Educated Europeans: In Search of Time Lost (On Media).

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Abstract

In the present paper we empirically investigate the economic reasons why people spend time watching television, reading newspapers, listening to the radio and connecting to the web.We adopt a hierarchical framework, with a first level represented by individual characteristics and a second one related to country- level features. We focus on the impact of education and economic status on the allocation of time to media and on how country-level variables affect media-related decisions. We use data from the European Social Survey (ESS) Round 5 – 2010 and from other minor empirical sources.

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1 Introduction

Individuals, at least in industrialized countries, spend some non negligible share of their time watching television, reading newspapers, listening to the radio and surfing the web. In the

present paper we empirically investigate the main determinants of media use.

Our research question is driven by the economic perspective that resorting to media is the outcome of a decision process which, like any other such process in economics, takes into account costs and benefits. The cost of media use mainly consists in the opportunity cost of time. The benefits are related to the role played by the media in providing news and entertainment, but also in the diffusion of learning, and the promotion of cultural excellence. Moreover media are also expected to give voice to minorities and to act as watchdog in the public interest.

In this respect education, through cognitive skills, impinges on both the individual "technology" for media use (and therefore on its cost) and on the taste for media services. Since, the requirements in terms of time and cognitive skills differ across media, we expect education to influence to a different extent and in different directions the use of broadcasting, newspapers, radio and web. Indicators of high opportunity cost of time should instead be negatively associated with media use.

While media diet is largely determined by individual characteristics, it is also true that individuals do make their decisions within an economic, social and cultural environment, at the country level. "Environment" is a catch-all term, but certainly two basic dimensions are crucial here: the characteristics of the media system and the socio-political traits of the country of living, which affect the decisions of all individuals belonging to the same country. Not only media differ from one another, as we stressed above, but the services provided by the same medium may vary in quantity and quality across countries. As regards the socio-political national environment, the incentive to get informed also depends on the institutional arrangements concerning voting and the political process. The causal relationship between country-level variables and individual behaviors is currently far from being thoroughly settled from a theoretical viewpoint. Then we shall investigate the impact of country-level characteristics on individual media-related decisions, allowing for fixed and random effects.

As a result of this view, our framework is intrinsically hierarchical, with a first level represented by individual-related characteristics, and a second one related to country- level features. In this context, mixed multilevel estimation techniques represent the natural tool for addressing the above research issues. We employ data from European Social Survey (ESS) Round 5 – 2010, covering 22 countries, and from other minor sources, to empirically map the main determinants of the demand for TV, newspapers and radio and web services.

As a short preview of our results, education and economic-social status of the individual represents crucial drivers in the use of all media. In this respect, TV and radio respond to these variables in the opposite way with respect to newspapers and web; educated and high-income individuals tend to consume broadcasting and radio less than the general population. This differentiation across media persists even when the analysis is limited to the use of media for information purposes. Conversely, the empirical evidence concerning the impact of time constraints is somehow less sharp. Furthermore, as expected, we find that country-level environment contributes to explain a sizable share of total variance in the use of media, as regards both the structure of the media system and the social-political context.

1.1 Related literature

In the last twenty years-or-so media economics has steadily progressed, both on the theoretical and the empirical side. Theory has mainly delved in the relationship between media and advertising markets, according to the two-sided markets paradigm (Anderson and Coate (2005)) and in the issue of media bias and the related political economy developments (Mullainathan-Shleifer (2005), Corneo (2006), Ellman-Germano (2009), Anderson-McLaren (2010), Larcinese (2009).). Both lines of theoretical enquiry have sparked a number of empirical contributions (Argentesi and Filistrucchi (2007), Brown- Alexander (2005), Kaiser and Wright (2006), Kaiser and Song (2009), Rennhoff and Wilbur (2012, 2014) and Hiller et al. (2014)). There is however a research theme which more or less explicitly lies behind both streams of literature and surfaces here and there in them, namely the demand for media or

media use. Here we provide a short summary of this research field. On the theoretical side, this literature augments the application of standard demand theory (i.e. individuals allocate scarce resources to alternative uses) with a closer consideration of the specificity of the sector, along the lines we described in the Introduction: first, media use crucially requires time, and therefore the resource allocation problem is largely a time allocation matter (Battaggion and Vaglio (2012); Alaoui and Germano (2016)); second, the purpose of media use is the consumption of an immaterial good which we can call in a broad sense *messages* (ranging from information-carring messages (news) to entertainment of various types and advertising (Baron (2006); Battaggion Vaglio (2015)). Since receiving, understanding and elaborating messages of any kind engages to varying extent the cognitive skills of individuals, education is likely to have, in explaining media use, a more prominent place than it has in the demand for the majority of others goods and services. As a matter of fact, both indicators of time opportunity cost and education levels appear among explanatory variables of media behavior in a wide range of studies, including those not specifically focused on such covariates. Such studies differ as to the media investigated, the specific focus of research and needless to say, as to the empirical strategy. Chapela (2016) isolates the pure income effect from the opportunity cost effect of personal earnings on the demand for time online and on adoption of the Internet. The level of education is included among controls and it has a positive impact especially as regards adoption, while it has positive effects on usage only in specified age/sex groups, a result which confirms previous findings by Goldfarb-Prince (2008). Pure income effect seems to be negative. Fernandez-Gutierrez and Calero (2016) find a negative effect of education on TV watching as opposed to other forms of leisure (book reading, newspapers, sports, theatre/cinema/exhibitions). Molina et al. (2016) obtain similar results concerning TV *vis à vis* reading and radio listening. In these papers, income-related variables are not included among the controls. Stromback et al. (2013) find a positive relationship from education on a composite index of news media consumption, but a negative one when referred to TV watching. Not always education turns out to be relevant: Dou et al. (2006) (pref-

erences for contents in young Chinese consumers) and Pantea-Martens (2016) (estimation of consumer surplus from Internet use) find a limited impact of education on media-related behavior. In the former paper, income also has no effect on individual media choices.

A common feature of the previous papers is that they all rely on single country data. Also, beside a variety of methodologies, none uses a multilevel approach. An exception is Hiller et al. (2015) who employ a two-level framework in an experimental study on US consumer's preferences for media variety: here individuals are grouped according to the local media market they belong to.

