Measuring Well-Being differences across EU Countries. A Multidimensional Analysis of Income, Housing, Health, and Education.*

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Abstract

This paper investigates the evolution of the inequality in well-being across different EU countries between 1994 and 2001 by means of a multidimensional approach focusing on income, housing, education and health. We first analyse the four dimensions each by each through an univariate Atkinson-Kolm-Sen index. Then the distributions of each attribute are aggregated into an index which takes into account the possible correlation between dimensions.

Our empirical results summarize the trends in inequality for the four indicators of well-being considered both separately and jointly, over time and across countries. Since our multidimensional index depends on the values assigned to the parameters, we test the sensitivity of the trend in well-being inequality for different normative choices.

JEL codes: D30, D63, O15.

Keywords: Well-being; Inequality indicators; European Union.

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Résumé

L'objet de ce papier est d'analyser l'évolution des inégalités de bien-être parmi un ensemble de Pays de l'Union Européenne pendant la période 1994-2001, en suivant une approche multidimensionnelle qui considère comme attributs de bien-être le revenu, les conditions habitatives, le niveau d'éducation et l'état de santé. Nous considérons en premier les quatre attributs séparément en appliquant un indice univarié à la Atkinson-Kolm-Sen. Deuxièmement, les indices unidimensionnels sont agrégés dans un indice qui tient compte de l'éventuelle relation de dépendance entre les différents attributs.

Nos résultats empiriques montrent la dynamique des inégalités pour les quatre indicateurs de bien-être considérés un à la fois ainsi que conjointement. Comme notre indice multidimensionnel dépend des valeurs assignées aux paramètres, nous testons la sensibilité des résultats aux différents choix normatifs.

Classification JEL: D30, D63, O15.

Mots-clés: Bien-être ; Mesures d'inégalitées ; Union Européenne.

1. Introduction

In the research line dealing with inequality of multidimensional well-being across individuals or households, the concept of well-being spans over several spaces of the human condition. On theoretical grounds, the most well-known appraisal of well-being is represented by the capability theory proposed by Amartya Sen (1985; 1992). Conditions for a decent life consist in the achievement of a series of functionings (being nourished, healthy, educated, etc) and capabilities, i.e. opportunities to achieve well-being through the access to combinations of beings and doings. Overall, well-being is the capability to achieve valuable functionings. On empirical grounds, the most influent measurement of well-being is the Human Development Index (HDI) proposed by the United Nations Development Programme (UNDP) since 1990. For each country, the HDI collects in a sole figure information about per capita GDP (PPP), literacy, and life expectancy.

There are essentially two reasons to approach inequality not just with reference to income disparities – as the traditional indexes do - but as a multidimensional phenomenon: 1) people with the same income level can end up with largely different well-being conditions just because functionings and capabilities depend on factors heterogeneous across individuals: individual positions differentiate regarding both their own personal characteristics (gender, age, etc.) and the environment in which they live (family conditions, social norms, institutions, natural environment, etc.); 2) the cross-correlation among the dimensions where inequality across people emerges. Once other-than-income dimensions of well-being are considered, a cause of inequality in one dimension may happen to magnify – or to compensate for – a condition of inequality in another dimension. As a matter of fact, even when two distributions are quite similar under all other regards, one distribution could present a degree of correlation with other disadvantaged positions across dimensions higher than that of another distribution. As often underlined by Sen (Foster and Sen, 1997), one empirically finds that individuals with a low income show a much higher degree of correlation with disadvantaged positions in other dimensions (e.g., poor education and health conditions).

Both reasons have been addressed by a theoretical strand of research on multidimensional well-being (hereafter, MWB). As for the first, the seminal contribution by Kolm (1977) has originated research work on majorization, that is the extension to multidimensionality of the Pigou-Dalton criterion, according to which any transfer from a “rich” to a “poor” individual preserving the relative position of the two individuals in the distribution reduces the degree of inequality. As for the second, Atkinson and Bourguignon (1982; 1987) observed that the individuals’ ranking in terms of MWB also depends on the cross-correlation between distributions of different resources and attributes. For the single individual, inequalities in different dimensions can mutually magnify or, alternatively, cancel out. Overall, one distribution can be less unequal than another if the former presents a lower dispersion than the latter, or if it exhibits a lower degree of interdependence among the individual distributions of resources/attributes.

To combine both the inequality across people in different dimensions and the cross-correlation between distributions of resources/attributes in different dimensions, and to provide a ranking, appropriate dominance criteria have been elaborated, specifying the conditions under which a multidimensional distribution is at least as equal as another one. Here we just mention the two dominance criteria the scientific community working on MWB agrees on, as they deal with the extension of the univariate Pigou-Dalton principle to the multidimensional space of well-being: 1) One dimensional Pigou-Dalton majorization (UPD) and 2) Uniform Majorization (UM).

The axiomatic properties have to be complete and consistent. Once the multidimensional inequality index is compatible with the needed set of dominance criteria, each multidimensional distribution will be consistently mapped to a real number. Value judgement are unavoidable in order to obtain a complete ordering of alternative distributions. The normative approach to the measurement of multidimensional inequality aims at making explicit the value judgements underlying the inequality index (Weymark, 2006). To rank alternative distributions according to their social desirability, a social evaluation function is usually employed. A decision has to be taken with respect to 1) the weighting structure (the extent to which each dimension is considered to contribute to each individual’s well-being), 2) the degree of substitution between resources/attributes, and 3) the degree of inequality aversion.

