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AN ECONOMETRIC APPROACH TO MEASURE INEQUALITY IN MEDIA CONSUMPTION

Comparisons of media consumption in different countries or markets are usually focused on statistics of average usage, penetration or access. This study advocates an alternative, describing the distribution of individual usage by means of a disparity measure. Specifically, it employs the Theil index and discusses the benefits of its utilization in the context of media consumption. Furthermore, an empirical analysis has been conducted drawing on data from the European Social Survey. Analyzing the usage of television, radio and newspaper, Theil indices are provided for 29 countries and three periods: 2002/2003, 2004/2005 and 2006/2007. The Theil indices for television and radio are not correlated with the included traditional consumption measure, thus having great potential to produce new insight. The estimates show fairly substantial levels of inequality for most countries with regard to newspaper reading and radio listening while inequality in television watching is comparably low in most countries. An international comparison reveals that countries with shared cultural traditions and common language origins tend to have similar usage structures. Finally, apart from a few exceptions, the Theil indices remain relatively constant over the observed period of time.

Keywords: audience research, media usage, mass media, inequality, Europe.

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1. Introduction

Media consumption is a matter of utmost importance within social science, political science and management studies. Therefore, the usage of various media has been closely monitored throughout the past half century. Common indicators include, for example, the access rate, the reach, the penetration rate, the circulation, the frequency of usage and the average duration of daily usage per person as well as the average number of items purchased. In-depth statistics reveal that consumption is not evenly distributed among the population, on the contrary, the usage of certain media appears to be rather concentrated in particular social subgroups and milieus. Given such concentration, it might be highly misleading to rely solely on the indicators mentioned above to describe the overall market structure in analyses on the macro-level, as high rates of penetration and average usage may distract from the fact that most of the demand could well be allocated to a small group of heavy users. This has been taken into account by the definition of interest groups or target groups. However, little effort has been made to examine these inequalities by means of quantitative measures regarding the overall audience. The aim is to identify a summary statistic that conveys information on the level of disparity in macro-analyses of the overall audience which would otherwise become apparent only in an in-depth analysis of the distribution. The author puts forward for consideration that an econometric approach is adequate and provides an appropriate solution. The objective is to describe an alternative way to assess disparities in media consumption. The article will simultaneously suggest an intuitive interpretation and a presentation of its advantages vis-à-vis traditional measures. This paper describes an acknowledged econometric measure of concentration and discusses its utilization in the context of media consumption. On the basis of these theoretical considerations an empirical analysis is conducted. Much existing research on media consumption is based upon studies of only one single country or of paired cross-national comparisions. The main reason for such an unilateral approach can be that comparable data is scarce, which may be due to the expensiveness of data gathering and structural differences between national media markets. However, any attempt trying to generalize from that kind of studies with a national focus is highly problematic. Therefore,

it is desired to provide the proposed indicators for as many countries as possible establishing a reliable basis for further research. By reanalyzing publicly available data, a concentration measure has been calculated for various media and multitudinous countries. The results provide insight into the structure of different markets, thus allowing to draw comparisons both, between geographical regions as well as between different media.

The article is structured in seven sections: Departing from a concise précis of traditional measures, the concept of inequality in media consumption is described. The methodological section adapts an inequality indicator to the exploration of media consumption. The source of raw data and the variables are documented. Departing from a presentation of the estimated indicators, the empirical analysis highlights the differences between newspaper reading, radio listening and television watching and comprises a cross-national and an intertemporal collation. Furthermore, the new indicators are confronted with traditional measures, thus demonstrating their potential for new insight.

2. Traditional Measures of Media Consumption

Multitudinous indicators of media usage evolved over time. Almost all of them relate to one of six basic concepts: Access, frequency of use, duration of use, content used, economic demand and spending as well as preference structures. The analysis of those concepts of media consumption can take place on three levels: At the micro-level the objects are individuals, at the meso-level the objects are target groups and at the macro-level the audience or society as a whole is examined. Recent reviews provide, for example, McQuail (1997), Süss & Bonfadelli (2001) and Meyen (2004). The precondition for any media consumption is access to the media, which requires the availability of technical infrastructures, the distribution of physical media products and the proficiency of the client to use a certain medium. Technical reach and actual circulation are especially popular measures, as data is available from operators and industry statistics. Figures on the ownership of receiving devices are easily accessible as well. Gathering data on actual usage is far more onerous, as it requires to conduct laborious surveys or costly technical measurement. Such data collection has to involve the individual user. Well established are three

measures: Contact, frequency of use and the duration of use. At the meso-level and the makro-level this data is sometimes given in the format of frequency tables but often just the mean is reported. For analytical purposes it is often required to condense data to summary metrics that characterize the structure of a whole market by means of a single measure. With the commonly adopted mean, however, a great deal of information is disregarded as it describes only the location of the distribution but not its shape. From in-depth statistics it is known that media consumption is often concentrated in certain social groups. Considering only the mean, this phenomenon could go unnoticed: At a given mean media consumption could be evenly distributed within the population or highly concentrated within a small group of persons who use the medium extensively. Therefore, some summary statistics like the mean can be criticized because they do not represent the shape of the distribution sufficiently. However, this is important when dealing with concentration. Over the past century, the assessment of such disparities has been given a great deal of thought in econometrics with regard to the distribution of wealth and income. A whole spectrum of different econometric measures evolved that highlight different aspects. In this article it is proposed to transfer the concept of inequality to the measurement of media consumption. The degree of inequality reflects the level of inhomogeneity in the media consumption patterns of an audience. In market studies it may be the basis for the definition of homogeneous target groups. In the course of a free interpretation it may serve as an indicator of dissimilarities in personal information gathering and social participation. Therefore, it might be employed in analyses of phenomena such as civil unity, social cohesion and political involvement.