The paper is organized as follows. In section 2 we expose our conceptual framework of reference. Section 3 illustrates the empirical and the econometric methods adopted. 4 describes the dataset. Estimates and results are discussed in section 5 . The final section 6 provides the concluding remarks.

2 A simple model of media use

Let us imagine that there exist two different media, 1 and 2 (for the sake of intuition, think of TV and newspapers). The utility of the individual depends on the time devoted to the two media, t_1 and t_2, and on the time devoted to an outside, non-media activity $(T - t_1 - t_2)$ where T is the total time endowment of the individual, according to the following utility function

$$(V_1 - C_1)(t_1)^{\alpha_1} + (V_2 - C_2)(t_2)^{\alpha_2} + w(T - t_1 - t_2)^{\beta} \tag{1}$$

where $\alpha_1, \alpha_2, \beta$ lie between 0 and 1. V_i and C_i are respectively the benefit and cost associated to an increase in $(t_i)^{\alpha_i}$ $(i = 1, 2)$ while w is the marginal utility associated to an increase in $(T - t_1 - t_2)^{\beta}$. For the time being we assume V_i, C_i and w to be individual-specific positive constants and $V_i - C_i > 0$. If the individual maximizes (1), neglecting corner solutions we have:

$$\alpha_1 (V_1 - C_1)(t_1)^{\alpha_1 - 1} - w\beta(T - t_1 - t_2)^{\beta} = 0 \tag{2}$$

$$\alpha_2 (V_2 - C_2) (t_2)^{\alpha_2 - 1} - w\beta (T - t_1 - t_2)^{\beta} = 0 \tag{3}$$

Some simple comparative statics is readily done (see the Appendix, where also an extension to n media is offered). First of all, t_1 and t_2 are non-increasing with respect to w, the derivatives being

$$\frac{dt_1}{dw} = \frac{ba_{22}}{\det J} < 0$$

$$\frac{dt_2}{dw} = \frac{ba_{11}}{\det J} < 0$$

where $b = \beta (T - t_1 - t_2)^{\beta} > 0$

$a_{11} = \alpha_1 (\alpha_1 - 1) (V_1 - C_1) (t_1)^{\alpha_1 - 2} < 0$

$a_{22} = \alpha_2 (\alpha_2 - 1) (V_2 - C_2) (t_2)^{\alpha_2 - 2} < 0$

$\det J = c (a_{11} + a_{22}) + a_{11} a_{22} > 0$

$c = \beta (\beta - 1) w (T - t_1 - t_2)^{\beta} < 0$

This is not surprising, since w represents the opportunity cost of time spent on media.

So far we have considered V_i, C_i as constants. Let us now suppose that they depend on the individual education level, as measured by some variable Ed, and by a vector of other variables $\mathbf{z} = \left[\mathbf{x}\, \mathbf{v} \right]$ (we shall later discuss $\mathbf{z}$**)**. Then we have

$$V_i = V_i (Ed, \mathbf{z}) \tag{4}$$

$$C_i = C_i (Ed, \mathbf{z}) \tag{5}$$

with V_{Ed}^i and C_{Ed}^i as the first-order partial derivatives with respect to Ed of respectively (4) and (5). We assume that C_i^{Ed} is non-positive: education reduces the utility cost of using any medium. It may be also reasonable to think that the size of this effect varies across media and messages and that it is larger in absolute value in the presence of sophisticated messages: to make a simple example, the difference in utility cost between an educated and an uneducated individual is larger when they read a well informed report on some subtle economic issue than when they both watch a kid cartoon. As regards V_i, we have not such a

sharp *apriori*. While tastes are surely influenced by education, especially in the field of media activities, ex ante generalizations as to the direction of this influence are likely to be shaky. Educated persons do not necessarily prefer reading a newspaper's literary supplement to watching blockbuster popcorn movies. The most we can say is that they have an advantage over uneducated individuals in performing the former activity.

Let us assume now that Ed exogenously changes, other things being equal. We get

$$\frac{dt_1}{dEd} = \frac{-MB^1_{Ed}\left(a_{22}+c\right)+cMB^2_{Ed}}{\det J}$$

$$\frac{dt_2}{dEd} = \frac{-MB^2_{Ed}\left(a_{11}+c\right)+cMB^1_{Ed}}{\det J}$$

where $MB^i_{Ed} = \alpha_i\left(V^i_{Ed} - C^i_{Ed}\right)\left(t_i\right)^{\alpha_i - 1}$ for $i = 1, 2$.

The main result of this comparative statics exercise is fairly intuitive. It is possible that the use of both media increases as education increases: this is the case if both marginal net benefits from education MB^1_{Ed}, MB^2_{Ed} are positive and not too different. If instead the ratio $\frac{MB^1_{Ed}}{MB^2_{Ed}}$ is larger than a given critical value, the time devoted to medium 1 increases and the other one decreases. If both $MB^1_{Ed}, MB^2_{Ed} < 0$, it is still possible that the use of medium 1 increases, while the use of medium 2 decreases (if the ratio $\frac{MB^1_{Ed}}{MB^2_{Ed}}$ is sufficiently small). Otherwise, the use of both media decreases. Finally, if $MB^1_{Ed} > 0$ and $MB^2_{Ed} < 0$, as education increases, t_1 increases and t_2 decreases.

There is another interesting implication. Suppose that $a_{11} = 0$ and $a_{22} < 0$. This means that the use of medium 2 is independent of w while medium 1 decreases as w increases. An implication is that the sign of $\frac{dt_2}{dEd}$ coincides in this case with the sign of the difference between MB^2_{Ed} and MB^1_{Ed}.

The comparative statics of any variable included in the $\mathbf{z}$ vector above can be discussed in a similar way. In addition to education, we shall be particularly interested in a variable measuring the household income level. In that case, MB^1_y, MB^2_y shall be interpreted as the

variations in the marginal net benefits of the two media attributable to variations in the income level. A reasonable restriction in this case might be that $C_y^1 = C_y^2 = 0$, i.e. income affects benefits but not the utility cost of using media, which implies that under the $a_{11} = 0$, $a_{22} < 0$, the sign of $\frac{dt_2}{dy}$ corresponds to the effect of income on the marginal utility of media use.