In this paper we adopt a normative approach to measure multidimensional inequality in well-being across different EU countries between 1994 and 2001. We focus on four important dimensions of life: income, housing, education and health. In particular, we first analyse each dimension separately through an univariate Atkinson-Kolm-Sen index. Then the distributions of each attribute are aggregated into an index following the theoretical result of Abul Naga and Geoffard (2006) on the decomposition of multivariate inequality indices by attributes. The value of this approach is that it allows to take explicitly into account the possible correlation between different attributes of well-being.

This methodology – that to our best knowledge has not been applied until now in the economic literature - places our article nearer the one by Gaydos and Weymark (2005) than to the works of Maasoumi (1986) and Tsui (1995). The former aggregates the distributions of each attribute by using univariate generalized Gini social evaluation functions. In the second stage, it introduces a functional form depending on the number of attributes and on which version of a comonotonic additivity axiom is used. The latter authors employ an ordering to aggregate individuals and attributes that is the reverse of the order used by Gaydos and Weymark (2005). In the first stage, they use a utility function to determine the distribution of utilities. In the second stage a univariate inequality index is applied to the distribution of utilities obtained in the first stage.

The paper is organized as follows. In section 2 we introduce the theoretical framework pointing out the properties of the social evaluation function. Then we derive the inequality index considering first the simplest case with only one dimension of well-being and secondly the multidimensional case with *m* attributes. Data and results are described in sections 3 and 4. Section 5 concludes.

2 Framework

Consider a population composed of *n* individuals, indexed by $i = 1, \ldots, n$, with $n \geq 2$. Each individual is endowed with *m* resources $\mathbf{x}_i^{'} = (x_{i1}, \ldots, x_{im})$ where $\mathbf{x}_i^{'} \in \Re_{++}^m$. The joint distribution is a matrix $X = \begin{pmatrix} \mathbf{x}_1^{'} \\ \vdots \\ \mathbf{x}_n^{'} \end{pmatrix} \in M^n$, the set of all $n \times m$ matrices with strictly positive elements.

A *m*-dimensional inequality index is a real valued function $I(X): M^n \rightarrow \Re_+$. Underlying I is a social welfare function $W(X): M^n \rightarrow \Re$.

In the next section we consider the simple univariate case focusing only on the distribution of attribute j to describe some properties of the utility function and social welfare function. Then we introduce the inequality index proposed by Atkinson in his seminal paper of 1970.

2.1 The unidimensional case

The social welfare function takes the form $W(\mathbf{x}_j) = \frac{1}{n}\sum_{i=1}^{n} u(x_{ij})$. The individual utility function $u(\cdot)$ is continuous, strictly increasing, and concave.[1]

Definition 1 **(EDESAA – Equally Distributed Equivalent Share of Average Attribute)**: $\gamma_j \in [0,1]$ s. t. $W(\gamma_j \cdot \mu_j \cdot \mathbf{1}) = W(\mathbf{x}_j) \Leftrightarrow \frac{1}{n}\sum_{i=1}^{n} u(x_{ij}) = u(\gamma_j \cdot \mu_j)$.

We define the EDESAA $\gamma_j \cdot \mu_j$ as the amount of attribute j that - if equally distributed to all individuals - leads to the same social welfare as the unequal distribution $\mathbf{x}_j$. The EDESAA γ_j can be interpreted as an index of relative equality and its complement as a (relative) index of inequality, $I(\mathbf{x}_j) = 1 - \gamma_j$.

Index γ_j is scale invariant iff $W(\cdot)$ satisfies the following property:

I. ***(Homotheticity)*** $W(\mathbf{x}_j^A) = W(\mathbf{x}_j^B) \Leftrightarrow W(\lambda \mathbf{x}_j^A) = W(\lambda \mathbf{x}_j^B)$ if λ>0.

The scale invariance implies that an equal proportional increase of the attribute for all individuals does not affect the value of γ. The social welfare function is such that, given two distributions $\mathbf{x}_j^A$ and $\mathbf{x}_j^B$ that guarantee the same level of welfare, if both distributions are multiplied by a same positive scalar, then the two transformed distributions $\lambda \mathbf{x}_j^A$ and $\lambda \mathbf{x}_j^B$ will attain the same level of welfare.

The property *I.* of homoteticity implies that the individual utility function takes a form depending on the value of the parameter α_j, $u(x_{ij}) = \begin{cases} x_{ij}^{\alpha_j} \text{ if } 0 < \alpha_j \leq 1 \\ \ln(x_{ij}) \text{ if } \alpha_j = 0 \\ -x_{ij}^{\alpha_j} \text{ if } \alpha_j < 0 \end{cases}$.

Note that $(1-\alpha_j)$ is a measure of the degree of inequality aversion. As α_j rises, greater weight is given to transfers at the lower end of the distribution and less weight to transfer at the top. If $\alpha_j = 0$, it reflects an inequality neutral attitude, so that the society does not care about inequality at all.

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[1] The monotonicity of $u(\cdot)$ implies that the social welfare function satisfies the Pareto principle, i.e. increasing the quantity of the attribute for any individual is socially desirable provided that nobody's allocation of the attribute decreases. The concavity of $u(\cdot)$ implies that individuals are risk averse.

As a result, (if $\alpha_j \neq 0$) $\gamma_j = \frac{1}{\mu_j} \cdot \left(\frac{1}{n} \sum_{i=1}^{n} x_{ij}^{\alpha_j} \right)^{1/\alpha_j}$.