3. An Econometric Measure of Inequality in Media Consumption

In the following chapter the general notion of disparity is adjusted to the measurement of inequality in media consumption. It might appear that there is no common consent how inequality should be defined. If there was, one might expect that it should be easy to deduce an undisputed universal statistic. As inequality is a more subtle concept, there are various measures that highlight different aspects. Comprehensive reviews on the measurement of inequality are often written from an econometric per-

spective with particular emphasis on its application in research on income distribution and poverty, an example is the book of Cowell (2000). From a formal point of view most measures of inequality are closely interrelated, but put emphasis on different aspects and foster different interpretations. In the context of communication sciences the concept has not been used frequently, if ever. Therefore, the following definition shall be suggested: A metric of inequality in media consumption is a statistical formulae summarizing the dispersion of the distribution of media consumption among individuals. Building on this intuition, the introduction of inequality indicators shall depart from an individual-level analysis. When the distribution is equal, all individuals have the same level of media consumption, and the measure of inequality assumes its absolute minimum. Deviations from this equal distribution occur, when one or more individuals have a higher share of the total amount than others. This is reflected in an increase in the value of the inequality measure.

The current study employs the Theil index, which is probably one of the most popular inequality measures. Theil introduced a new inequality measure in 1967 that is based on Shannon's information theory (1948). Several further entropy-related measures of disparity have appeared over the past decades. However, apparently none of them had such an impact as the original Theil index.

The calculation of inequality measures can be based on continuous as well as on discrete distributions. In this paper the focus will be on the latter. The unit of analysis are individuals, but could be households as well. The observed audience is considered to be a population of n individuals i , each of whom having a media consumption of y_i indicating the time of daily usage in minutes. Of course, it could be the frequency of usage, the demand in units or the spending as well. Obviously, $y_i \in]0, \infty]$ for all $i=1,2,\dots,n$. The average consumption is given by μ . The aggregated consumption of all audience members together is given by Y . Each of the individuals constitutes a portion of $1/n$ of the audience.

Adapted to the notation used in this article, the formula of the Theil index in its original form is given by:

$$T = \frac{1}{n} \cdot \sum_{i=1}^{i=n} \frac{y_i}{\mu} \cdot \ln \left(\frac{y_i}{\mu} \right)$$

By definition, $0 \leq T$. In its familiar form Theil's index is not intuitively appealing to everybody. However, its qualities as inequality measure can be easily explained, without extensive reference to the concept of entropy or the statistical information theory, as Conceição & Ferreira (2000) highlighted. Some rudimentary transformations lead to a less familiar form of the index:

$$T = \sum_{i=1}^{i=n} \frac{y_i}{Y} \cdot \ln \left(\frac{y_i}{Y} \div \frac{1}{n} \right)$$

The Theil index is based on the notion that perfect equality is attained when all individuals have the same level of consumption. In this case for any given person i its share of the total consumption (y_i/Y) would be equal to its share of the audience ($1/n$). If $(y_i/Y) = (1/n)$ is true for a certain individual i , then $(y_i/Y)/(1/n) = 1$ and $\ln[(y_i/Y)/(1/n)] = 0$. Thus, the value of the index will not be increased. In the case of perfect equality, this is true for all individuals and $T=0$. If $(y_i/Y) \neq (1/n)$ the individual i adds to overall inequality. Then, $0 < T$. Aggregating the contributions of all individuals, the Theil index is the consumption-weighted sum of the logarithms $\ln[(y_i/Y)/(1/n)]$. The Theil index has no absolute maximum. The upper bound which corresponds to perfect inequality is dependent on population size: $T_{max} = \ln(n)$. This reflects that disparities can be bigger in a large population than in a small one.

The presented formula of the Theil index requires that the consumption of every individual is measured precisely. Unfortunately, the data set employed in the current study does not meet this requirement. In reply to survey questions like «How long do you watch TV on an average day?» the respondents have rated their own usage habits according to a scale of eight items. Therefore, the obtained data is categorial. Each category covers an interval of 30 minutes (apart from two exceptions). Obviously, such a survey design disregards some information: A respondent, for example, picks the category $]30,60]$. Then it remains unknown, whether this respondent watches television for almost an hour or just a little longer than 30 minutes. This information, however, is relevant. In a survey with a large sample several respondents will be assigned to the same category. Then it is very likely that not all of those respondents use the medium to exactly the same degree. Therefore, there will be some hidden inequality

resulting from the differences in the consumption levels of the respondents who are assigned to the same category. To cope with this problem two approaches have evolved: Firstly, the potential inequality within the categories can be simply ignored. In this case, the all respondents within a category are assumed to have the same hypothetical consumption level and the Theil index measures only the inequality between the categories. Of course, this comes at the cost of underestimating the real inequality. Secondly, some advanced techniques try to estimate the disparity within the categories. After an exploratory analysis, the author believes that the first approach yields satisfactory empirical results here.¹ Hence, for the sake of simplicity, the current study makes use of the less sophisticated approach: All persons who are assigned to a certain category $[a,b]$ are assumed to have a consumption level of $y=(a+b)/2$.

4. Data

The current study makes use of survey data on media consumption derived from the European Social Survey (ESS), which has been conducted biennially since 2002 (Jowell and the Central Co-ordinating Team 2003 and 2005 and 2007).² In the first wave, denoted ESS1, 22 countries participated with a combined sample size of 42359 in the period of 2002/2003. The second survey ESS2 took place in 2004/2005 comprising 26 countries with a total of 49067 respondents. Recently, data of the third wave has been published (ESS3). However, for now, design weights are not available for all countries that participated in 2006/2007, thus, included are only 17 countries with a sample size of 30948 respondents.

The ESS is academically-driven and publicly funded by the European Commission, the European Science Foundation and national funding

¹ The approach employed here should not be transferred to other analyses without careful consideration. The reader is explicitly warned to beware of the numerous methodological problems that are associated with the application of the Theil index in empirical analyses. The choice of an appropriate approach as well as a correct implementation depend on various factors, including the data structure and the research design. The reader is strongly advised to consult the relevant literature on the methodological basics before employing the method in any further empirical analysis.