Let us now go in more depth in the description of the $\mathbf{z} = \left[\mathbf{x}\,\mathbf{v}\right]$ vector. We distinguish two subvectors in it: $\mathbf{x}$ contains a set of variables which vary across individuals (*first-level* variables): although we singled out for the discussion education, income and the opportunity cost of time w, these also belong to first-level variables, along with, for example, age, sex, occupation,etc. (further details in section 4). Given that individuals are divided into national (non-overlapping) groups, $\mathbf{v}$ instead is a set of variables which vary at the national level (*second-level* variables).

Summing up, suppose that there exists a population of n individuals, belonging to J different countries (each individual belongs to one and only one country). Further, there exist H media (the same in all countries, indexed by i). Then an individual k belonging to country j maximizes the following H-media version of (1)

$$\sum_{i=1}^{H}\left(V_i\left(\mathbf{x}^k\,\mathbf{v}^j\right) - C_i\left(\mathbf{x}^k\,\mathbf{v}^j\right)\right)(t_i)^{\alpha_i} + w\left(T - \sum_{i=1}^{H} t_i\right)^{\beta} \tag{6}$$

For simplicity, the variables concerning education, income and time opportunity cost are included here together with other first-level variables in $\mathbf{x}^k$. The outcome of the maximization problem is a set of H functions of the form:

$$t_i^k = t_i^k\left(\mathbf{x}^k; \mathbf{v}^j\right) \tag{7}$$

$i = 1, ..., H$

3 Methodology

We estimate a linear version of equation (7), which we rewrite as follows:

$$t_i^k = a_0 + \mathbf{a}\mathbf{x}^k + \mathbf{b}\mathbf{v}^j + \varepsilon_i^{kj} \tag{8}$$

where $\mathbf{x}^k$ is the $(1 \times p)$ vector of first-level variables, while $\mathbf{v}^j$ is the $(1 \times q)$ vector of second-level variables. ε_i^k corresponds to the individual random component of the model and we assume it is identically independently (across individuals) normally distributed with mean 0 and variance σ_ε^2. In principle, vector coefficients $\mathbf{a}$ and $\mathbf{b}$. should be indexed to i since they differ across media. However, to keep notation as simple as possible we omit this indexation.

$\mathbf{b}$ is a vector of coefficients measuring the impact of 2nd level covariates. We believe that cross-country changes in variables describing the country as a whole do affect the individual decisions under analysis, but in a non-deterministic way. As a matter of fact, the complexity of social and cultural interactions does not allow for reduction to simple causal relationships between aggregate values and individual choices. We shall therefore estimate the $\mathbf{b}$ coefficients under two different sets of assumptions: as a first step we shall treat these coefficients as non-random. As a further step, we shall allow 2nd level coefficients to have a random component. a_0 will be assumed in all cases to have a random component.

$\mathbf{G}$ is the variance–covariance matrix of the random components of the second-level coefficients. As a consequence, then we have

$$Var \begin{bmatrix} \mathbf{b} \\ \varepsilon \end{bmatrix} = \begin{bmatrix} \mathbf{G} & \mathbf{0} \\ \mathbf{0} & \sigma_\varepsilon^2 \mathbf{I} \end{bmatrix} \tag{9}$$

where $\mathbf{G}$ is $(q \times q)$ and we assume it to be diagonal: this implies that second level variables are assumed to be mutually independent. Finally, $\mathbf{b}$ is assumed to be orthogonal to ε_i^{kj}.

The structure of this model is hierarchical, with individuals grouped into non-overlapping clusters (countries). We therefore shall estimate it as a linear multilevel model[1] where the fixed component is analogous to the linear predictor from a standard OLS regression, allowing at the same time for second-level random effects. While the method leads to the estimation of deterministic coefficients for the all variables, it provides estimates of the variance component associated to each random effect (both at the first and second level).

In order to assess the advantages of a multilevel approach versus an OLS standard model, and of alternative multilevel models we shall resort to comparisons of the Bayesian Information Criterion (BIC-Schwartz (1978))[2]. The BIC is defined as follows

$$BIC = -2\ln(L) + r\ln(n) \tag{10}$$

where L is the maximized value of the likelihood function for the estimated model, r is the number of free parameters to be estimated (i.e. the fixed parameters and the variance components attached to random effects) and n is the number of observations[3]. Expression (10) consists of two components: the first decreases as the unexplained residual variance decreases, and represents therefore, intuitively, a sort of measure of the "goodness of fit". The second component represents instead the "cost" of the reduced residual variance in terms of increased complexity of the model, as represented by the number of estimated parameters. Since comparisons are made for a fixed n, those described are the only two sources of variation of (10). When BIC decreases after the introduction of a new set of parameters, this means that the increase in explanatory power has more than compensated the increase in complexity. Then, BIC is properly interpreted as a means of comparison across different versions of models, rather then a simple absolute measure of goodness of

[1] See Skrondal-Rabe Hesket (2002) for a general treatment of mltilevel models

[2] See also Bishop (1995) and Ripley (1996).

[3] The choice of the n value is the object of a wide debate in the literature (e.g. Skrondal, Rabe-Hesketh(2002) and Cameron-Trivedi (2010)), the alternatives being the number of first-level units (individuals in our case) or the numeber second -level clusters (countries). In the present paper, we provide only results based on the number of first-level units; when using the number of second-level clusters, the results are not significantly different (values available upon request)

fit. Rules of thumb to interpret the value of the variation in BIC across different models are (Fabozzi et al. 2014): if the variation is less than 2, it is negligible. Between 2 and 10, the change in BIC is meaningful. When the value is larger than 10, the difference between models is very strong.

4 Data

The main source for our dataset comes from the European Social Survey (ESS) Round 5 – 2010[4]. The ESS is an academically-driven multi-country survey that has been conducted every two years across Europe since 2001. Its first aim is to monitor and interpret changing public attitudes and values within Europe and to develop a series of European social indicators, including attitudinal indicators. In the fifth round, the survey covers 27 countries.[5] We exclude from the analysis five countries,[6] which gives a total of 22, in order keep a sufficient level of geographical, institutional and data homogeneity in the sample. The survey provides, on an individual basis, information on media consumption, demographic and socioeconomic variables, political interest, participation and trust. The units of analysis are the individuals aged 15 and over, resident within private households in the participating countries. The survey data is organized as a cross section and the total number of questionnaires achieved, in the period September 1st, 2010 – December 31st 2010, is 52.458. We employ weights correcting for the population size and for sample biases, provided by ESS. In particular we employ in this paper, the set of weights defined by EES as post-stratification, meant to reduce the sampling error (related to attempting to measure only a fraction of the population) and potential non-response error (which may lead to a systematic over-or-under-representation of people with certain characteristics).[7]

[4]Later waves of the ESS Survey are not as rich as the 2010 version as regards media use. This is the reason of our reliance on the chosen issue.