2.2 The multidimensional case

We define the social welfare function as $W(X) = \frac{1}{n} \sum_{i=1}^{n} u(\mathbf{x}_i^{'})$ which entails that the individual utility function is continuous, strictly increasing, and concave as in the unidimensional case. Let $\boldsymbol{\mu} = (\mu_1, \ldots, \mu_m)$ denote the vector of sample means, we give the following definition analogous to Definition 1,

Definition 2 **(EDESAAs – Equally Distributed Equivalent Share of Average Attributes)**: $\theta \in [0,1]$ s. t. $W(\theta \cdot \boldsymbol{\mu}) = W(X) \Leftrightarrow \frac{1}{n} \sum_{i=1}^{n} u(\mathbf{x}_i^{'}) = u(\theta\mu_1; \theta\mu_2; \ldots, \theta\mu_m)$.

Scalar θ is an index of (relative) overall equality and $I(X) = 1 - \theta$ is an index of inequality.

In addition to the property of multidimensional homotheticity, we introduce also the property of aversion to correlation increasing transformations,

II. ***(Multidimensional Homotheticity)*** If Λ is a $m \times m$ diagonal matrix with strictly positive elements, then $W(X^A) = W(X^B) \Leftrightarrow W(X^A \Lambda) = W(X^B \Lambda)$.

III. ***(Aversion to Correlation Increasing Transformations)*** For any X and $Y \in M^n$, if Y is a correlation increasing transformation of X then $W(Y) < W(X)$.

To clarify the last property, we present a simple example. Consider four individuals and three attributes, i.e. a monetary attribute measured by the monthly wage; health proxied by the number of days in which the individual is healthy; education measured by the number of years individual went to school. Initial distributions of three attributes for two individuals are represented in the matrix X of Table 1.

[Insert Table 1 here]

In matrix X, the first individual has a lower income and education but is healthier than the second one. Now suppose that the two individuals swap the number of days in which they are healthy so that the first individual has a lower level of all three attributes. The new distributions are represented in matrix Y of Table 1. Y is a correlation increasing transformation of X since the switch increases the rank correlation between attributes (i.e. Kendall's Tau).

In the following we reformulate the theorem introduced by Aczél (1988) and Tsui (1995).

Theorem 1 (Aczél, 1988; Tsui, 1995): Given a social welfare function $W(X)=\frac{1}{n}\sum_{i=1}^{n}u(\mathbf{x}_i^{'})$ continuous, monotonic in all its arguments and concave, it satisfies property *II.* (Multidimensional Homotheticity) and *III.* (Aversion to Correlation Increasing Transformations) iff $u(x_{i1},...,x_{im})=-x_{i1}^{\alpha_1}\cdot x_{i2}^{\alpha_2}\cdot ...\cdot x_{im}^{\alpha_m}$, where $\alpha_j<0$ for all *j*.

The Abul Naga and Geoffard (2006) result is the following:

Theorem 2 (Abul Naga and Geoffard, 2006): Given the conditions of Theorem 1, the inequality index θ can be decomposed into m indices $\gamma_1,\gamma_2,...,\gamma_m$ related to the marginal distributions and a term κ based on the dependence structure between attributes:

$$\left(\sum_{j=1}^{m}\alpha_j\right)\ln\theta=\sum_{j=1}^{m}\alpha_j\ln\gamma_j+\ln\kappa \tag{1}$$

where γ_j is an AKS index for $\mathbf{x}_j$ and κ is given by $\kappa=\frac{n\sum_{i=1}^{n}x_{i1}^{\alpha_1}\cdot x_{i2}^{\alpha_2}\cdot ...\cdot x_{im}^{\alpha_m}}{\sum_{i=1}^{n}x_{i1}^{\alpha_1}\cdot\sum_{i=1}^{n}x_{i2}^{\alpha_2}\cdot ...\cdot\sum_{i=1}^{n}x_{im}^{\alpha_m}}$.

3. Data

We make use of data from the European Community Household Panel (ECHP) which provides social, demographic and economic information at the household and at the individual level for the EU countries. Cross-national comparability is achieved through a standardised questionnaire design and common technical and implementation procedures, with centralised support and co-ordination of the national surveys by Eurostat. The total period covered by the ECHP is 8 years, running from 1994 to 2001. We consider only countries which participate to the ECHP for all 8 waves and have complete information on well-being attributes we have chosen, i.e. Belgium, France, Germany, Italy, Spain and the UK.

Exploiting the longitudinal nature of the data set, we apply our measures to all waves in order to evaluate the evolution of welfare inequality over time within a single country as well as between countries.

In order to make the data set representative, each individual is weighted by its cross-sectional weight coded by PG002.

The ECHP survey has the great advantage of collecting information on the same variables in a uniform way across countries. Yet, we are well aware that all variables are just a pale approximation of the well-being attributes we would like to have. We endeavour showing the potentialities of the methodology we employ by using the available information, aiming at conducting an empirical analysis as rigorous as possible.

The first dimension is a monetary welfare attribute represented by per capita income. It is obtained by considering the total household income net of income taxes and social security contributions, in the year preceding the interview. We adjust this total net income variable (HI100) for household size and composition.[2]

The second dimension is housing, proxied by the number of rooms the household has the use of, not counting kitchens, bathrooms and toilets (HA007) and adjusted by the modified OECD scale. This variable, ranging 1-10 or more, was chosen because - among the 39 variables coded HA and referring to accommodation - it appeared to be the most verifiable and synthetic measure of the housing dimension; it also shows a minimum number of missing answers.