² Data archive and distributor of the ESS Data: Norwegian Social Science Data Services, Bergen, Norway, <http://ess.nsd.uib.no>

bodies, which ensures independence and high credibility. Employing the most rigorous methodologies, this survey can be seen as one of the most actual, comprehensive and reliable data source of its kind. Implementing strict random probability sampling and target response rates of 70 percent, data collection took place in hour-long standardized face-to-face interviews. Standards, comprehensive documentation and rigorous translation protocols ensure cross-national comparability. Aimed at the monitoring of public attitudes and values, the survey covers a huge range of social matters. Concerning the usage of traditional mass media, the ESS provides data on the total time which the respondents devote to media consumption on an ordinary weekday. Comparable data is available for television watching (ESS variable: TVTOT), radio listening (RATOT) and newspaper reading (NWSPTOT). The data is grouped. The variables consist of 8 categories each plus several non-response identifiers. Starting with a zero category, the brackets that define the categories comprise intervals of 30 minutes each up to 180 minutes. Labelled «three hours and more», the highest category is open-ended. In respect to the estimation of inequality measures, this is potentially problematic. Considering that in many of the observed countries a large fraction of the population is allocated to the highest category of television watching, the shape of the upper end of the distribution is neglected. This is the main drawback of the ESS data set. The problem is of less relevance with respect to radio listening and newspaper reading as few people are assigned to the highest usage category. The implications for the estimates for television watching depend on the applied approach. The method used in this study requires assumptions on the upper limit. A presupposition shall be that, in a conservative approach, an underestimation of inequality is preferable to an overestimation. Therefore, a cautious assumption about the upper limit shall be applied, chosen is 210 minutes. Thus, the limits of the brackets are as follows: [0];]0,30];]30,60];]60,90];]90,120];]120,150];]150,180];]180,210[. The numbers indicate the total time of media usage on an ordinary weekday in minutes. The assumed consumption levels corresponding to those intervals are as follows: → 0; 15; 45; 75; 105; 135; 165; 195. To obtain maximal representativeness, slight imbalances in the sampling procedures of the national surveys are corrected by the application of the official ESS Design Weights to all variables.

5. Empirical Findings

The data analysis is conducted in four stages: Departing from the described data set, Theil indices are calculated according to the procedure already discussed. The second stage of the analysis uses these country indices to draw comparisons between the three media vehicles and to tests for intercorrelations. The next step is focused on international differences: In correlation analyses inequality is compared to access. Then, patterns of inequality in media consumption are described based on an exploratory cluster analysis.

5.1. Estimates of the Theil Index

The available data allows to calculate inequality measures for 29 countries and three periods. Figure 1 presents the estimated Theil indices for television watching, Figure 2 depicts those obtained for radio listening and Figure 3 displays the estimates for newspaper reading.

In advance of the further discussion, a word of caution is necessary: With regard to many countries the availability of data for three periods allows to analyze a «mini time series». However, as the number of countries included in the sample varies between the surveys, summary statistics describing the cross-national sample are not comparable over time.

Inequality in television watching is comparatively low. In all three periods the median of the Theil indices of the observed countries equals about 0.16. The range equals 0.170 in 2002, 0.155 in 2004 and 0.175 in 2006. In comparison to the ranges of the Theil indices of the other media the range is relatively narrow, meaning that the cross-national differences are smaller than those observed for radio and newspapers. Nevertheless, the absolute difference seen between the indices of Switzerland and the United Kingdom is substantial. Furthermore, in all of the observed countries the Theil index for television watching remains virtually constant over time.

Inequality in radio listening varies notably between the observed nations, with the Theil index ranging from 0.261 to 1.110 in 2004. The range equals 0.486 in 2002, 0.839 in 2004 and 0.651 in 2006. The median is roughly at 0.46 in all three periods. In the Netherlands, Por-

Figure 1: Inequality in Television Watching

Television	ESS1	ESS2	ESS3
Austria	0.237	0.193	
Belgium	0.171	0.161	0.155
Bulgaria			0.119
Cyprus			0.104
Czech Republic	0.120	0.121	
Denmark	0.134	0.153	0.141
Estonia		0.148	0.160
Finland	0.167	0.167	0.174
France	0.176	0.174	0.164
Germany	0.145	0.150	0.157
Greece	0.139	0.114	
Hungary	0.166	0.170	
Iceland			0.158
Ireland	0.118	0.123	
Israel	0.229		
Italy	0.131		
Luxembourg	0.183	0.183	
Netherlands	0.126	0.137	
Norway	0.145	0.151	0.161
Poland	0.180	0.185	0.190
Portugal	0.157	0.145	0.164
Slovakia		0.178	0.149
Slovenia	0.234	0.222	0.238
Spain	0.141	0.165	0.165
Sweden	0.165	0.164	0.179
Switzerland	0.283	0.262	0.279
Turkey		0.144	
Ukraine		0.152	
United Kingdom	0.113	0.107	0.127

Theil Indices. Own Estimations. Source of Raw Data: European Social Surveys ESS1 (2002/2003), ESS2 (2004/2005) and ESS3 (2006/2007). Variable: TVTOT. ESS Design Weight.

Figure 2: Inequality in Radio Listening

Radio	ESS1	ESS2	ESS3
Austria	0.363	0.372	
Belgium	0.435	0.480	0.428
Bulgaria			0.983
Cyprus			0.410
Czech Republic	0.377	0.390	
Denmark	0.365	0.397	0.451
Estonia		0.377	0.432
Finland	0.470	0.542	0.555
France	0.509	0.532	0.526
Germany	0.381	0.418	0.400
Greece	0.747	0.725	
Hungary	0.451	0.454	
Iceland		0.329	
Ireland	0.261	0.271	
Israel	0.464		
Italy	0.746		
Luxembourg	0.473	0.429	
Netherlands	0.457	0.615	
Norway	0.492	0.466	0.454
Poland	0.483	0.450	0.473
Portugal	0.643	0.618	0.793
Slovakia		0.358	0.332
Slovenia	0.390	0.366	0.401
Spain	0.648	0.636	0.663
Sweden	0.564	0.557	0.554
Switzerland	0.489	0.431	0.465
Turkey		1.110	
Ukraine		0.651	
United Kingdom	0.465	0.534	0.506

Theil Indices. Own Estimations. Source of Raw Data: European Social Surveys ESS1 (2002/2003), ESS2 (2004/2005) and ESS3 (2006/2007). Variable: RATOT. ESS Design Weight.

