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ABSTRACT

The World Health Report 2000 proposed three fundamental goals for health systems encompassing population health, health care finance and health systems responsiveness. The goals incorporate both an efficiency and equity dimension. While inequalities in population health and health care finance have motivated two important strands of research, inequalities in responsiveness have received less attention in health economics. This paper examines inequality and polarisation in responsiveness, bridging this gap in the literature and contributing towards an integrated analysis of health systems performance. It uses data from the World Health Survey to measure and compare inequalities in responsiveness across 25 European countries. In order to respect the inherently ordinal nature of the responsiveness data, median-based measures of inequality and polarisation are employed. The results suggest that, in the face of wide differences in the health systems analysed, there exists large variability in inequality in responsiveness across countries.

1. Introduction

Evaluating the performance of health systems has received increased attention in the health economics literature and has become a fundamental tool for identifying the strengths and weaknesses of systems, appraising their evolution over time, aiding meaningful international comparisons and most importantly, informing evidence-based policy reform. The recent European Ministerial Conference on Health Systems, which culminated in the Tallin Charter (World Health Organization, 2008), illustrates the importance policy makers place on comparative analyses of health systems performance. Evaluating health systems, however, requires the definition of performance goals. The World Health Organisation's (WHO) framework for health system performance assessment, set out in the World Health Report 2000, is a landmark in this field. It identifies three health system goals: population health, fairness of financing, and responsiveness. The concept of responsiveness relates to a system's ability to respond to legitimate expectations about non-health enhancing and non-financial aspects of health care. As defined in Valentine et al. (2003) it broadly comprises the way in which health care users are treated and the environment in which they are treated, encompassing users' experience of contact with the health system. The concept covers eight dimensions of quality of care that reflect respect for human dignity and interpersonal aspects of the care process (Valentine et al., 2009). While conceptually responsiveness may be viewed as encompassing non-health enhancing aspects of interactions with health services, a responsive system may contribute to improvements in health by encouraging and facilitating individuals to seek care in a timely fashion, to be more open in their interactions with care providers, to assimilate health information more efficiently and to show greater compliance with treatment (Williams, 1994). Indeed, health system responsiveness has been described as "the vehicle by which technical care is implemented and on which its success depends" (Donabedian, 1980). In this way, the quality of provision of health care, which we interpret as incorporating the responsiveness of a system to patients' expectations and needs, is viewed as being interrelated with the health outcomes it achieves (Haddad et al., 1998). Indeed the link with health outcomes via access to care and compliance with treatment has been a strong driver in prompting greater patient satisfaction and increased responsiveness of health systems.

The World Health Report 2000 argues that the accomplishment of the goals for health, fairness of financing and responsiveness is only possible when efficiency and equity criteria are both fulfilled. Accordingly, it is not only average levels of health and responsiveness but, equally, the distribution of health and responsiveness that

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are of interest.[1] Analyses of inequalities in the first two goals, population health and health care finance, are the subject of two long established strands of research in the economics literature. For example, papers such as van Doorslaer and Wagstaff (1992), van Doorslaer et al. (1997, 2000), van Doorslaer and Koolman (2004), van Doorslaer and Masseria (2004) and Bago d'Uva et al. (2009) provide cross-country comparisons of inequalities in health and health care use. Analyses such as Wagstaff et al. (1989, 1999), Wagstaff and van Doorslaer (1992), and van Doorslaer et al. (1999), provide a body of evidence on inequalities in health care finance. However, for the third goal of responsiveness, the analysis of inequality has received very little attention.[2] This is of interest since inequalities in responsiveness may lead to inequality in access to health services preventing certain groups in society from seeking and receiving adequate care and/or care that is not used efficiently given a health condition. Low utilisation of some health services might be due to the low level of responsiveness of these services (Valentine et al., 2003).[3] This paper bridges the gap in the methodological and empirical literatures, contributing towards an integrated analysis of inequality across the WHO's three fundamental goals of health systems.

We explore individual-level data from the World Health Survey (WHS) to measure and compare inequalities in responsiveness across 25 European countries. This poses a fundamental methodological challenge, relating to the inherently categorical and ordinal nature of the 5-point scale used to measure responsiveness which ranges from *very bad* to *very good*. Zheng (2008) shows that only first order stochastic dominance can be used in ranking social welfare of ordinal data distributions. Given that all higher orders of stochastic dominance, such as generalised Lorenz dominance, have no additional power in ranking distributions, the use of mean-based measures of inequality is precluded. For example, the relative inequality indices used to measure health-related inequalities are generally mean-based and can only be applied to ordinal variables once these are converted to a cardinal scale. The problem is that different cardinal scales will change the value of these indices. Accordingly, when two or more ordinal distributions are compared in terms of relative inequality, different cardinal scales may bring about different inequality rankings (see for example, Kakwani, 1980; van Doorslaer and Jones, 2003; Allison and Foster, 2004; Erreygers, 2009).