[5]Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and Ukraine.

[6]Cyprus, Israel, Portugal, Russia and Ukraine.

[7]See, *Documentation of ESS Post Stratification Weights,* April 2014.

4.1 Dependent variables

To measure individual attitude to resort to media, we are interested in the time devoted to media consumption by individuals. ESS 2010 classifies individual responses into seven 30-minutes intervals ranging from 0 to more than 3 hours.

The media considered by ESS 2010 are: television (TVTOT: total time of TV watching on average weekday), newspapers (NWSPTOT, total time of newspaper reading on average weekday) and radio (RDTOT total time of radio listening on average weekday). Moreover the use web for personal reasons (not related to work or study) is analogously measured but on a different scale (NETUSE see Table 2).

Then, ESS 2010 also provide three additional variables which represent refinements of the previous ones, singling out the use of media for information as opposed to the use for general purpose. Therefore, the new variables are labeled with the extension "POL" to indicate the time devoted to news/policy/current affairs on an average weekday respectively for TV, newspaper and radio (TVPOL, NEWSPPOL, RDPOL), measured according to the above described scale. Unfortunately, this refinement is not available for NETUSE, so that it is impossible to disentangle the news oriented use of internet from the time devote to entertainment. The following Tables 1 and 2 illustrate the descriptive statistics for the dependent variables.

Table 1

	TVTOT	TVPOL	NWSPTOT	NWSPPOL	RDTOT	RDPOL
Number of observations	42,383	42,372	42,394	42,355	42,388	42,185
Total time on average weekday	Percent	Percent	Percent	Percent	Percent	Percent
No time at all	4.00	11.64	31.81	41.91	24.95	39.01
Less than 0,5 hour	5.02	31.66	30.00	41.60	15.05	32.70
0,5 hour to 1 hour	12.93	34.77	25.56	12.25	15.87	16.12
More than 1 hour, up to 1,5 hours	12.95	12.17	7.17	2.57	7.57	5.27
More than 1,5 hours, up to 2 hours	16.27	5.17	3.21	0.93	6.61	2.79
More than 2 hours, up to 2,5 hours	12.59	2.11	1.04	0.25	4.06	1.27
More than 2,5 hours, up to 3 hours	12.60	1.05	0.45	0.11	3.99	0.86
More than 3 hours	23.47	1.31	0.62	0.15	21.91	1.98
Total	100	100	100	100	100	100

Table 2	
	NETUSE
Number of observations	42,385
Personal use of internet, e.mail, www	Percent
No access at home or work	21.86
Never use	12.97
Less than once a month	1.25
Once a month	1.06
Several times a month	2.57
Once a week	3.49
Several times a week	12.48
Every day	44.18
Total	100

4.2 Explanatory variables

As we stated in Section 2 the determinants of the utility of resorting to media can be classified into two levels. In the first one we include individual characteristics: the age of the respondent (AGE), the sex (SEX, dummy variable, value 1 for female), the fact of belonging to an ethnic minority (ETHNIC_MINORITY, dummy variable, 1 if belonging to a minority), holding the right to vote (VOTE_RIGHT, dummy variable, 1 if entitled to vote), the size of the place where the respondent lives (BIGCITY takes value 1 for individuals describing themselves as living in big cities or in their suburbs, VILLAGE instead is 1 when the individual declares he/she lives in a country village or in the countryside)[8]. We also consider among first-level variables the respondent's education level (EDUCATION, measured in years in education):, his/her per capita family income (INC_FAMILYPROC)[9], the number of children in the family aged less than six (LESSTHAN6). For what concerns the working status we consider his/her being or not retired (RETIRED), being unemployed in the last week, but actively looking for job (UNEMPLOYED), being long term unemployed (LTUNEMPLOYED) and the gross pay in euros, before deductions for tax and insurance (TRUEWAGE).

In the second level we include:

- GDPPRO (Per capita GDP in PPP-World Bank 2014), as a proxy of the general

[8] VILLAGE and BIGCITY identify extremes: roughly 30% of the sample lives in towns or small cities.

[9] ESS provides a re-classified measure of family income as declared by the respondent. We further divide this value by the number of family components.

economic and social condition of the country;

- a group of variables representing the social and political environment (FREE (a measure of the degree of freedom in media market - World Press Freedom Index 2010), TURNOUT (average election turnout in the time span 2005-2010 - Institute for Democracy and Electoral Assistance– IDEA), ELECTION2011 (dummy variable: 1 in the case of election (Parliament or President to be held in the year 2011 - IDEA)

- a group of variables related to the structure of broadcasting (PUBLICAUDIENCE (share of audience of the public broadcasting system-COE[10]); NATIONWIDCHAN (number of nation wide TV channels available in the country- COE); PAYTVSUBS (ratio of pay-TV subscribers to the population - COE). Finally we take into account the broadband diffusion (BROADBAND, share of households with a broadband connection.)

- a group of variables related to the structure of press: ADVPERCOPY (newspapers advertising revenues per copy WAN-IFRA[11]); NEWSPH (Herfindhal concentration l index on circulation- 10 largest newspapers WAN-IFRA); UNITCIRCULATION (ratio of newspapers circulation to population WAN-IFRA); ADVNEWSPTVRATIO(ratio of newspapers advertising revenues to the broadcasting advertising revenues WAN-IFRA).

- Finally, two indicators of the supply of entertainment alternative to other media (CINEMA (ratio of the number of cinema screens to the population - COE), UEFA (UEFA country ranking 2006-10)).

The list of the first- and second level variables is in Appendix.