Figure 3: Inequality in Newspaper Reading

Newspaper	ESS1	ESS2	ESS3
Austria	0.430	0.422	
Belgium	0.758	0.871	0.771
Bulgaria			0.794
Cyprus			0.832
Czech Republic	0.433	0.505	
Denmark	0.523	0.497	0.486
Estonia		0.426	0.447
Finland	0.298	0.283	0.296
France	0.748	0.761	0.778
Germany	0.400	0.436	0.433
Greece	1.306	1.284	
Hungary	0.547	0.455	
Iceland		0.244	
Ireland	0.438	0.427	
Israel	0.615		
Italy	0.624		
Luxembourg	0.611	0.549	
Netherlands	0.408	0.435	
Norway	0.243	0.256	0.277
Poland	0.759	0.694	0.681
Portugal	0.874	0.767	0.975
Slovakia		0.558	0.525
Slovenia	0.487	0.440	0.510
Spain	0.884	0.905	0.879
Sweden	0.303	0.282	0.276
Switzerland	0.344	0.331	0.349
Turkey		1.057	
Ukraine		0.584	
United Kingdom	0.559	0.582	0.659

Theil Indices. Own Estimations. Source of Raw Data: European Social Surveys ESS1 (2002/2003), ESS2 (2004/2005) and ESS3 (2006/2007). Variable: NEWTOT. ESS Design Weight.

tugal, Denmark, Finland and Estonia inequality increased substantially without any obvious reason. For the rest of the sampled countries no changes of substantial magnitude are to be reported.

Inequality in newspaper reading is minimal in Norway, Iceland and Finland, Theil indices being below 0.30. Maximal inequality is observed in Greece, Turkey and Spain with Theil indices of up to 1.306. Clearly, the range is a lot wider than for television watching and radio listening. Comparing the three media, the differences between the European countries are largest for newspaper reading, as the Theil index has a range of up to 1.063. The median Theil index equals 0.535 in 2002, 0.497 in 2004 and 0.525 in 2006. While in most countries the indicators remained practically unchanged in all three periods, there was an increase in the United Kingdom, the Czech Republic and Portugal. Inequality decreased in Hungary and Poland. In the light of the sparse data it is impossible to determine, whether these changes are isolated or a part of an ongoing trend.

The pattern of inequality in media consumption seems to be relatively stable over time. For both periods and all media the values of the indicator remained roughly unchanged in most countries. Only inequality in newspaper reading changed remarkably in a few countries.

5.2. *Inter-Media Comparison*

Between television, radio and newspaper exist substantial differences in the level of inequality in consumption. Analyzing those patterns, the first question is, whether the inequalities in television watching, radio listening and newspaper reading are correlated. Figure 4 shows the results of the analysis using Pearson's correlation coefficient. In the sample, there seems to be only insubstantial correlation between the Theil indices of television watching and radio listening as well as for those of television watching and newspaper reading. However, there is a correlation between Theil indices of newspaper reading and radio listening although it is not very strong. Inequality in media consumption does not appear to be a phenomenon that affects all media within a country in a similar way. Therefore, it is not feasible to use an composite measure to describe the overall phenomenon of inequality in media consumption within a country. A differentiation of the media vehicles and a separate measure-

Figure 4: Correlation of Inequality in Media Consumption

		ESS1 cor	ESS2 cor	ESS3 cor
Theil(Television)	Theil(Radio)	-0.1255	-0.2578	-0.2088
Theil(Television)	Theil(Newspaper)	-0.1480	-0.2947	-0.4019
Theil(Radio)	Theil(Newspaper)	0.6003	0.6463	0.4552

Theil indices: Own Calculations based on Data from ESS.

ment is necessary. To characterize the media market, the patterns of all three media have to be considered.

By common consent television is regarded as the leading medium of our time. The results give new support to this notion. Television is not only the medium most heavily used, it is the medium that is most equally used as well. In all of the observed countries television watching is the most equally adopted activity of media consumption. This is reflected in lower Theil indices compared to newspaper reading and radio listening in all of the observed periods. In 18 countries inequality in newspaper reading is bigger than inequality in radio listening, thus making newspapers the medium with the least homogeneous consumption pattern. Contra-wise, in the nine remaining countries newspapers are more equally used than radios. Those countries are Bulgaria, Finland, Italy, Netherlands, Norway, Sweden, Switzerland, Turkey and the Ukraine. Therefore, two clear cut hierarchies can be distinguished: television – radio – newspaper and television – newspaper – radio, ranked in the order of increasing inequality.

5.3. Inequality in Consumption and Access Indicators

Accessibility, penetration rates and inequality in consumption are somehow related concepts. All of them assess, how widely a medium is being used within a society or across an audience. Accessibility describes, how many people have got the chance to use a medium, penetration rates

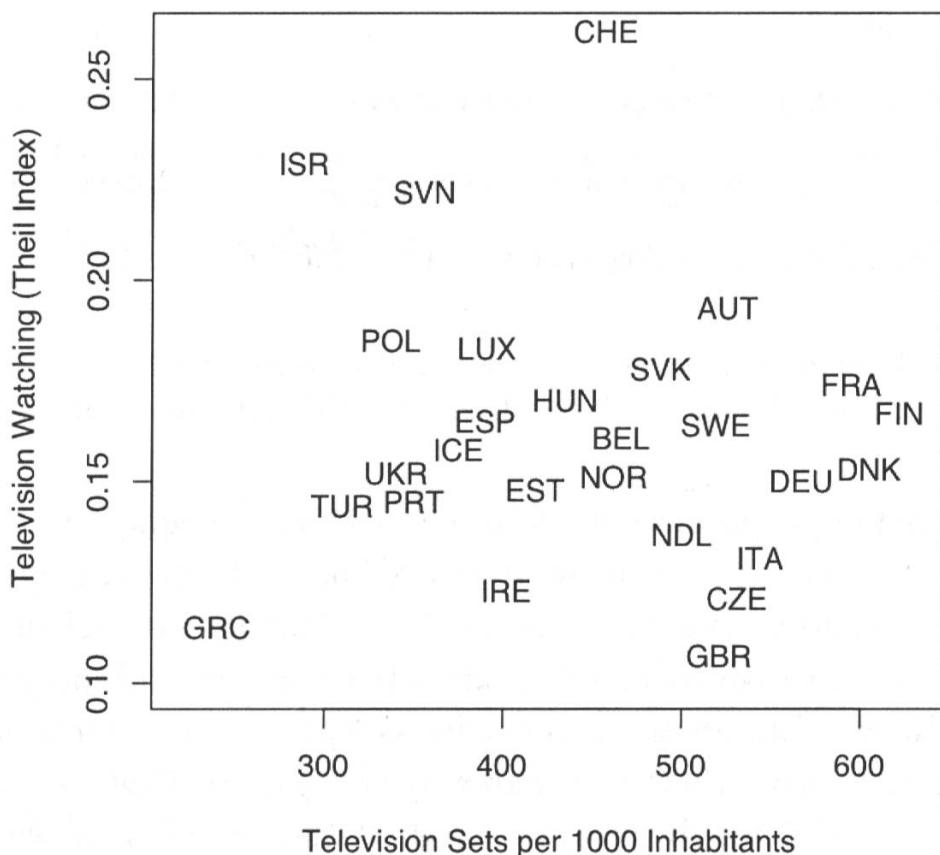
Figure 5: Media Access and Inequality in Media Consumption