In the case of inequalities in self-assessed health, which is typically measured on an ordinal scale, methods have been developed to make this transformation less arbitrary. For example, van Doorslaer and Jones (2003) employ external information on a cardinal health scale, the McMaster Health Utility Index Mark III, to re-scale the thresholds of an ordinal self-assessed health variable. In the case of responsiveness this kind of external information is not available hence inequality indices specifically developed for ordinal data are required.

In this paper, we make use of the family of inequality measures proposed by Abul Naga and Yalcin (2008), and is based on the Allison and Foster (2004) ordering, rendering them invariant to the numerical scale of the responsiveness variable. With the exception of a recent application to Irish self-assessed health data by Madden (2010), these indices have not been used in the applied health economics literature. Note that in using these indices we are comparing measures of pure inequality in responsiveness and not inequality relative to the distribution of economic resources, such as income, which has been popular in recent literature measuring inequality in health and health care (e.g. van Doorslaer and Koolman, 2004).

There may, however, be important distributional aspects not captured by traditional analyses of inequality. One of these is the existence of distinct peaks within a distribution and in general, relative inequality indices do not decrease as a population becomes less concentrated around one or more peaks. This phenomenon has been a concern in describing the evolution of income distributions where there has been a tendency away from a centrally located mass point towards peaks in the upper and lower tails of the distribution. The issue has motivated a growing literature on the concept of polarisation. Love and Wolfson (1976) introduced the concept of polarisation between two social groups, which prompted the development of bi-polarisation measures such as those proposed in Foster and Wolfson (2010), and Wolfson (1994, 1997). Esteban and Ray (1994, 1999) and Duclos et al. (2004) pioneered a different line of research focused on multi-group polarisation, and based on the concepts of within-group identification and between group alienation.[4] Within health economics, and following the strand of literature initiated by Foster and Wolfson (2010) and Allison and Foster (2004), Apouey (2007, 2010) proposed a specific measure of bi-polarisation for the case of self-assessed health. However, this is yet to find wide applicability in empirical work in this area.[5] In the context of responsiveness polarisation would imply the existence of a concentration of reporting around poles in its discrete distribution. While inequality measures do not distinguish between variation in outcomes in the upper and lower parts of the distribution, the concept of polarisation better reflects concerns over distinctly different experiences of health care services across the distribution. Polarisation therefore, consists of a distributional feature where there is an increasing demarcation between population sub-groups in the levels of responsiveness encountered when accessing health care services. In the extreme this would imply a segregation of individuals into those enjoying very high levels of responsive care and those receiving very low levels. This is likely to lead to large differences in access to appropriate levels of care and consequent impact on health. We complement our approach to inequality measurement with a comparison of the degree of polarisation in the distribution of responsiveness. This is based on the indices proposed in Apouey (2007), which are applicable to the specific case of an ordered response variable.

The results suggest that in the face of wide differences in the health systems analysed, inequalities in responsiveness vary substantially across countries complementing the considerable evidence indicating wide international disparities in inequalities affecting the two other health system goals: health and fairness in health care finance. Comparison with measures of health inequality derived using the same median based index employed here suggest that across the countries compared, inequalities in responsiveness are at least as great as those observed for health.[6] Comparison of the relative performance of countries when ranked by inequality

[1] In measuring overall attainment across these goals the WHO's index assigned the following weights to each goal: health level: 25%; health distribution: 25%; responsiveness: 12.5%; distribution of responsiveness: 12.5%; financial fairness: 25%.

[2] Deckovic-Vukres et al. (2007), Ortiz et al. (2003) and Valentine et al. (2009) have sought to investigate inequality in responsiveness. The measures of inequality utilized by these studies, however, are fairly limited.

[3] A framework that describes how responsiveness is linked to access to care via the care context and process is described in Valentine et al. (2009).

[4] The conceptual differences concerning the definition and measurement of polarisation are meticulously discussed in Bossert and Schworm (2008).

[5] In addition to Apouey's work, Contoyannis and Wildman (2007) compare the degree of polarisation in the distributions of the body mass index between England and Canada. To the best of our knowledge these are the only applications of the concept of polarisation in a health economics context.

[6] Note, however, that the WHO's performance assessment framework apportions half the weight to inequality in responsiveness as to inequality in health.

in responsiveness do not accord closely with those reported elsewhere for access to physician visits, suggesting further evidence is required on the link between responsiveness and access to health services.

2. Data and study design

2.1. The World Health Survey (WHS)

The WHS was launched by the WHO in 2001 and was aimed at strengthening national capacity to monitor critical health outputs and outcomes through the fielding of a valid, reliable and comparable household survey instrument (Üstün et al., 2003). The basic survey mode was an in-person interview, consisting of either a 90-min in-household interview (53 countries), a 30-min face-to-face interview (13 countries) or a computer assisted telephone interview (4 countries). Seventy countries participated in the WHS 2002–2003, and all surveys were drawn from nationally representative frames; this resulted in sample sizes of between 600 and 10,000 respondents across the countries surveyed.