[10] COE-European Audiovisual Observatory 2010-2012
[11] WAN-IFRA World Association of Newspapers and News Publishers 2010-2012

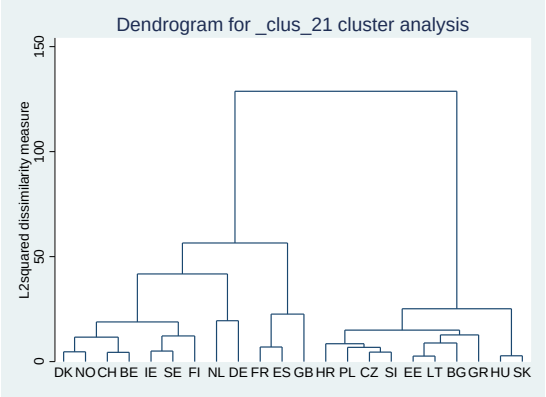

Figure 1: Figure 1

4.3 A general overview at the country level

In this Section we provide a general description of the media systems at the country level. We considered twenty-two European countries, belonging in 2010 to the European Union (with the exception of Norway and Switzerland). Therefore the countries are relatively homogeneous as regards geography, economic integration and the legal and institutional framework. Nevertheless, we believe that differences at the national level remain which might affect individual behavior as far as media are concerned. As a descriptive tool, we performed a Ward-type cluster analysis where each country is identified by the vector of standardized average values for the above described second-level variables related to the media market (that is, with the exception of ELECTION2011, GDPPRO, TURNOUT, FREE). Figure 1 shows the tree diagram obtained.

Starting from the top of Figure 1, one immediately identifies the two most distant groups: one (GROUP 1) contains all East European countries plus Greece (HR, SI, GR, PL, LT, CZ, BG, HU, SK and EE). The other group contains the remaining twelve countries. Among them it is easy to recognize three subgroups. One is mainly composed by a number of small, high-income countries : DK, BE, NO, SE, IE, CH, FI (GROUP 2A). The second subgroup (GROUP 2B) is composed by two countries: NL and DE. The remaining cluster (GROUP 2C) includes FR,ES and GB.. Table 3 provides the average values of second-level variables at group level (in the original, non-standardized format). GROUP 1 exhibits the smallest values

for almost all the second-level variables, with the exception of NEWSPH and PAYTVSUBS

.

Differences across the other subgroups are less easily readable. If one looks at the dendrogram, it appears that within the non-East countries, the largest distance lies between GROUP 2 and the remaining countries, while DE and NL are relatively close to GROUP 2A. GB, FR and ES taken together show comparatively low values for PAYTVSUBS, UNITCIRCULATION, and advertising-related indicators. . Groups 2A-2B-2C are fairly similar, for the mean values of many second-level variables, however they show some remarkable differences. Newspapers' circulation in GROUP 2C exhibits a larger value than all the other clusters. Analogously, the number of TV channels in all Groups is larger than in GROUP 1 with a very high value of NATIONWIDCHANNEL in GROUP 2A. The second-level variable UEFA indicates that countries of GROUP 1 are ranked at a lower level with respect to countries in GROUP 2A-2B-2C in the football game, with a remarkable high value of GROUP 2.

The main insight one gets from the above analysis concerns the existence of two main patterns of organization of the media sector. One is characterized by a variety of media sources, where public television complements private- owned pay-TV and a strong press sector reaches a substantial share of the advertising market. The other pattern exhibits a weaker structure and less differentiated media supply, where advertising resources are mainly channelled to television, while within the television sector pay-TV and public broadcasting are relatively weak. Countries where the first pattern appears in a relatively clearer way, besides being the richest in the sample (see GDPPRO), show also more political participation, journalist freedom and a larger variety in the entertainment according to the provision of cinema screens and the role of the favorite domestic sport.

Table 3				
	GROUP 1 East*	GROUP 2A NO SE CH DK BE IE FI	GROUP 2B DE NL	GROUP 2C GB FR ES
	Mean	Mean	Mean	Mean
CINEMA	0.0368	0.0744	0.0527	0.077
PAYTVSUBS	0.212	0.386	0.364	0.2088
UNITCIRCULATION	127.667	303.987	262.166	172.419
NEWSPH	0.147	0.135	0.1215	0.15
NATIONWIDCHANNE	19.1	25.714	29.5	63.00
PUBLICAUDIENCE	22.37	41.743	39.95	38.93
ADVNEWSPTVRATIO	0.465	1.4129	1.311	0.545
ADPERCOPY	0.353	0.978	0.755	0.474
GDPPRO	22792.15	44972.11	41306.34	34077.62
TURNOUT	59.96	73.75	76.05	66.267
FREE	40.118	49.786	48.875	40.457
UEFA	14.11	19.186	50.35	71.8
BROADBAND	64.18	83.4	81.85	83.2
East*= HR, PL, CZ, SI, EE, LT, BG, GR, HU, SK				

5 Estimates and Results

In this section we shall provide the estimation results for the above described models, for each medium separately. Before proceeding, however, let us address the issue of endogeneity as regards first-level variables. We can consider the variables referring to individual demographic characteristics as exogenously given . However, individual education raises doubts as regards endogeneity. Thus, we augment our model by adding one further equation, where the potentially endogenous variable is regressed on a set of instruments:

$$\begin{gathered} education = \alpha_0 + \alpha_1 age + \alpha_2 sex + \alpha_3 ethnic\_min.+ \\ \alpha_5 tongue + \alpha_6 education\_m + \alpha_7 education\_f + \alpha_8 orphan\_m+ \\ \alpha_9 orphan\_f + \alpha_{10} high\_m + \alpha_{11} high\_f + \alpha_{12} whitecoll\_f+ \\ \alpha_{13} whitecoll\_m + \alpha_{14} blu\,\mathrm{col}\,l\_f + \alpha_{15} blues\,\mathrm{col}\,l\_m+ \\ \alpha_{16} farm\_f + \alpha_{17} farm\_m + \nu \end{gathered} \tag{11}$$

Equation (11) explains the individual education by means of parents' education levels (EDUCATION_F and EDUCATION_M) and professional status when the respondent was fourteen, (HIGH_M, HIGH_F, WHITECOLL_M, WHITECOLL_F, BLUECOLL_M, BLUECOLL_F, FARM_F, FARM_M). ORPHAN_M and ORPHAN_F are 1 if the respondent was respectively motherless or fatherless at the same age. In addition to the men-

Table 4	
EDUCATION	
age	-.0285***
sex	-0.0868
ethnic_min	-.0552
education_m	.2487***
education_f	.3679***
orphan_m	-.3693
orphan_f	.1236
high_m	-.4404**
high_f	1.7801***
whitecoll_f	1.3416***
whitecoll_m	.1583
bluecoll_f	.7697***
bluecoll_m	.0541
farm_m	-.3073***
farm_f	-.3654*
_cons	1.1821
Number of observations	37.534
R-squared 0 0.235	
*** P<0.001, ** P<0.01, * p<0.05	

tioned regressors the equation includes country dummies. ν is an error term, for which the same assumptions as stated for ω apply. The predicted values, denoted as EDUCATION_IV are then employed in the estimation of equation (8).