Pearson		p	Cor
Television (Theil)	Television Sets per 1000 Inhabitants	0.5858	-0.1097
Radio (Theil)	Radio Receivers per 1000 Inhabitants	0.1654	-0.2748
Newspaper (Theil)	Circulation of Daily Papers per 1000 Inhabitants	0.0000	-0.7445

Data Sources: Theil indices: Own Calculations based on Data from ESS2 (ISR, ITA: ESS1), Figure 1, Figure 2, Figure 3. Access data: UNESCO Institute of Statistics.

show, how many people actually do use it at all and inequality in consumption takes into account to what extend the medium is being used across the population. A correlation analysis (Pearson's coefficient) has been conducted to analyze interrelations between access and inequality. Well established indicators of access to television and radio are the number of receiving devices per 1000 inhabitants. With regard to newspapers, the circulation per 1000 inhabitants is a standard measure. Timely data on media access has been retrieved from the UNESCO Institute for Statistics (1999, 2000). In order to include as many countries as possible, the analysis is based on the data of ESS2, being extended by the indices for Israel and Italy from ESS1. The results are reported in Figure 5. The Theil indices for television watching are not significantly correlated with the number of television sets per thousand inhabitants. The measures of inequality in radio listening are not correlated with the number of radio receivers per thousand inhabitants either. However, the inequality index for newspaper reading is negatively correlated with the circulation of daily newspapers per 1000 inhabitants. These results are to be discussed in greater detail consulting the scatterplots. Figure 6 depicts the relation between accessibility and inequality for television. It can be seen that at the same level of accessibility, inequality varies substantially. For instance, having about the same access level, the United Kingdom has got the lowest inequality in television watching, whereas Switzerland has got the highest. Furthermore, different levels of accessibility can correspond to the same level of inequality. In Denmark inequality is roughly the same

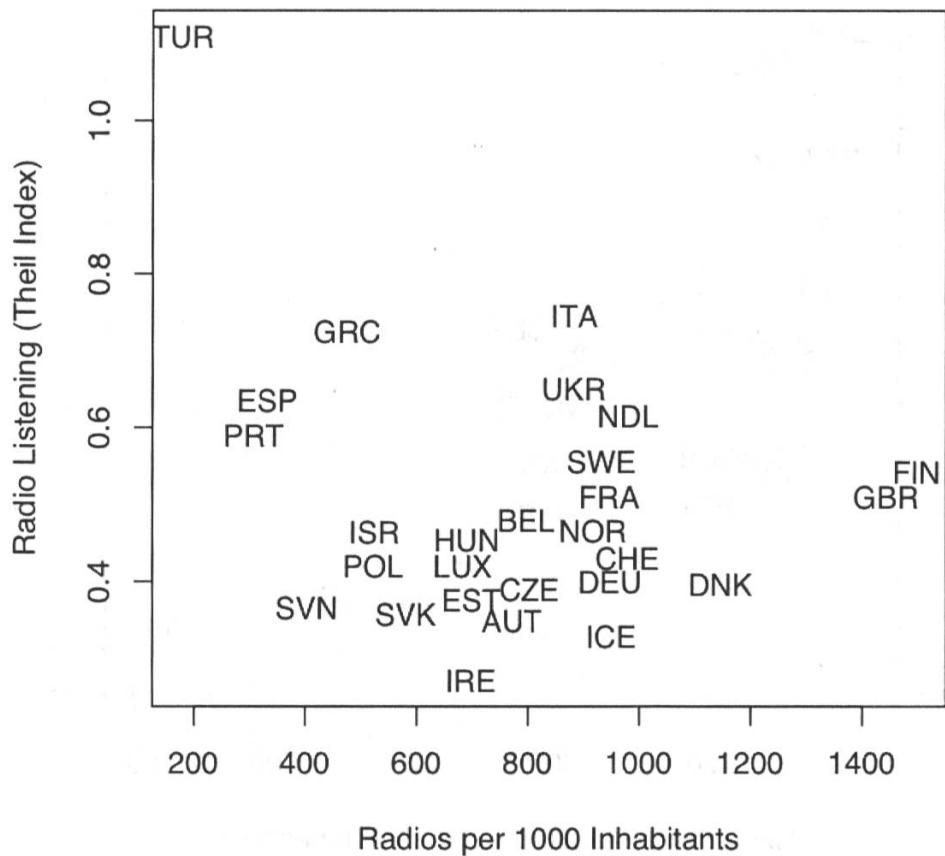
Figure 6: Access and Inequality in Television Watching



Theil Index Television Watching: Own Calculation based on Data from ESS2 and ESS1 (ISR, ITA). Television Sets per 1000 Inhabitants (1997): Data from UNESCO Institute for Statistics.

as in Turkey despite the fact that there are nearly twice as much television sets in Denmark. The examples illustrate two important findings: Firstly, excellent infrastructural conditions do not necessarily translate into equal usage. Secondly, access conditions below the average do not necessarily hinder widespread usage and equal consumption – although, some minimal access will obviously be absolutely necessary. Both phenomena are even more pronounced for radio listening, as can be seen in Figure 7. With roughly the same access level the inequality indicator in Italy is almost twice as high as in Iceland. Spain and Finland differ not much in their inequality level, although access rates are about five times higher in Finland than in Spain. Limited accessibility can go along with