The third dimension is health status. We measure this variable by the number of nights not spent in hospital during the past 12 months. This variable was chosen from among the 23 health-related variables - which all refer to the individuals rather than to the households - for the very reason of being objectively measurable and free of personal judgements. To obtain this variable, we transform the health variable available in the dataset (PH007 i.e. the number of nights spent in hospital during the past 12 months) in the following way, $S_i = 365 - x_i$, where 365 is the highest number of nights an individual can spend in hospital in a year. The number of relevant observations refers to a subset of unhealthy individuals over the ECHP sample. As this dimension may be related to age we have tried to compute it both for the population regardless their age and for the population under 65, but we did not detect any cross-country difference worth mentioning.

[2] We employ the modified OECD scale (HD005) which gives a weight of 1.0 to the first adult, 0.5 to the remaining persons aged 14 or over living in the household, and 0.3 to each child aged less than 14).

Finally, the fourth dimension is education status, proxied by the age when the highest level of general or higher education was completed (PT023). This variable – chosen among the over 20 education-related variables - ranges between 9 and 75. As with the health related variable, also the education variable is referred to the individuals, by excluding those still in education and training it reports a subset of the ECHP sample, and is open to country-specific characters. A check on age distributions however reveals that only a tiny minority (ranging from France 0.3% to Germany 8%) get their highest level of education when aged over 30, while everywhere those aged over 40 hardly reach 3%. For France in the last wave, where this variable is missing, we use highest level of general or higher education completed (PT022). We rank the level of education in increasing order - that is, beginning with the lowest level of education individuals and ending with the highest one - by transforming the education variable in the following way: the education variable is equal to one if the individual attended less than the second stage of secondary education (ISCED 0-2); is equal to 2 if he attended the second stage of secondary level education (ISCED 3); and is equal to 3 if attended the third level education (ISCED 5-7).

Table 2 summarizes mean and standard deviation of variables.

[Insert Table 2 here]

4. Results

The values of the multidimensional index of inequality are plotted in Figure 1.[3] The values of parameters introduced in (1) to compute indexes are -0.7 for income, housing and education and -15 for health. In this way, we assume an higher social inequality aversion for health and a lower, and equal across them, aversion degree for the other three attributes. Values of parameters α_j determine not only the level of inequality aversion but also the weight of each attribute in the aggregation process to obtain the multidimensional index. Then, all attributes have equal weight with the exception of health whose weight is more than 21 times higher than that of the other attributes. This is consistent with the higher inequality aversion for a good that can hardly be renounced since it is necessary to benefit from the other attributes of well-being. "*There is some plausibility to the claim that rational people should refrain from (…) trading of health for other goods. Loss of health may preclude us from pursuing what we most value in life. We do, after all, see people willing to trade almost anything to re-gain health once they lose it.*" (Daniels et al., 2004). Figure 1 shows the highest degree of inequality for Mediterranean countries (Italy and Spain) increasing over time; the central countries fall in the middle of the ranking (Belgium, Germany and France); the United Kingdom closes the ranking with the lowest level of inequality.

[Insert Figure 1 here]

The item-by-item analysis allows us to determine which dimension contributes to modify the degree of inequality over time and/or between countries. Figures 2.1 to 2.4 report the AKS inequality indices calculated on each dimension.

[Insert Figures 2.1 to 2.4 here]

The highest level of inequality in Italy and Spain is due to income inequality for Spain (the AKS inequality index is 0.7 percent in both waves) and health and education inequality for Italy (AKS indices are respectively 0.16 and 0.125 on average while in the other countries average values are lower).

In the central region, Belgium and France exhibit over time a decrease in inequality of well-being: the multidimensional index of the former passes from 0.5355 in 1994 to 0.4558 in 2001 (-7.97 percent), from 0.4434 to 0.4333 (-1.01 percent) the index of the latter. In

[3] To present clearest results we report in all tables and figures calculations only for 1994 and 2001. Results on the years between these two waves are available upon request.

particular, in Belgium the decrease concerns the inequality indices for health (-16.44 percent), for income (-13.22 percent) and, to a small extent, for housing (-1.94 percent), while education remains nearly stable over time; and in France the rise of inequality for education partially compensates for the reduction of inequality for income and housing.

The increase of multidimensional inequality index in Germany (+3.5 percent) is mainly due to the increase of inequality in the health dimension which is not sufficiently offset by the reduction of inequality in the remaining three dimensions. The lowest level of inequality manifested by the United Kingdom in both waves is explained by lower levels of inequality in all attributes, particularly in health and education, with respect to the levels in the other countries.

Now we focus for on the term κ representing the relationship of dependence between attributes. Looking at the equation (1) of Theorem 2, it is clear that if κ is equal to one, there is no joint effect of attributes on multidimensional inequality index. Table 3 reports the values of κ together with the values of univariate and multivariate indexes for the different countries. The term κ is always higher than one: the joint effect of increasing quantities of attributes contribute to the reduction of inequality. This is a clear consequence of our assumption of substitution of attributes. If we look for example to the value of κ for the United Kingdom, we find a decrease over time then the joint effect of attributes on well-being inequality is positive in the sense that all together they contribute to reduce inequality.

[Insert Table 3 here]

Figure 3 summarizes multidimensional indexes for a different set of parameters' values: -1.2 for income, housing and education and -12 for health. This implies an increase in the inequality aversion for income, housing and education and a reduction in inequality aversion for health. As a result the degree of substitutability between health and the remaining attributes of well-being is lower.

