hauptströmungen der sozialwissenschaftlichen Forschung*. Frankfurt/Main, Berlin, Wien: Ullstein.
- Teune, H. 1990. "Comparing Countries: Lessons Learned." Pp. 38-62 in *Comparative methodology: Theory and practice in international social research*, edited by Øyen, E. London: Sage.

- van de Vijver, F. J. R. 2003. "Bias and Substantive Analysis." Pp. 207-233 in *Cross-Cultural Survey Methods*, edited by Harkness, J. A., F. J. R. van de Vijver, and P. Ph. Mohler. Hoboken, New York: Wiley Interscience.
- van de Vijver, F. J. R. 1998. "Towards a Theory of Bias and Equivalence." Pp. 41-65 in *Cross-Cultural Survey Equivalence*, edited by Harkness, J. A. ZUMA-Nachrichten Spezial, Nr. 3. Mannheim: ZUMA.
- van de Vijver, F. J. R., and K. Leung. 1997. *Methods and Data Analysis for Cross-Cultural Research*. Thousand Oaks, London, New Delhi: Sage.
- van Deth, J. W. 1998. "Equivalence in comparative political research." Pp. 1-19 in *Comparative Politics. The problem of equivalence*, edited by van Deth, J. W. London, New York: Routledge.
- Welkenhuysen-Gybels, J., and F. J. R. van de Vijver. 2001. *Methods for the Evaluation of Construct Equivalence in Studies Involving Many Groups*. <http://www.kuleuven.ac.be/dvz/softwaredata/webversion.pdf> (2003-08-27).