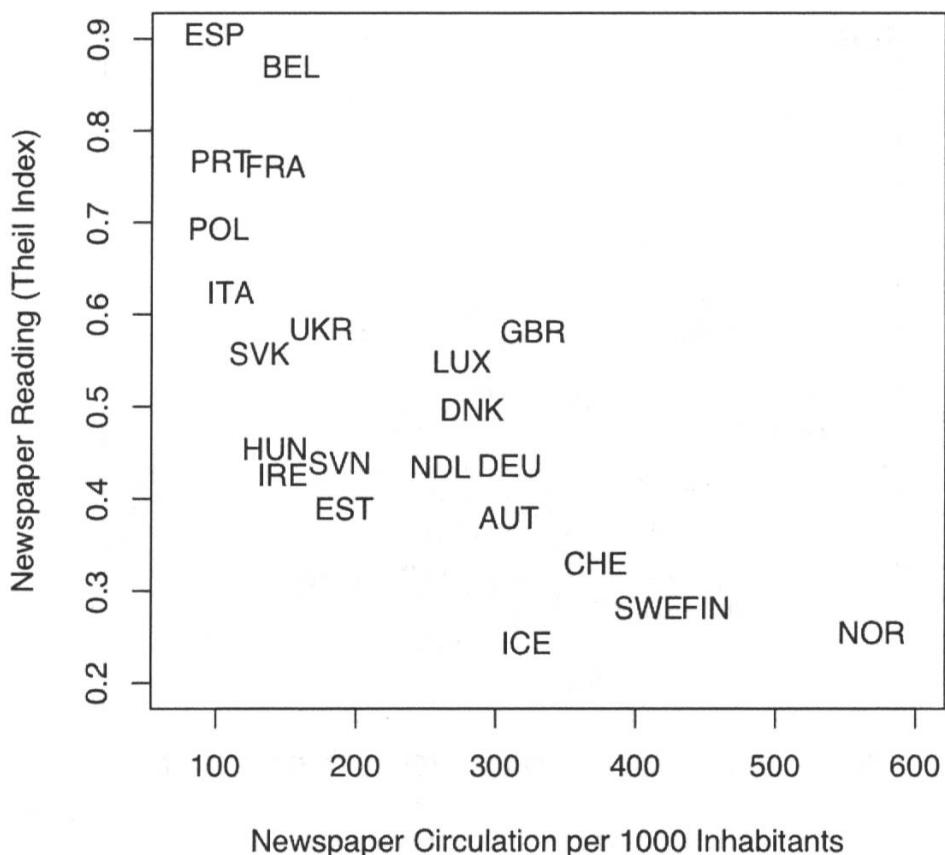
Figure 7: Access and Inequality in Radio Listening



Theil Index Radio Listening: Own Calculation based on Data from ESS2 and ESS1 (ISR, ITA). Radio Receivers per 1000 Inhabitants (1997): Data from UNESCO Institute for Statistics.

very pronounced equality in consumption, as the examples of television watching in Greece, Turkey and Portugal demonstrate. Although access is lower than average, consumption is high and evenly distributed across the population. On the other hand, very high accessibility can go along with above average inequality, like the examples of radio listening in Finland and the United Kingdom illustrate. For newspaper reading, the situation is a little different. Figure 8 depicts the relation between the circulation of daily newspapers and inequality in newspaper reading. Although a correlation is observed, the described phenomena occur again. Comparing, for example, two countries at the same access level, Belgium has an inequality rate that is two times higher than the one of Ireland is.

Figure 8: Access and Inequality in Newspaper Reading

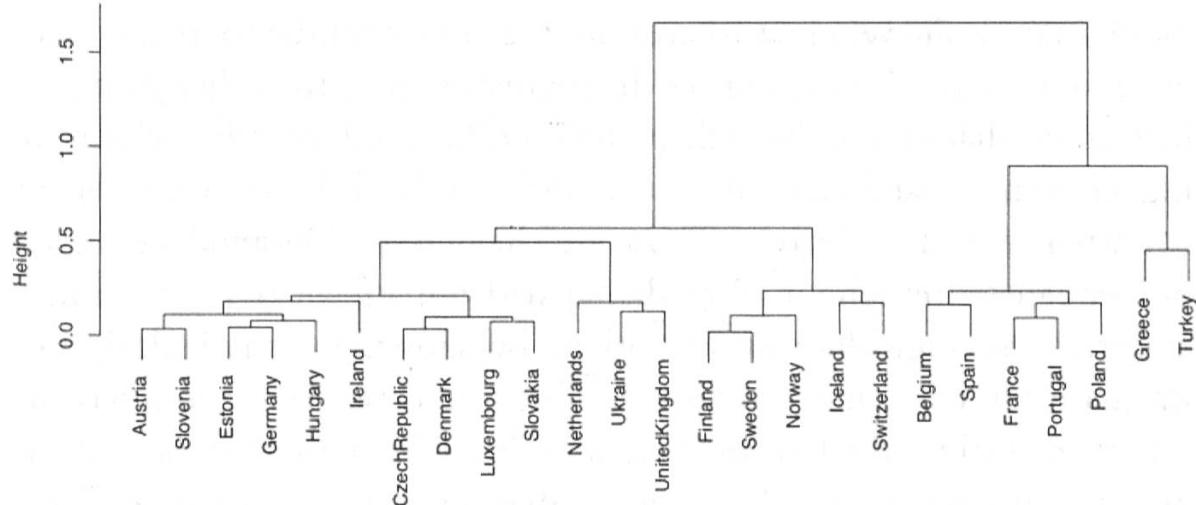


Theil Index Newspaper Reading: Own Calculation based on Data from ESS2 and ESS1 (ISR, ITA). Circulation of Daily Newspapers per 1000 Inhabitants (2000): Data from UNESCO Institute for Statistics.

5.4. Cluster Analysis

From the preceding analyses it is fairly obvious that an integrative approach is needed to study the structures of inequality in media consumption internationally. For this purpose, an exploratory cluster analysis has been carried out on the basis of the Theil indices of all three media. The following clustering approach has been chosen: In light of the formal structure of the data, an agglomerative hierarchical clustering algorithm is employed. All variables – Theil(TVTOT), Theil(RATOT), Theil(NWSPTOT) – are metric with $0 \leq \text{Theil}$. A distance measure is chosen for the quantification of proximity, Euclidean distances seem

Figure 9: Cluster Analysis: Dendrogram



Cluster Analysis – Metric = “Euclidean” – Method = “Ward” – Data: Theil Index Television Watching (based on ESS2), Theil Index Radio Listening (based on ESS2), Theil Index Newspaper Reading (based on ESS2). – Agglomerative Coefficient = 0.93.

adequate. The Ward method is applied. Of course, alternative clustering approaches could be used instead. The results of several alternative analyses do not differ too much from those presented here, which adds to the credibility. The dendrogram presented in Figure 9 summarizes the results for 2004.