[Insert Figure 3 here]

The ranking of countries remains relatively unchanged; the only remarkable difference is for the most unequal countries: Italy and Spain. The former presents now a degree of overall inequality stable over time, the latter an opposite pattern of inequality, that is inequality decreases over time while with the previous set of parameters it increased. This is due to the lower weight of health and to a smaller increase of inequality in this attribute from 1994 to 2001. Indeed, looking at table 3 – inequality increased by three percent over the eight years with the second set of parameters while with the first set it increased by eight percent.

5. Conclusion

In this paper we apply a result from the recent literature on multidimensional inequality measurement to quantify the evolution of well-being inequality across countries. We treat well-being as a multidimensional concept focusing on four dimensions: income, housing, health, and education. Inequality on these four dimensions shows a different trend over the eight years period considered in our analysis. On the theoretical side, the multidimensional index we compute allows, on one hand, to separate the effect of different attributes that contribute to determine individual well-being, and on the other hand, to consider the joint effect of all attributes on individual well-being. Moreover, it allows to modulate some important aspects from the policy maker's point of view such as the degree of inequality aversion, the weight of each attribute and so implicitly the level of substitutability between them. Our sensitivity analysis, reflecting different normative choice, shows that international inequality remains quite unchanged.

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Table 1: Example of a correlation increasing transformation

$$X = \begin{pmatrix} 1000 & 340 & 13 \\ 2000 & 300 & 17 \\ - & - & - \\ - & - & - \end{pmatrix} \qquad Y = \begin{pmatrix} 1000 & 300 & 13 \\ 2000 & 340 & 17 \\ - & - & - \\ - & - & - \end{pmatrix}$$

Table 2: Descriptive Statistics for Income, Housing, Health and Education

	Belgium	France	Germany	Italy	Spain	United Kingdom
Income in national currency						
1994	579503 (282713)	89853 (52881)	30852 (18140)	16458 (10843)	1031849 (528779)	8869 (5293)
2001	705821 (318961)	109693 (60234)	38472 (23175)	23956 (12135)	1869282 (1019427)	12886 (8251)
Housing						
1994	3.1781 (1.2018)	2.9172 (1.0561)	2.8280 (0.9856)	2.2488 (0.9093)	2.5565 (0.8986)	2.6435 (1.0054)
2001	3.1461 (1.0814)	2.4337 (0.9312)	2.9499 (0.9966)	2.4217 (0.9936)	2.6618 (1.0597)	3.5032 (1.2159)
Health						
1994	363.1020 (10.2061)	363.7333 (6.8465)	362.5515 (10.5975)	363.7464 (7.3887)	363.9800 (5.8771)	363.9984 (5.7525)
2001	363.7375 (6.7594)	363.8448 (6.7373)	363.1011 (8.7299)	363.8411 (7.9370)	364.2009 (5.4658)	364.0233 (5.8778)
Education						
1994	19.3411 (5.1750)	17.0333 (3.7030)	23.2027 (7.6876)	17.4668 (7.4549)	17.1631 (6.5671)	17.3221 (4.4842)
2001	20.1965 (5.7972)	2.3761 (1.5774)	24.2397 (8.2722)	17.8097 (8.2371)	19.4616 (8.0770)	17.4591 (4.5338)

Table 3: Uni- and Multi-dimensional Inequality Indexes

Year	Country	AKS Index Income (α = -0.7)	AKS Index Housing (α = -0.7)	AKS Index Health (α = -15)	AKS Index Education (α = -0.7)	k	Multidimensional Index
1994	Belgium	0.3183	0.1035	0.2393	0.0487	5608.84	0.5355
	France	0.4298	0.1009	0.0150	0.0360	10956.62	0.4434
	Germany	0.4057	0.0946	0.1096	0.0905	4016.63	0.4600
	Italy	0.4377	0.1168	0.2433	0.0878	15252.51	0.5684
	Spain	0.7188	0.0850	0.0351	0.0844	13172.67	0.4754
	United Kingdom	0.2883	0.1062	0.0154	0.0277	8459.11	0.4299
2001	Belgium	0.1861	0.0841	0.0749	0.0441	8127.42	0.4558
	France	0.2765	0.1089	0.0167	0.1617	8345.68	0.4333
	Germany	0.2238	0.0780	0.1935	0.0789	3821.50	0.4975
	Italy	0.2381	0.1174	0.2803	0.1192	12551.55	0.5776
	Spain	0.6971	0.1023	0.1271	0.0983	5176.06	0.4918
	United Kingdom	0.2345	0.0860	0.0191	0.0352	6100.34	0.4188
Year	Country	AKS Index Income (α = -1.2)	AKS Index Housing (α = -1.2)	AKS Index Health (α = -12)	AKS Index Education (α = -1.2)	k	Multidimensional Index
1994	Belgium	0.6398	0.1325	0.1542	0.0602	11641.13	0.5609
	France	0.8033	0.1308	0.0083	0.0451	8378.29	0.5156
	Germany	0.6801	0.1207	0.0501	0.0889	2836.99	0.4799
	Italy	0.6695	0.1489	0.1426	0.1223	9349.70	0.5560
	Spain	0.9920	0.1071	0.0114	0.0991	5904.67	0.6146
	United Kingdom	0.4378	0.1362	0.0073	0.0422	8501.51	0.4750
2001	Belgium	0.3311	0.1068	0.0322	0.0644	8715.86	0.4787
	France	0.6778	0.1403	0.0089	0.2231	9624.81	0.5098
	Germany	0.3312	0.1134	0.1141	0.0979	3566.35	0.4860
	Italy	0.3755	0.1501	0.1833	0.1327	11182.44	0.5564
	Spain	0.9889	0.1282	0.0433	0.1248	1510.20	0.5811
	United Kingdom	0.4188	0.1104	0.0087	0.0412	6515.89	0.4640