In this paper we use data from 25 countries, encompassing most of Western, Central, and Eastern Europe and Russia. This choice of countries was made in order to ensure consistency with the bulk of the empirical literature on international comparisons of inequalities within the two goals of health attainment and health care financing, which is largely focused on European countries. Data collection was on a modular basis covering different dimensions of health and health systems, including information on health state valuation, health system responsiveness and health system goals. The dataset has undergone extensive quality assurance procedures, including the testing of the psychometric properties of the responsiveness instrument (Valentine et al., 2009), and close attention has been paid to the issue of comparability (Üstün et al., 2003).

2.2. Measures of responsiveness

The concept of responsiveness covers a series of non-clinical and non-financial domains of health care, which reflect respect for human dignity and interpersonal aspects of the process of care. Although the WHS responsiveness module gathers information for both inpatient and outpatient services, we have limited our focus to the former since the data on inpatient services is richer. The measurement of responsiveness was obtained by asking respondents to rate their most recent experience of contact with the health system within a set of eight domains by responding to set questions. The domains consist of "autonomy" (involved in decisions), "choice" (of health care provider), "clarity of communication" (of health care personnel), "confidentiality" (e.g. to talk privately), "dignity" (respectful treatment and communication), "prompt attention" (e.g. waiting times), "quality of basic facilities" and "access to family and community support". In the analysis that follows, we focus on four domains rated as the most important by survey respondents across the countries analysed. These are "clarity of communication", "dignity", "confidentiality" and "prompt attention". The following five response categories were available to respondents when rating their experience of health systems: *very good*, *good*, *moderate*, *bad*, and *very bad*. Responsiveness is thus viewed as a multidimensional concept with each of its domains measured on an ordinal scale.

3. Methods

3.1. Inequality in responsiveness: the Abul Naga–Yalcin index

As implied by Zheng (2008) and demonstrated by Allison and Foster (2004), an ideal measure of dispersion for ordinal data cannot be mean-based: mean-based measures require imposing a cardinal scale on the values taken by inherently ordinal variables, such as responsiveness. In order to circumvent this issue, Allison and Foster (2004) show that, under fairly general conditions, the cumulative distribution function (cdf) of an ordinal variable X displays more inequality than the cdf of Y if X can be obtained from Y though a series of median preserving spreads (i.e. if Y first order dominates X below the median and X first order dominates Y above the median). Accordingly, let X and Y represent two distributions of a variable with c ordered categories and median denoted by m, and let X_j and Y_j be the cumulative proportions of the population in each category j ($j = 1, \ldots, c$), in each distribution. Then X exhibits less inequality than Y if for all categories, $j < m$, $X_j \leq Y_j$ and for all $j \geq m$, $X_j \geq Y_j$. This principle provides a partial inequality ordering which is used by Abul Naga and Yalcin (2008) to propose a parametric family of inequality indices for ordinal data.[7]

For an ordered variable with c categories and median denoted by m, let P_j, be the cumulative proportion of the population in each category j. The Abul Naga–Yalcin inequality index is then defined as:

$$I_{\alpha,\beta} = \frac{\sum_{j<m} P_j^{\alpha} - \sum_{j\geq m} P_j^{\beta} + (c+1-m)}{k_{\alpha,\beta} + (c+1-m)}, \quad \alpha, \beta \geq 1$$

where $k_{\alpha,\beta} = (m-1)(1/2)^{\alpha} - [1-(c-m)(1/2)^{\beta}]$ is a normalisation to ensure that the index lies in the interval [0,1]. With ($\alpha = \beta$) inequality is at a minimum when everyone is in the same category and at a maximum when half of the population lies in the lowest category and half in the highest category. Different calibrations of the parameters α and β allow the researcher to give different weights to inequalities above and below the median of the responsiveness distribution – for higher values of $\alpha(\beta)$, less weight is given to inequalities below (above) the median. However, by design, the index can only be used to compare distributions with the same median category.[8] We apply this index both in the case of symmetry ($\alpha = \beta$) and, following the literature that attributes particular importance to inequalities affecting those at the bottom of the distribution,[9] in the case in which a greater weight is given to inequalities below the median responsiveness value ($\alpha = 1$, $\beta = 4$).

3.2. Polarisation in responsiveness

The analysis of median-based relative inequality measures may not capture all relevant aspects of the responsiveness distribution. One aspect about which inequality indices are not informative is polarisation. The concept of polarisation has become popular in economics and in particular in describing the evolution of what has been termed as the diminution of the middle class in wage and income distributions (Ercolani and Jenkins, 1998; Autor et al., 2006; Poggi and Silber, 2010). In broad terms, polarisation has been used to describe the disappearance of mass at the centre of a distribution (depolarisation) or the increase in distance and intensity between multiple points of modality over time or across

[7] This alternative way of evaluating distributions of ordered data operationalizes the approach by Allison and Foster (2004), and therefore is not affected by the impossibility result proved by Zheng (2008).