A reasonable interpretation of the dendrogram might lead to the identification of three main clusters. Astoundingly, each of them consists almost entirely of neighbouring countries. The clusters mirror geographic regions: Central Europe, Scandinavia and Mediterranean countries.

The Mediterranean countries have got the highest inequality rates in newspaper reading. Turkey and Greece have, at the same time, the most pronounced inequality in radio listening and a very low inequality in television watching. In France, Belgium, Spain, Portugal and Poland, however, those levels are moderate, while inequality in newspaper reading is very high. Ranked in the order of increasing inequality, the hierarchy of the media is television, radio and newspaper for the whole cluster, Turkey not included. The second cluster is constituted mainly by Scandinavian

and northern countries. Finland, Norway, Sweden, Iceland and Switzerland are the nations which, have the most equal distributions of newspaper reading. In Iceland the levels of inequality in television watching and radio listening are very low, whereas for the other countries both are moderate. The Scandinavian cluster distinguishes from the other countries by a somewhat reverse hierarchy, Theil indices are lowest for television, higher for newspapers and highest for radio. A third cluster comprehends countries of central Europe. Those are characterized by moderate levels of inequality throughout all media, apart from a few exceptions. These countries distinguish from the others by showing a particularly low inequality in television watching. In fact, the United Kingdom has the lowest inequality in television watching throughout all countries. In the central European cluster the following hierarchy is dominating: television has the smallest index value, followed by radio listening and newspaper reading, with higher Theil indices. These findings are most illuminating: The exploratory analysis discovers three clusters, each of which is characterized by a specific pattern of inequality in media consumption.

6. Discussion

In this section, the main findings of the empirical analysis shall be summarized and discussed. Subsequently, considering the limitations of the current study, directions for further research are being suggested.

In many European countries, inequality in media consumption, particularly in newspaper reading and radio listening, appears to be quite substantial. This result *per se* is important for many discussions about the modern information society. For example, in the light of this finding, the notion of the frequently debated and closely monitored digital divide should be put into a new perspective. The digital divide appears to be a new facet of a broader phenomenon that could be labelled media divide. Furthermore, being interpreted as indicator of dissimilarities in the level of personal informedness and social participation, the findings may be related to phenomena like civil unity, social cohesion and political involvement.

Inequality in media consumption is clearly not a phenomenon that affects all media to the same extent. Throughout the continent, television is by far the most cohesively used medium. Radio listening and news-

paper reading are far more inequally adopted throughout the population. The extend of those differences between the media vehicles varies between the different countries. Two hierarchies of increasing inequality can be established: television – radio – newspaper and television – newspaper – radio.

There are substantial differences in the level of inequality between the observed countries. Their magnitude is particularly noteworthy, as the set of nations being under observation is fairly homogeneous, when compared to a global perspective, which raises questions about the situation in other parts of the world. These international differences are larger in respect to the consumption of newspapers reading and radio listening than in respect to the consumption of television watching. The comparative analysis shows substantial differences in the patterns of inequality between the European countries which have been observed in this study.

Previous audience research has already highlighted international differences. However, the measurement was mainly based on access indicators. A main finding is that inequality proves not to be associated with infrastructural access with regard to television watching and radio listening. An explanation for the inexistence of a correlation may be the fact that, although accessibility is a precondition for any media consumption, it is by no means determined that people choose to make use of this option. This might be especially valid for media that require the possession of infrastructural devices and thus induce an initial investment but don't cause further costs. Newspapers, however, are to be bought and paid for every time an individual seeks usage. Therefore, usage translates directly in demand and is, therefore, well reflected in the circulation measure.

As the Theil index and access indicators are uncorrelated, it is to be expected that quantitative empirical analyses based on inequality reveal findings which have been undetected in the past and which shade a new light on the patterns of media consumption and its effects. This should be considered in the design of future comparative studies. Furthermore, this result might have implications for strategic considerations. For instance, it had been argued that good accessibility of mass media can foster democratization and desirable human development (e.g. Norris 2003). However, it could well be that those positive effects depend on actual media usage behaviour as well. Patterns of media consumptions seem to be influenced

by various factors, like the cultural background. Changing these circumstances and initiating cultural change is supposedly much more difficult than just increasing accessibility.

The exploratory analysis discovers three clusters each coalescing countries according to their similarity in the estimated Theil indices. Each of the three clusters is characterized by a specific pattern of inequality in media consumption. What are the driving forces behind those patterns? Again, the causes of inequality in media consumption come into question. A first clue to answer this question may be found in another finding of the cluster analysis: Each of the detected clusters consists mainly of neighbouring countries that have close cultural ties and sometimes common origins of their spoken languages. This fosters the supposition that the pattern of inequality in media consumption may be influenced by cultural factors.

The preceding discussion shows that there are two observations that should be explained in further research: Firstly, what are the causes of inequality in media consumption, and secondly, what are the causes of the differences of inequality in media consumption between the different countries.

This leads to a first limitation of the presented empirical research. The adopted focus on the macro-level allows to detect patterns of inequality, but does not allow to explain their causes. The Theil index is a summary statistic, which describes the distribution of personal media usage. The differences in individual usage, which are reflected by the observed inequality, have to be explained by factors that influence the individual's behavior. Thus, to study those factors on the micro-level, the unit of analysis should be individuals. This has to be left to further research. Nevertheless, without being subjected to further statistical testing, the presented findings can serve as a basis for a free interpretation. Referring to previous comparative studies of media consumption, some possible causes of inequality shall be discussed.

Possible causes for the general phenomenon of inequality in media consumption may be derived from the discussion about differences in the individual media usage behavior, as inequality is a direct consequence of those dissimilarities between individuals. The alleged causes include but are not limited to education and training (e.g. literacy), inherited

characteristics (e.g. talent), fields of interest, the leisure-industriousness choice (time budget constraints), life cycle effects (e.g. work load at different ages), inherited wealth and economic circumstances (e.g. possibility to achieve access) and finally contextual conditions (e.g. availability of infrastructure). Which combination of those possible causes might actually be responsible for the inequality, will particularly be depending on the medium in question.