Table 4 shows the estimation results for the (11) equation. According to these results, parents' education seems to predict highly educated children, while the same is true for father's professional status. Surprisingly enough, the professional condition of the mother is not significant. However, being orphan of the mother exerts a negative effect on individual education.

We focus now on the main results, as summarized in the following (see Tables 5 through 10 for details):

1. The shift from OLS estimation to multilevel methods represents a clear improvement in the explanatory power of the model, as shown by the remarkable increase in the BIC.

2. In assessing the effect of education (EDUCATION_IV) we control for wage and eco-

nomic status. Then what we observe is the pure effect of education on MB (the net marginal benefit from media use). Education positively affects web use, newspaper reading and radio listening for purposes of information. General TV watching is negatively affected by education. Finally, general radio and TV watching for purposes of information are neutral to education.

3. Among the other covariates AGE and SEX are almost always significant. As regards AGE, older individuals tend to read newspapers and listen to the radio for purposes of information more (and use the web less) than younger persons. Finally, men resort to media to a larger extent than women.

4. We employ three indirect indices of the opportunity cost of time, namely LESSTHAN_6, RETIRED and UNEMPLOYED. The resulting evidence is mixed. LESSTHAN_6 and UNEMPLOYED seem to exert a negligible influence on all media with the exceptions of NWSPTOT. On the contrary, RETIRED plays an important role in all cases except radio listening. However, the retirement effect is favorable to media use in the case of television and newspapers and adverse in the case of web. Were retirement simply equivalent to a softening of the time constraint, the sign of the coefficient should always be non-negative. The implication is that retirement also brings with itself some change in tastes which privileges some media with respect to others.

5. The only available direct measure of time cost, namely, WAGE, has a significant impact (with the expected negative sign) on television only, while it is statistically 0 in all remaining cases. According to our interpretation in Section 2, this might be the consequence of a very slow decline of the marginal utility of TV-watching, while the coefficient of any z covariate can be interpreted as the difference between MB_z^{TVTOT} and $MB_z^{\overline{TVTOT}}$ where $\overline{TVTOT}$ refers to media other than television.

6. Two of our covariates describe the general socio-economic condition of the respondent, other than education and personal earnings (if any). One is INC_FAMILYPROC and

refers to the current economic and social condition of the respondent's household. The other (LTUNENMPLOYED) describes instead past experience in the labour market. We find that the pure income effect is favorable to media use in the case of newspaper reading and the web, while it is adverse in the case of general TV and not significant in the case of general radio listening. While LTUNENMPLOYED seems to be favorable only to TV watching, while it reduces newspapers reading for information purposes and web use.

7. Second-level variables prove significantly related to media use in a wide range of cases, the more so if the random component and the fixed component are kept separated. ELECTION11 do clearly increase the use of media for political purposes. When significant, our press freedom indicator favorably affects newspapers reading and radio news and negatively TV watching. Advertising resources matter in the competition among media. In particular, the higher the ratio of press- to- TV advertising reduces TV watching. The choice opportunities within the broadcasting system have a significant impact on the media diet: the existence of successful public broadcaster (PUBLICAUDIENCE) reduces time devoted to newspapers reading, while the presence of a substantive Pay-TV audience negatively affects TV watching and encourages newspapers reading. Alternative type of leisure matter to a different extent: CINEMA negatively affects TV watching only, while UEFA discourages not only TV but also newspaper reading and radio listening. This is rather surprising in the face of alleged complementarity between media and the soccer business. The use of all media, but the web, is positively influenced by two variables: one refers to the availability of TV channels, the other measures the newspapers circulation per head. This might suggest that dynamism in one specific media segment has positive spillovers on media as a whole.

6 Conclusions

The empirical analysis carried out in this paper provides a meaningful contribution to the research issues we started with. The use of media turns out to be actually related to a set of first level drivers reflecting time constraints and tastes of the individuals and to a set of second level factors reflecting national features.

The results concerning the first level estimates are broadly consistent with our expectations. Among the first level covariates, education emerges as a key factor. The role of education is in principle twofold: it increases the ability of processing and elaborating information, and therefore reduces the costs of using the media (possibly, in a more marked way with media with complex messages, i.e. newspapers vs TV, something which our empirical analysis supports). At the same time, education might make the use of media more attractive, both in general and for specific media, independently of opportunity cost considerations. In particular, our results witness of a differential positive impact of education on the news-oriented media consumption in comparison to general media use (which includes, for instance, entertainment). A particularly interesting case is represented by TV: general purpose TV watching decreases with education, while no such negative impact is observed in the case TV watching for information purposes. Radio exhibits a similar pattern. This divergence in the impact of education is not observed instead in the case of newspapers, which might be probably explained by the small content of entertainment of general newspaper reading.

As regards the income index (INC_FAMILYPROC), let us remind that it is not a measure of opportunity cost of time, but it catches an income effect in a broad sense. For this reason, the main conclusion we can draw is that media consumption is a normal good, with the remarkable exception of general TV consumption which seems to be an inferior one, as it decreases with respect to income. The intuition behind this evidence might be that, as income grows, the range of opportunities for entertainment broadens. Indirect indices of time constraints (retirement, unemployment and childcare) seem to be related both to time

opportunity cost and other features of individual tastes, so that a sharp interpretation of results is not possible. An interesting result concerns retirement, which according to our analysis, encourages the use of traditional media; notice that since we control for age, this effect is a pure one.