[8] This is analogous to mean-based indices of relative inequality such as the Gini coefficient and concentration index (see Kakwani, 1980).

[9] In the health economics literature this approach is taken, for example, in Wagstaff (2002) in order to reflect the importance of *poor-non-poor* health inequalities. In the case of responsiveness, the disadvantage suffered by those experiencing the poorest levels of responsiveness is of particular interest since it may lead to lack of access to health care and appropriate treatment.

distributions (see for example, Anderson, 2004).[10] Inequality measures are not well suited to describing such phenomena and while the literature is rich in polarisation measures the vast majority are applicable only to cardinal data. The polarisation index proposed in Apouey (2007), which was developed specifically for the case of self-assessed health, is median-based and therefore generally applicable to ordinal data such as those analysed here. Following Apouey (2007), polarisation in responsiveness is measured by:

$$P_I = 1 - \frac{2^\tau}{c-1}\sum_{c=1}^{c-1}\left|P_j - \frac{1}{2}\right|^\tau, \quad 0 \le \tau \le 1$$

where again c denotes the number of responsiveness categories and P_j is the cumulative proportion of category j in the population. The index lies in the interval [0,1]. The parameter τ measures the weight given to the median category: as τ approaches zero, the relative weight given to the median category increases, and the relative contribution of the other categories is reduced. Apouey (2007) defines *intermediate polarisation* as the polarisation exhibited by a uniform distribution which is in an intermediate position between minimum and maximum polarisation levels and uses this to propose a particular calibration of τ: depending on c, the number of categories, τ must be chosen such that P_I(Uniform distribution) = 1/2. According to this rule, Apouey (2007, p. 885) tabulates the proposed values for τ against the corresponding values for c – where there are five categories, it is suggested that $\tau = 0.73$. We have used this value for the calibration of this parameter.[11]

4. Results

Fig. 1 present plots of the frequencies of responsiveness in the domain dignity across eight example countries. These plots illustrate variability in levels of responsiveness – for example, for Greece approximately 50% of respondents rate responsiveness as *very good* while for Russia the corresponding figure is approximately 15%. Similarly while around 30% of respondents in Russia rate responsiveness as *moderate* or worse, this figure is less than 10% for Danish respondents.

Before considering the indices of inequality and polarisation we present the cumulative frequencies of reporting each of the five ordered categories for the domain dignity. This provides a descriptive analysis of the raw data, but also allows us to check for dominance as set out in Allison and Foster (2004) and based on a partial ordering obtained from a median-preserving spread of the distribution. The cumulative frequencies for the domain dignity are shown in Table 1. The countries are stratified into those with a median of *very good* (fifth category) and those with a median of *good* responsiveness (fourth category). Among the countries with a median of *very good*, partial orderings can be found – for example, Denmark displays greater inequality than Austria; Great Britain has greater inequality than Luxemburg and Sweden, and Greece has greater inequality than Austria, Luxemburg and Sweden. Similarly, for the group of countries with a median category of *good*, we observe dominance across pairwise comparisons.[12] However, for this group of countries there are multiple dominance comparisons and as might be expected when comparing across a large number of countries clear orderings of inequality measures are less apparent. While pairwise comparisons reveal some partial orderings within groups of countries it is difficult to generalise findings. This is unsurprising and, in the absence of a complete ordering, illustrates well the need for the type of inequality index developed by Abul Naga–Yalcin.

Table 1
Cumulative frequencies by country for domain Dignity.

Country	Median	Very bad	Bad	Moderate	Good	Very good
AUT	5	0.00	0.01	0.06	0.38	1
CZE	5	0.00	0.01	0.1	0.47	1
DNK	5	0.03	0.05	0.08	0.39	1
GBR	5	0.02	0.03	0.09	0.49	1
GRC	5	0.01	0.04	0.11	0.49	1
LUX	5	0.00	0.03	0.08	0.49	1
SWE	5	0.01	0.03	0.09	0.44	1
BEL	4	0.02	0.03	0.09	0.55	1
BIH	4	0.00	0.02	0.13	0.64	1
DEU	4	0.00	0.03	0.14	0.66	1
ESP	4	0.01	0.02	0.08	0.69	1
EST	4	0.00	0.03	0.14	0.64	1
FIN	4	0.01	0.02	0.09	0.51	1
FRA	4	0.03	0.05	0.14	0.52	1
HRV	4	0.01	0.04	0.3	0.65	1
HUN	4	0.01	0.04	0.15	0.52	1
IRL	4	0.01	0.02	0.21	0.54	1
ITA	4	0.02	0.06	0.27	0.74	1
LVA	4	0.02	0.07	0.2	0.64	1
NLD	4	0.00	0.02	0.1	0.65	1
PRT	4	0.00	0.02	0.17	0.81	1
RUS	4	0.01	0.05	0.32	0.87	1
SVK	4	0.02	0.05	0.18	0.72	1
SVN	4	0.02	0.04	0.17	0.7	1
UKR	4	0.02	0.07	0.4	0.9	1