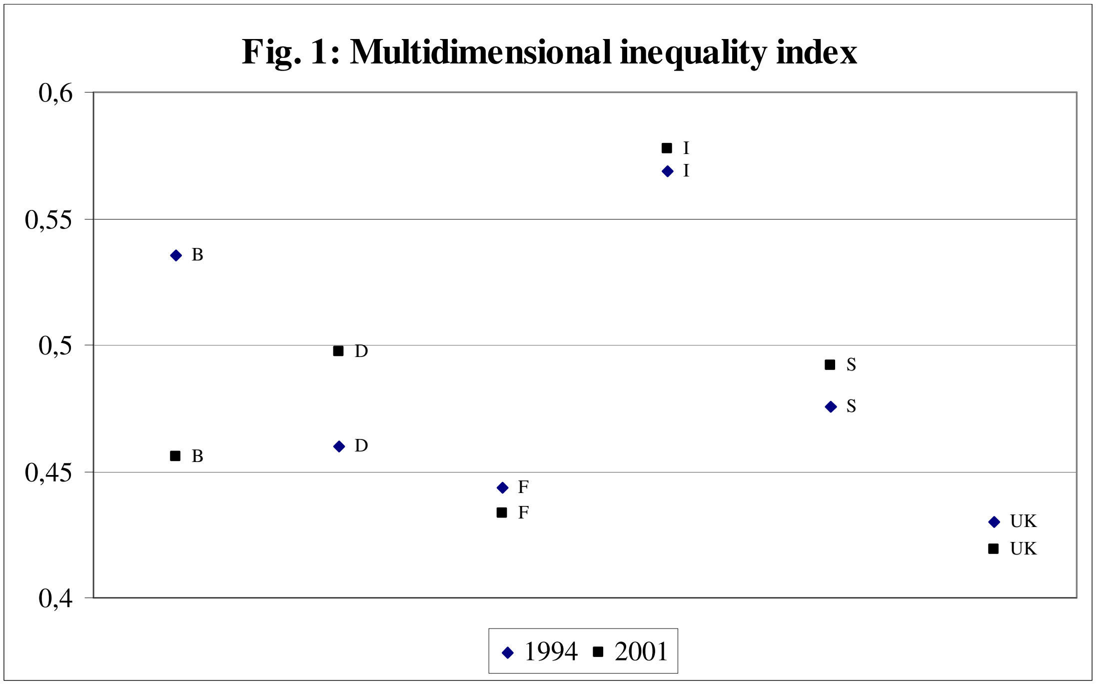
Fig. 1: Multidimensional inequality index
0,6
0,55
0,5
0,45
0,4
I
I
B
D
S
S
B
D
F
F
UK
UK
1994
2001

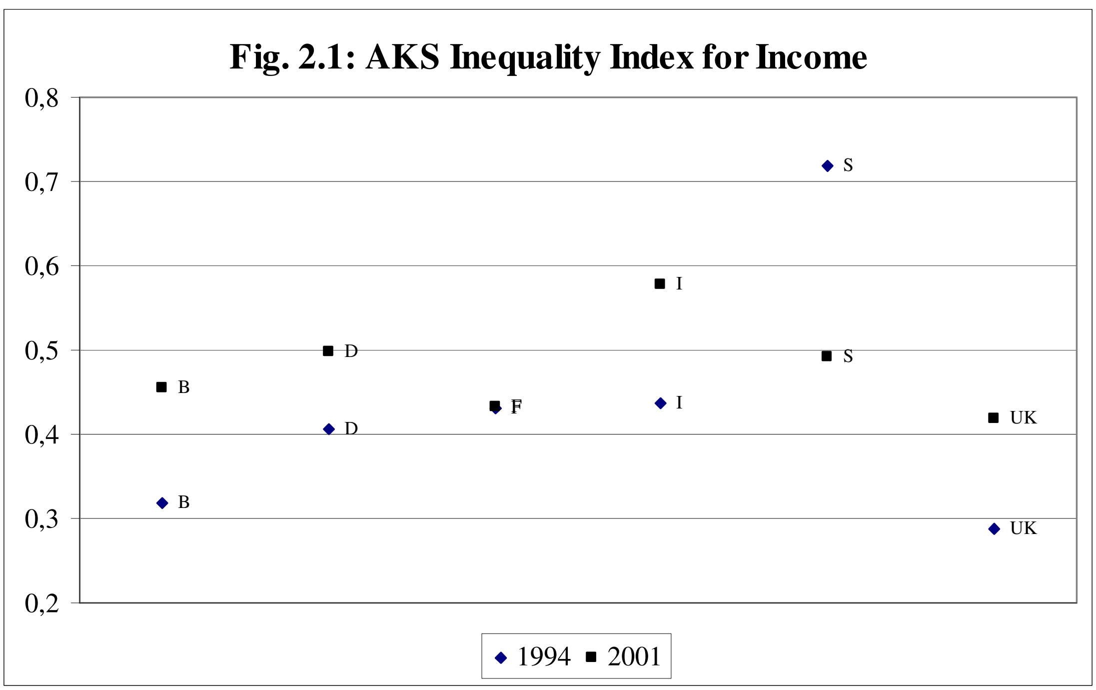
Fig. 2.1: AKS Inequality Index for Income
0,8
0,7
0,6
0,5
0,4
0,3
0,2
S
I
D
S
B
F
I
D
UK
B
UK
1994
2001