Sex significantly affects media use: with the exception of TVTOT and RDTOT, which are independent of sex, all other uses of media are larger for males.

The introduction of second (country) level variables has proved relevant, as it contributed to a significant extent to increase the explanatory power of the model, as shown in the values of the Bayesian Information Criterion. This amounts to saying that basic features of the national media markets and of the country social and political environment matter as far as individual choices are concerned. None of the second level variables alone seems to exert an overwhelming and ubiquitous influence on the outcomes; the effect is mainly a joint one. Allowing for both fixed and random components in the impact of second level variables proved informative: as long as random components were excluded, the significance of fixed components was in general smaller than in the presence of random effects. The introduction of second level variables does not reduce the relevance of first level covariates: their statistical significance and signs are only occasionally affected by the multilevel extensions.

Among the many further research paths suggested by our analysis, we would like to stress one. We got sharp results in applying our model to web users. Although the results obtained are stimulating, the analysis suggests that crucial issues might be thoroughly addressed by means of more extensive and refined data: a finer description of web use, distinguishing not only news from entertainment, but also from time devoted to get services, and high-quality data on individual opportunity costs.

Table 5

	OLS	Fixed	Fixed + Random
TVTOT			
age	.005	.0043	.004
sex	.023	.014	.014
vote_right	.023	-.042	-.047
ethnic_min	.001	-.091	-.097
retired	.346**	.347***	.347***
lessthan6	-.078*	-.079**	-.079
education_iv	-.096**	-.119	-.119***
inc_familyproc	-.051**	-.04**	-.038**
wage	-3.87e-07	-2.92e-06*	-3.04e-06**
bigcity	-.0339	-.022	-.023
village	-.169*	-.136**	-.135*
unemployed	.164	.155	.151
ltunemployed	.216*	.245**	.246**
gdppro	5.315	.00002*	.00003**
free		.0051	.014
election11		.166	.139
turnout		.009	.003
publicaudience		.0009	.007
nationwidchan		.006	.006**
paytvsubs		-2.469***	-2.688***
advpercopy		-.139	-.139
newspH		-.388	1.44
unitcirculation		.0001	.00006
advnewsptvratio		-.421*	-.397**
cinema		-7.863	-10.837*
UEFA		-.008	-.005
broadband		.018***	.011**
BIC	116668.4 (a)	92181.4 (b)	92142.64 (c)
ΔBIC		24487 (a-b)	38.76 (b-c)
Number of obs	27355	27355	27355
R-squared	0.036		

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 6

	OLS	Fixed	Fixed + Random
TVPOL			
age	.018***	.0181***	.0181***
sex	-.224***	-.226***	-.226***
vote_right	.055	.058	.0568
ethnic_min	.086	.075	.071
retired	.24***	.233***	.233***
lessthan6	-.001	-.007	-.007
education_iv	.004	.006	.005
inc_familyproc	.0186	.024**	.025**
wage	-8.45e-07	-2.12e-06***	-2.15e-06***
bigcity	.106*	.075	.076
village	-.061	-.074**	-.074**
unemployed	.074	.067	.064
ltunemployed	.106***	.117***	.116***
gdppro		.00003***	.00002***
free		-.022**	-.015*
election11		.338**	.310**
turnout		.024***	.020***
publicaudience		-.0006	.002
nationwidchan		.004	.004
paytvsubs		-.451	-.709**
advpercopy		-.842	-.643**
newspH		1.235	.869
unitcirculation		.00005	.00007
advnewsptvratio		-.1589	-.134
cinema		-7.228	-4.753
UEFA		-.006	-.01**
broadband		.017	.023***
BIC	88019.08(a)	69315.2 (b)	69276.76 (c)
ΔBIC		18703.88 (a-b)	38.44 (b-c)
Number of obs	27351	27351	27351
R-squared	0.113		

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 7

	OLS	Fixed	Fixed + Random
NWSPTOT			
age	.0129**	.010***	.010***
sex	-.128*	-.137**	-.137**
vote_right	.112	.0812	.0804
ethnic_min	.089	.043	.0412
retired	.296***	.297***	.297***
lessthan6	-.054	-.062*	-.0623*
education_iv	.0847***	.044***	.044***
inc_familyproc	.077***	.072***	.072***
wage	5.99e-07	-3.26e-07	-3.43e-07
bigcity	.047	.083***	.084***
village	-.042	-.042	-.0417
unemployed	.107**	.148***	.148***
ltunemployed	-.098	-.079	-.079
gdppro		.00002	-3.55e-06
free		.009	.013**
election11		.180*	.242***
turnout		.0002	-.003
publicaudience		-.007	-.014***
nationwidchan		.004*	.006***
paytvsubs		.412	1.141*
advpercopy		-.081	.299
newspH		1.208***	.98***
unitcirculation		.0001	.0001
advnewsptvratio		-.011	.084
cinema		1.072	7.38
UEFA		-.007***	-.007***
broadband		-.003	-.002
BIC	85061.64 (a)	66454.62 (b)	66422.85 (c)
ΔBIC		18607.02 (a-b)	31.77 (b-c)
Number of obs	27370		
R-squared = 0.088			

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 8

	OLS	Fixed	Fixed + Random
NWSPPOL			
age	.009***	0.0078***	0.0078***
sex	-.131**	-0.133***	-0.1335***
vote_right	.045	0.0590	0.0591
ethnic_min	.03	0.0357	0.0351
retired	.095**	0.1125***	0.1122***
lessthan6	-.018	-0,023	-0.0229
education_iv	.069***	0,0495***	0.0487***
inc_familyproc	.066***	0,0591***	0.0593***
wage	7.25e-07	6.31e-07	6.43e-07
bigcity	.052*	0.0647**	0.0655**
village	-.022	-0,0384*	-0.0392**
unemployed	.027	0.0526	0.0523
ltunemployed	-.076*	-0,070*	-0.071*
gdppro	-.691	0.00001*	0.00001
free		0.0009	0.001
election11		0.155***	0.1583***
turnout		0.001	0.0002
publicaudience		-0.004**	-0.0049***
nationwidchan		0.0018*	0.002*
paytvsubs		0.4245*	0.411*
advpercopy		-0.029	-0.0275
newspH		0.411	0.3629*
unitcirculation		0.00009**	0.00009**
advnewsptvratio		0.0404	0.066
cinema		2.895*	3.076*
UEFA		-0.004***	-0.004***
broadband		-0.002	-0.0015
BIC	67107.27 (a)	52366,17 (b)	(c)
ΔBIC		14741.1 (a-b)	(b-c)
Number of obs	27341		
R-squared = 0.078			