Table 2 presents the inequality and polarisation indices across the four domains for each of the twenty-five countries considered. Due to the indices being comparable across countries that share the same median category, for each domain we present the set of countries where the median category is *very good* (5th category), followed by the set of countries for which the median category is *good* (4th category). For each, the rank across countries in inequality and polarisation is provided in parentheses. It is worth bearing in mind that we cannot compare the absolute values of the different indices for a particular country. The indices embody different assumptions about the relative importance placed on different parts of the distribution (for inequality indices) or different measures of the shape of a distribution (inequality versus polarisation). We can, however, compare the rankings across countries produced by the indices. Seven countries within the domain of dignity have a median category of *very good* responsiveness and eighteen corresponding to *good* responsiveness. For the three other domains far fewer countries report a median category corresponding to *very good* (three for clarity of communication, two for prompt attention, and one for confidentiality).

Inequality in responsiveness in the domain of dignity for the seven countries with a median category of *very good* ranges from 0.229 (Austria) to 0.325 (Greece). The corresponding polarisation measure ranges from 0.191 (Austria) to 0.295 (Greece). Both inequality and polarisation exhibit the same ranking implying that countries with higher inequality also have greater polarisation. The absolute values and ranking of countries when the inequality index

[10] While theoretically polarisation can accommodate the emergence of multiple peaks within a distribution, typically the empirical literature tends to consider only two.

[11] See Apouey (2007, pp. 885–888) for an exhaustive listing of this polarisation measure's statistical properties and for the sensitivity analysis of alternative parameterisations of τ.

[12] These comparisons are a direct application of the Allison and Foster (2004) principle and corresponds to testing for whether the responsiveness distribution of country A first order stochastically dominates that of country B below the (common) median, and for whether the responsiveness distribution of country B first order stochastically dominates that of A above the median.