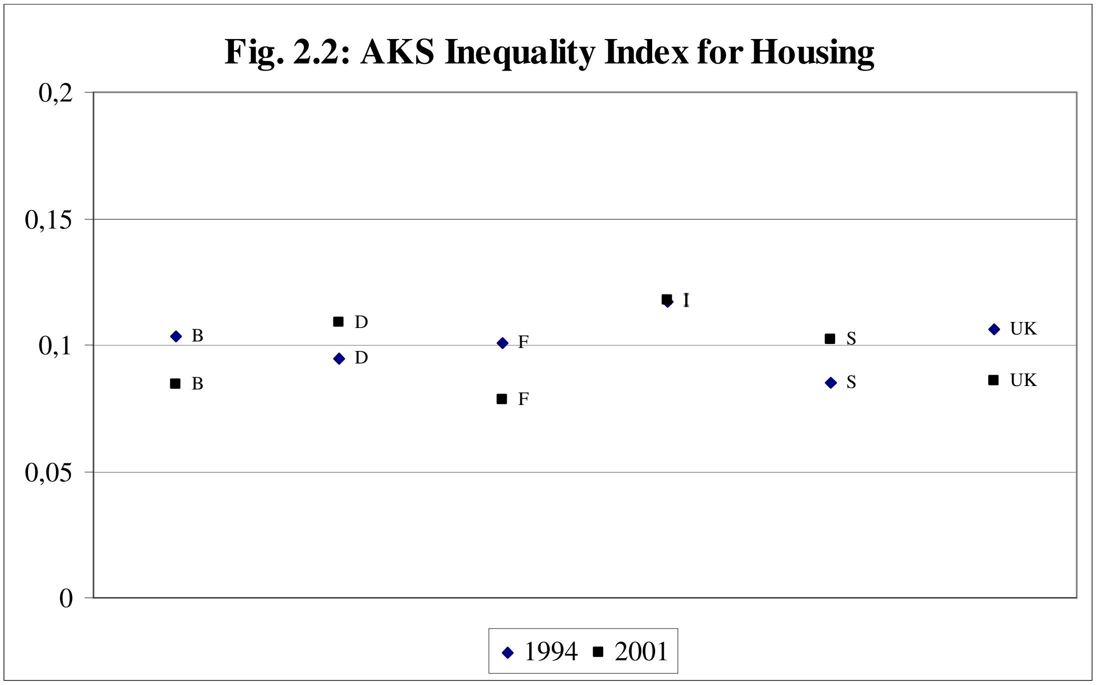

Fig. 2.2: AKS Inequality Index for Housing
0,2
0,15
0,1
0,05
0
B
D
F
I
S
UK
1994
2001

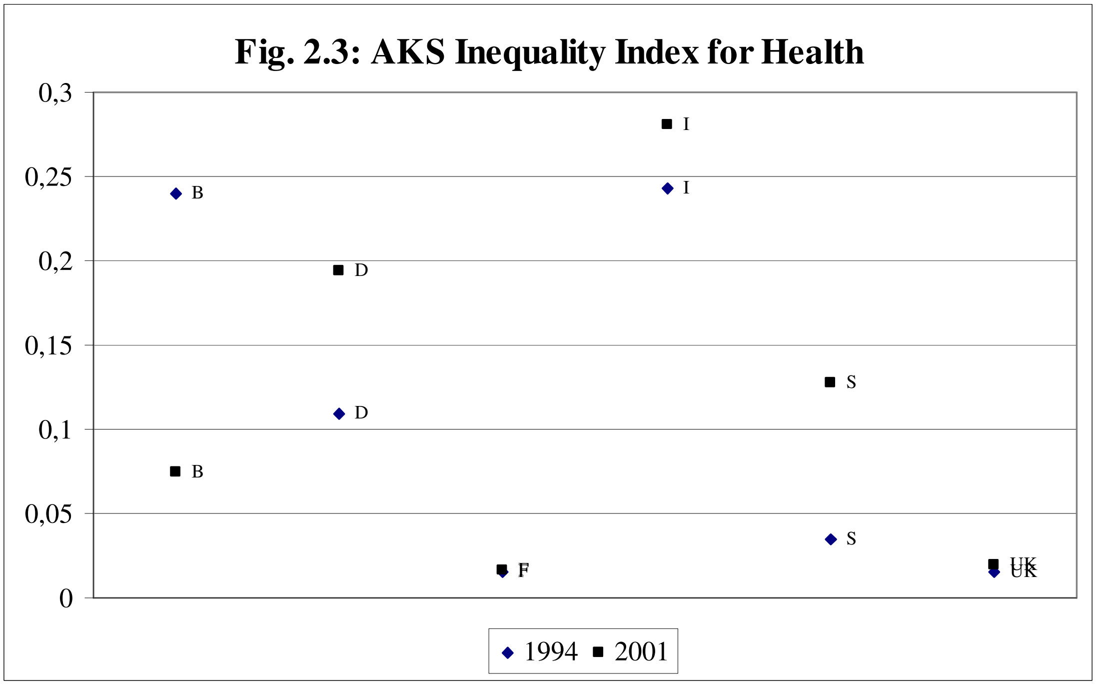

Fig. 2.3: AKS Inequality Index for Health
0,3
0,25
0,2
0,15
0,1
0,05
0
B
D
F
I
S
UK
1994
2001