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 9

	OLS	Fixed	Fixed + Random
RDTOT			
age	.001	-.0017	-.0017
sex	-.139	-.151	-.151
vote_right	.854***	.786***	.786***
ethnic_min	-.71***	-.709***	-.7069***
retired	.034	-.0049	-.005
lessthan6	-.016	-.0207	-.02
education_iv	.031	-.03	-.03
inc_familyproc	.088**	.0873**	.088**
wage	4.74e-07	5.33e-07	4.95e-07
bigcity	-.011	.0486	.047
village	.117	.1206	.12
unemployed	-.312**	-.2324**	-.2312
ltunemployed	.062	.0817	.08
gdppro		-.00001	-8.26e-06
free		.0463**	.0401**
election11		.0216	.212
turnout		-.0096	-.003
publicaudience		.015**	.014*
nationwidchan		.006	.008
paytvsubs		-2.343**	-2.45***
advpercopy		.89**	.7436**
newspH		-.101	-1.34
unitcirculation		.0005***	.0005***
advnewsptvratio		-.8428***	-.955***
cinema		1.1125*	11.117**
UEFA		-.0206***	-.0265***
broadband		.0126	.0162**
BIC	129546.5 (a)	102285.6 (b)	102261 (c)
ΔBIC		27260.9 (a-b)	24.6 (b-c)
Number of obs	27358		
R-squared = 0.022			

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 10

	OLS	Fixed	Fixed + Random
RDPOL			
age	.008***	.00736***	.0074***
sex	-.181*	-.185*	-.185*
vote_right	.353***	.3791***	.3791***
ethnic_min	-.233	-.2015***	-.2007***
retired	-.057	-.0686	-.0698
lessthan6	.045	.0385	.0389
education_iv	.046*	.0248**	.0245322
inc_familyproc	.076**	.0758***	.0759***
wage	2.12e-06*	2.04e-06	2.02e-06
bigcity	.045	.0598	.0611
village	.082	.0594	.0593
unemployed	-.124	-.0885	-.0871
ltunemployed	-.019	-.0176	-.0178
gdppro	-.226	-2.76e-06	-9.14e-06
free		.0163	.0114**
election11		.1632	.2806*
turnout		.0012	.003
publicaudience		.003	.0031
nationwidchan		.0025	.005
paytvsubs		-.0469	.37
advpercopy		.1032	.121
newspH		.675	-.3116
unitcirculation		.0001	.0001
advnewsptvratio		-.286	-.3138*
cinema		6.764	7.46
UEFA		-.008	-.0103*
broadband		.007	.0116
BIC	96453.18 (a)	76262.6 (b)	76232.61 (c
ΔBIC		20190.58 (a-b)	29.99 (b-c)
Number of obs	27267		
R-squared = 0.036			

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

Table 11

	OLS	Fixed	Fixed + Random
NETUSE			
age	-.058***	-.0621***	-.0621***
sex	-.186*	-.1932*	-.1933*
vote_right	.195*	.317***	.3124***
ethnic_min	-.404	-.408*	-.4165*
retired	-.812***	-.7344***	-.7345***
lessthan6	.116	.082	.082
education_iv	.359***	.316***	.316***
inc_familyproc	.359***	.338***	.3384***
wage	6.33e-06*	2.78e-06	2.70e-06
bigcity	.087	.0999**	.1005**
village	-.085	-.126*	-.1241*
unemployed	-.052	.024	.0185
ltunemployed	-.236**	-.177**	-.1747***
gdppro		-.00001	-.00003***
free		-.0165	-.0085
election11		.1827	-.084
turnout		-.002	-.0145***
publicaudience		.003	.006
nationwidchan		.002	-.0035
paytvsubs		3.63***	4.057***
advpercopy		.0725	.3503**
newspH		1.41	2.466***
unitcirculation		.0001	1.99e-06
advnewsptvratio		.224	.5327***
cinema		10.491*	14.18***
UEFA		-.0017	.007
broadband		.0181**	.0077236
BIC	122388.9 (a)	95884.42 (b)	95841.42 (c)
ΔBIC		26504.48 (a-b)	43 (b-c)
Number of obs	27359		
R-squared = 0.419			

(*) The estimated values for the constant are omitted for expository simplification
*** P<0.001, **P<0.01, *P<0.05

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7 Appendix

Explanatory Variables: first level

AGE	The age of the respondent
SEX	Dummy variable, value 1 for female
ETHNIC_MINORITY	Dummy variable, value 1 for a minority
VOTE_RIGHT	Dummy variable, value 1 if entitled to vote
BIGCITY	Dummy variable, value 1 for individuals living in big cities
VILLAGE	Dummy variable, value 1 for individuals living in a country village
EDUCATION	The years of education
INC_FAMILYPROC	Per capita family income of the rspondent
LESSTHAN6	The number of children in the family aged less than 6
RETIRED	Dummy variable, value 1 being retired
UNEMPLOYED	Dummy variable, being unemployed in the last week,
	but looking for job
LTUNEMPLOYED	Dummy variable, being long term unemployed
WAGE	Gross pay in euros, before tax and insurance deductions

Explanatory Variables: second level

GDPPRO	Per capita GDP in PPP
FREE	Index of of freedom in media market
TURNOUT	Average election tornout 2005-10
ELECTION2011	Dummy variable, 1 in the case of election
PUBLICAUDIENCE	Share of audience of the public broadcasting system
NATIONWIDCHAN	Number of nation wide TV channels in the country
PAYTVSUBS	Ratio of pay-TV subscribers tothe population
AVDVPERCOPY	Newspapers advertising revenues per copy
NEWSPH	H concentration index on 10 largest newspapers
UNITCIRCULATION	Ratio of newspapers circulation to population
ADVNEWSPTVRATIO	Ratio of newspapers advertising revenues to
	broadcasting advertising revenues
CINEMA	Ratio of the number of cinema screens to population
BROADBAND	Share of households with a Broadband connection