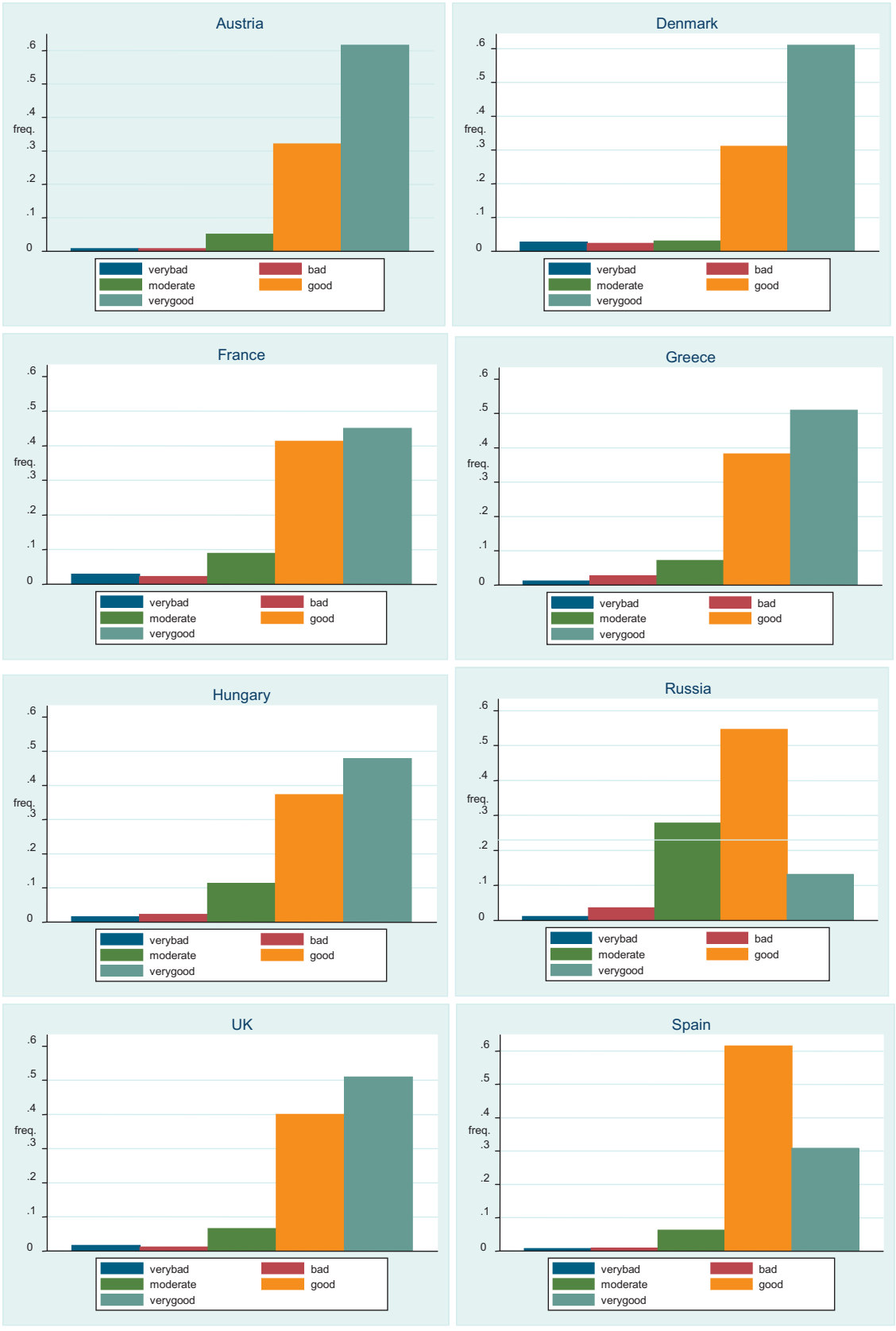

Fig. 1. Self reported responsiveness across eight countries for domain Dignity.

Table 2
Inequality and polarisation indices.