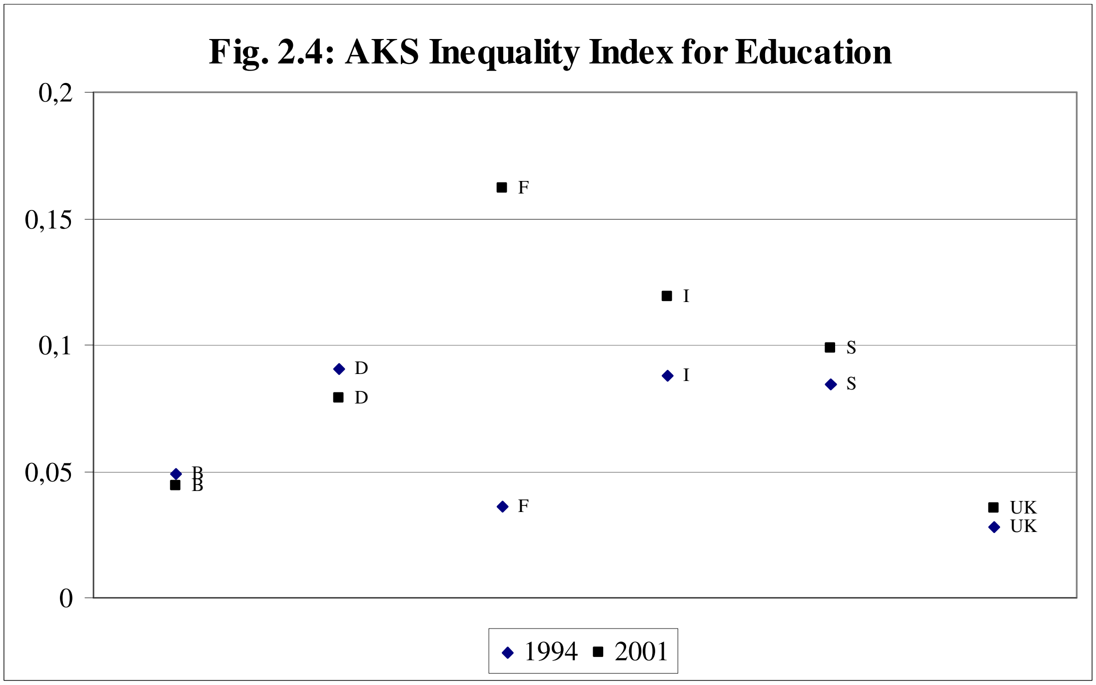
Fig. 2.4: AKS Inequality Index for Education
0,2
0,15
0,1
0,05
0
B
B
D
D
F
F
I
I
S
S
UK
UK
1994
2001

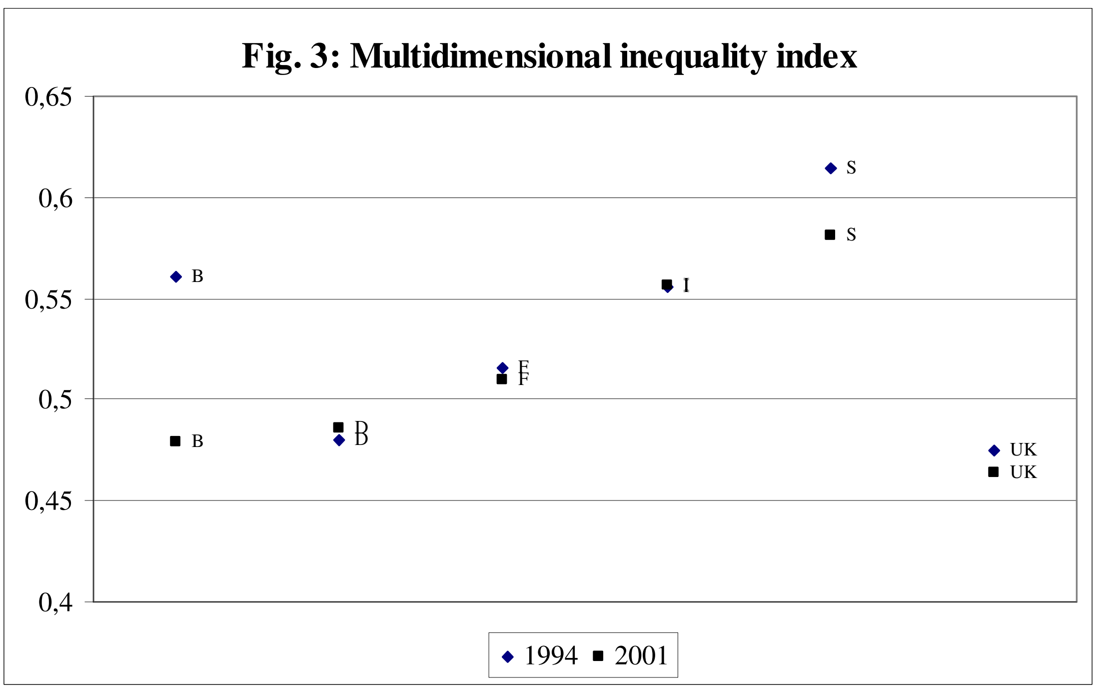
Fig. 3: Multidimensional inequality index
0,65
0,6
0,55
0,5
0,45
0,4
B
B
D
D
F
F
I
S
S
UK
UK
1994
2001