The causes of the differences in the national inequality indices between the examined countries are not so obvious. However, it seems quite reasonable that those factors causing inequality within a country may be responsible for international dissimilarities as well, as the overall levels of those factors differ between the countries. Relevant seem, firstly, those factors being related to the individual's characteristics. As the socio-demographic structures vary between the countries, the size of social subgroups varies as well, which gives different weight to milieu specific factors. For example, in a country with a larger share of young people their specific usage habits will have a larger impact. Secondly, there may be nation specific factors affecting the whole national population in a specific way. In this regard the empirical findings of the current study allow for two conclusions: Although accessibility is undisputedly a precondition for any media consumption, it does not seem to be the overriding driving force of international differences in inequality in consumption. The observed clusters of countries offer some support to the supposition of cultural causes, as each of the clusters comprises countries with shared cultural origins.

This interpretation is in line with the findings of preceding comparative studies. A study of Gustafsson and Weibull explored the newspaper consumption in Europe (latest update 2007). Their research was based on an analysis of industry structures as well as circulation and penetration data. They identified three regional clusters, which are fairly similar to those found in the current study. A nordic cluster (Finland, Norway, Sweden), a cluster of southern countries (French-speaking Belgium, Cyprus, France, Greece, Italy, Portugal and Spain), and the countries in the middle. As a fourth group, they identified the new Eastern European countries. Especially, the divide between north and south is reflected in their results as well. Gustafsson and Weibull discussed various possible causes of the identified

consumption structure that might explain the inequality patterns observed in the current study as well. Besides the social structure, they named socio-cultural factors, like the communication culture, traditions and religion, as well as political factors, like the political development and a constant historic evolution of newspapers. Further determinants, they argued, include the general economic development, industry structures, urbanisation and the climate. Of course, the factors might be interrelated. For example, Gustafsson and Weibull noticed that nations, where overall circulation is high, have successful newspapers, both, on the national and the local level. In low-circulation countries, however, national papers are dominating. Gustafsson and Weibull hypothesized that in northern cultures local newspapers have a central function in the communication of local communities, whereas that function is fulfilled to a higher degree by social networks in southern countries. Obviously, this could be a result of different climatic conditions as well as different reading traditions. Furthermore, Gustafsson and Weibull described that in the South, consumption is concentrated in certain social groups, whereas in the North, usage is widespread across the population. Indeed, the current study shows that the high circulation in Scandinavia goes along with low inequality in newspaper reading, usage tends to be equally adopted across the population. Whereas in the Mediterranean countries, inequality in newspaper reading is very high.

Similar conclusions are drawn by Norris (2000). Norris contrasts two archetypes of media markets. On the one hand, newspaper-centric societies, which include the Scandinavian countries as well as some smaller European nations and on the other hand, the television-centric societies like the Mediterranean states. Again, her observations indicate a north-south divide and the clusters are somewhat similar to those found in the current study. Norris attributes the national patterns of media consumption to the specific combinations of historic, cultural, social, political and economic conditions. Furthermore she set up a regression model showing that nationality remains a significant determinant, when one controls demographic factors like age, education and gender. This gives support to the notion that socio-cultural factors account to a certain degree for the international differences and that not only the differences in the demographic structures do count.

The current study adds to the conclusions of those previous studies that the European regions differ not only in the usage levels but in the inequality in media consumption. The observed patterns fit well in the picture of previous research.

Another important finding can be drawn from the analysis of the time-series. The current study indicates relatively stable patterns of inequality; in many countries the Theil indices remain roughly unchanged over the three periods. This may give some additional support to the notion that media consumption patterns are dependent on the cultural environment, which is subject only to rather slow changes. In some countries, however, an increase can be observed for radio listening or newspaper reading. One possible explanation might be the increasing competition of the new media. Does a closing of the digital divide come at the price of a widening divide with regard to other media vehicles? Unfortunately, the empirical research presented in this article had to turn a blind eye on the internet, on books and other media. This is a limitation of the data set, the ESS provides directly comparable data only for television, radio and newspapers. However, broadening the base of observed media seems to be a propitious aim for further research. Beyond the discussions, how internet usage affects the consumption of traditional media content, it might be highly interesting to investigate whether the digital divide fits into the topology of inequality in media consumption being described here.

A third limitation of the presented empirical research arises from the sample: When interpreting the presented results, it has to be taken into account, that the sample of European countries is rather homogeneous compared to a global perspective. The descriptive analysis being evaluated in this study is very much unaffected by this limitation. However, if the presented data is being used in further analyses on the implications of inequality in media consumption, this will have to be considered.

A further limitation originates in the categorial structure of the raw data: As inequality within the categories is unknown overall inequality could be underestimated. As the category of maximal usage is open-ended some information about heavy users is unknown. Setting an artificial upper limit can result in an underestimation of inequality as well. Both problems have already been discussed in detail.

7. Conclusion

The current study displays strength in multiple ways: Firstly, the suggestion of an econometric approach to describe media consumption, secondly, the presentation of an extensive data set on various countries and media types that was derived on the basis of a highly reliable data source, and thirdly, the discovery of clusters of countries with similar media consumption patterns, thus implying that inequality in media consumption may be a cultural issue.

Introducing the concept of inequality into media studies, the presented approach offers a flexible new instrument for audience research. Under many circumstances it appears to be conceptually superior to traditional measures and has the potential to shade a new light on preceding results, as it has empirically proven to highlight patterns which have been undetected by measures traditionally applied in media analyses on the makro-level. The data presented here in a ready-to-use format can serve as a basis for various types of cross-national comparative analyses in various fields. The presented measure has the potential to become a powerful instrument in various fields of media science.

Three major directions for further research seem to be propitious: Firstly, it would be interesting to determine the causes of inequality in media consumption and the differences between various media as well as between different countries. Secondly, relations between media consumption and other variables that have been explored by using traditional metrics could be reanalyzed with the presented inequality indices. Thirdly, inequality in media consumption can not only be analyzed on the national level, but could be broken down according to various socio-economic and sociodemographic segmentation criteria as well.

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