Dignity					Prompt attention					Confidentiality					Clarity of communication				
Country	m	$I_{\alpha,\beta}$		PI	Country	m	$I_{\alpha,\beta}$		PI	Country	m	$I_{\alpha,\beta}$		PI	Country	m	$I_{\alpha,\beta}$		PI
		$I_{1,1}$	$I_{1,4}$				$I_{1,1}$	$I_{1,4}$				$I_{1,1}$	$I_{1,4}$				$I_{1,1}$	$I_{1,4}$	
DNK	5	0.273 (6)	0.273 (6)	0.225 (6)	DNK	5	0.409 (1)	0.409 (1)	0.341 (1)	DNK	5	0.418 (1)	0.418 (1)	0.371 (1)	DNK	5	0.392 (1)	0.392 (1)	0.325 (2)
AUT	5	0.229 (7)	0.229 (7)	0.191 (7)	AUT	5	0.274 (2)	0.274 (2)	0.240 (2)	AUT	4	0.337 (12)	0.46 (9)	0.300 (6)	AUT	5	0.302 (3)	0.302 (3)	0.263 (3)
GBR	5	0.311 (2)	0.311 (2)	0.283 (2)	GBR	4	0.377 (4)	0.493 (5)	0.331 (3)	GBR	4	0.357 (6)	0.487 (5)	0.292 (9)	GBR	5	0.373 (2)	0.373 (2)	0.331 (1)
CZE	5	0.293 (4)	0.293 (4)	0.261 (4)	CZE	4	0.353 (10)	0.475 (12)	0.306 (6)	CZE	4	0.349 (8)	0.479 (7)	0.280 (11)	CZE	4	0.344 (7)	0.473 (5)	0.288 (7)
GRC	5	0.325 (1)	0.325 (1)	0.295 (1)	GRC	4	0.311 (17)	0.445 (15)	0.266 (16)	GRC	4	0.329 (13)	0.453 (10)	0.294 (8)	GRC	4	0.343 (8)	0.463 (9)	0.309 (3)
LUX	5	0.301 (3)	0.301 (3)	0.276 (3)	LUX	4	0.373 (6)	0.487 (8)	0.337 (2)	LUX	4	0.289 (19)	0.431 (14)	0.235 (17)	LUX	4	0.304 (15)	0.436 (14)	0.266 (11)
SWE	5	0.289 (5)	0.289 (5)	0.249 (5)	SWE	4	0.412 (1)	0.529 (1)	0.343 (1)	SWE	4	0.355 (7)	0.484 (6)	0.292 (10)	SWE	4	0.350 (4)	0.480 (3)	0.287 (8)
BEL	4	0.296 (8)	0.431 (8)	0.256 (7)	BEL	4	0.325 (15)	0.458 (13)	0.273 (15)	BEL	4	0.312 (14)	0.449 (11)	0.257 (14)	BEL	4	0.333 (10)	0.460 (10)	0.290 (5)
BIH	4	0.255 (15)	0.403 (13)	0.208 (14)	BIH	4	0.258 (23)	0.402 (19)	0.205 (23)	BIH	4	0.308 (15)	0.445 (12)	0.247 (15)	BIH	4	0.285 (17)	0.426 (15)	0.229 (17)
DEU	4	0.260 (13)	0.406 (10)	0.209 (12)	DEU	4	0.271 (22)	0.409 (18)	0.214 (21)	DEU	4	0.26 (21)	0.396 (19)	0.204 (21)	DEU	4	0.274 (19)	0.418 (16)	0.220 (18)
ESP	4	0.204 (17)	0.357 (15)	0.163 (17)	ESP	4	0.276 (21)	0.391 (20)	0.214 (22)	ESP	4	0.217 (23)	0.348 (23)	0.167 (23)	ESP	4	0.219 (21)	0.359 (19)	0.171 (21)
EST	4	0.264 (11)	0.411 (9)	0.215 (10)	EST	4	0.323 (16)	0.457 (14)	0.259 (17)	EST	4	0.292 (18)	0.419 (16)	0.230 (19)	EST	4	0.312 (13)	0.447 (12)	0.250 (15)
FIN	4	0.306 (7)	0.432 (7)	0.284 (5)	FIN	4	0.360 (9)	0.486 (9)	0.287 (13)	FIN	4	0.345 (11)	0.473 (8)	0.276 (13)	FIN	4	0.306 (14)	0.442 (13)	0.258 (14)
FRA	4	0.344 (3)	0.466 (3)	0.302 (2)	FRA	4	0.366 (8)	0.493 (6)	0.294 (9)	FRA	4	0.307 (16)	0.445 (13)	0.247 (16)	FRA	4	0.349 (5)	0.480 (4)	0.286 (9)
HRV	4	0.356 (1)	0.486 (1)	0.292 (4)	HRV	4	0.371 (7)	0.494 (4)	0.296 (7)	HRV	4	0.461 (1)	0.567 (1)	0.383 (1)	HRV	4	0.467 (1)	0.568 (1)	0.403 (1)
HUN	4	0.339 (4)	0.462 (5)	0.301 (3)	HUN	4	0.391 (3)	0.510 (3)	0.314 (5)	HUN	4	0.405 (2)	0.526 (2)	0.328 (3)	HUN	4	0.347 (6)	0.473 (6)	0.296 (4)
IRL	4	0.350 (2)	0.474 (2)	0.302 (1)	IRL	4	0.397 (2)	0.519 (2)	0.328 (4)	IRL	4	0.386 (3)	0.509 (3)	0.321 (4)	IRL	4	0.362 (2)	0.485 (2)	0.31 (2)
ITA	4	0.307 (6)	0.433 (6)	0.243 (8)	ITA	4	0.307 (18)	0.420 (17)	0.241 (18)	ITA	4	0.346 (9)	0.428 (15)	0.277 (12)	ITA	4	0.362 (3)	0.473 (7)	0.289 (6)
LVA	4	0.328 (5)	0.463 (4)	0.265 (6)	LVA	4	0.352 (11)	0.480 (10)	0.284 (14)	LVA	4	0.370 (4)	0.493 (4)	0.296 (7)	LVA	4	0.326 (11)	0.457 (11)	0.260 (13)
NLD	4	0.237 (16)	0.388 (14)	0.193 (16)	NLD	4	0.351 (12)	0.480 (11)	0.291 (11)	NLD	4	0.284 (20)	0.411 (17)	0.222 (20)	NLD	4	0.336 (9)	0.464 (8)	0.266 (12)
PRT	4	0.185 (18)	0.306 (18)	0.142 (18)	PRT	4	0.29 (19)	0.362 (22)	0.232 (19)	PRT	4	0.214 (24)	0.314 (24)	0.165 (24)	PRT	4	0.203 (22)	0.325 (22)	0.156 (22)
RUS	4	0.256 (14)	0.333 (17)	0.204 (15)	RUS	4	0.329 (14)	0.361 (23)	0.289 (12)	RUS	4	0.369 (5)	0.382 (20)	0.332 (2)	RUS	4	0.293 (16)	0.359 (20)	0.238 (16)
SVK	4	0.268 (10)	0.404 (12)	0.210 (11)	SVK	4	0.289 (20)	0.426 (16)	0.229 (20)	SVK	4	0.297 (17)	0.410 (18)	0.234 (18)	SVK	4	0.279 (18)	0.409 (17)	0.219 (19)
SVN	4	0.263 (12)	0.405 (11)	0.208 (13)	SVN	4	0.376 (5)	0.488 (7)	0.296 (8)	SVN	4	0.255 (22)	0.374 (21)	0.198 (22)	SVN	4	0.248 (20)	0.388 (18)	0.194 (20)
UKR	4	0.291 (9)	0.338 (16)	0.241 (9)	UKR	4	0.336 (13)	0.370 (21)	0.293 (10)	UKR	4	0.346 (10)	0.353 (22)	0.310 (5)	UKR	4	0.325 (12)	0.349 (21)	0.279 (10)

Note: m = median category; $I_{1,1}$ = symmetric inequality index with $\alpha = \beta = 1$ (rank within countries with same median in parenthesis); $I_{1,4}$ = inequality index less sensitive to the top of the distribution with $\alpha = 1$, $\beta = 4$ (rank within countries with same median in parenthesis); PI = polarisation index (rank within countries with same median in parenthesis).
Countries: AUT = Austria, BEL = Belgium, BIH = Bosnia and Herzegovina, CZE = Czech Republic, DEU = Germany, DNK = Denmark, ESP = Spain, EST = Estonia, FIN = Finland, FRA = France, GBR = Great Britain, GRC = Greece, HRV = Croatia, HUN = Hungary, IRL = Ireland, ITL = Italy, LVA = Latvia, LUX = Luxembourg, NLD = The Netherlands, PRT = Portugal, RUS = Russia, SVK = Slovakia, SVN = Slovenia, SWE = Sweden, UKR = Ukraine.
Note: An application of the hopit model results in the median category changing in a minority of countries: Dignity: Belgium and Finland from 4 to 5; Prompt Attention: Denmark and Austria from 5 to 4; Confidentiality: Denmark from 5 to 4; Clarity of communication: Denmark, Austria and Great Britain from 5 to 4.

is weighted away from the top of the distribution of dignity ($\alpha = 1$, $\beta = 4$) are equivalent to those derived from weighting the top and bottom of the distribution symmetrically ($\alpha = \beta = 1$). This is simply an artefact of the median value being the highest category of the distribution of dignity for this set of countries.

If we turn attention to the set of countries for which the median category for dignity is *good* (4th category) we find greater disparity in the inequality indices than when compared to the above seven countries. The inequality indices (with symmetrical weights) range from 0.185 (Portugal) to 0.356 (Croatia), while polarisation range from 0.142 (Portugal) to 0.302 (Ireland). When greater weight is placed on the lower part of the distribution, the inequality indices becomes larger ranging from 0.306 (Portugal) to 0.486 (Croatia). Hence inequality in Croatia is clearly greater than that observed in Portugal when symmetric weights are applied but this relativity diminishes considerably when weight is placed on the lower part of the distribution. Notably, the ranking of countries is very similar when using either weighting. Only two countries change rank by more than three places with Germany falling four places from 10th to 14th and Ukraine falling seven places in the relative rankings. Madden (2010) finds a similar result when applying the inequality index to data on the standard 5-category self-assessed health variable and reports, with one exception, no sensitivity to the choice of weighting parameter.[13] It is also notable that the polarisation index produces a very similar ranking to the inequality index when applying symmetric weighting. For dignity, fourteen countries retain their relative rank when comparing the two indices and only one country is greater than two places apart in the respective ranks.

Similar sets of results are observed for the domains of prompt attention, confidentiality and clarity of communication as for dignity. Broadly, while the absolute levels of the inequality and polarisation indices tend to be greater across these domains compared to dignity, for each domain the rank of countries by polarisation follows a similar pattern as those observed for inequality. Further, across all four domains a similar set of countries are placed high in the rankings and a similar set placed further down the rankings. Accordingly countries which perform well in one domain of responsiveness tend to perform well across other key domains.[14] Countries that appear to perform relatively well on these measures include Portugal, Spain, the Netherlands, Bosnia and Herzegovina, Germany and Russia.[15] Countries that appear to perform relatively poorly across the indices are Croatia, Ireland, Hungary and Great Britain.

Table 3 presents means of the measures of inequality and polarisation across countries for each of the four domains of responsiveness. These are presented separately by domains firstly for a set of countries that share the same median category (*good*) and secondly across all countries.[16] The results show that inequality and polarisation are lowest for the domain of dignity. For the other three domains, there is little difference in the measured indices with greatest inequality observed for prompt attention when equal weight is given to discrepancies above and below the median category. Polarisation is also marginally greater for prompt attention.

5. Discussion

The World Health Report 2000 proposed three fundamental goals for health systems encompassing population health, health care finance and health systems' responsiveness. Each goal incorporates both an efficiency and equity dimension. While inequalities in population health and health care finance have motivated two important strands of research, inequalities in responsiveness have received less attention. This paper contributes to the literature on health systems performance by examining inequality and polarisation in responsiveness in 25 European countries. Our results provide evidence of the magnitude of variations in health service performance. Across the four domains of responsiveness rated as being most important to respondents in the countries analysed we find variability in inequality ranging from 0.185 to 0.356 for dignity; 0.258 to 0.412 for prompt attention; 0.214 to 0.461 for confidentiality and 0.203 to 0.467 for clarity of communication. Our measures of polarisation similarly show variability ranging from 0.142 to 0.302 (dignity); 0.205 to 0.343 (prompt attention); 0.165 to 0.383 (confidentiality) and 0.156 to 0.403 (clarity of communication).

The majority of the health economics literature investigating inequalities in health and health care has relied extensively on the concentration index. This remains true when analysing self-reported measures of health status based on ordinal response scales (see van Doorslaer and Jones, 2003 for a discussion). The concentration index is a mean-based measure of socio-economic related inequality and is not comparable to the Abul Naga–Yalcin index adopted here. Accordingly, it is difficult to compare directly levels of inequality observed for health systems' responsiveness to those reported elsewhere for health and health care. It is also problematic to make comparisons to previous attempts to measure inequality in responsiveness as these have adopted different approaches. For example, Ortiz et al. (2003) converts the ordinal measures to a cardinal scale by deriving a latent measure of responsiveness for each domain and aggregating across the domains before applying the coefficient of variation; Valentine et al. (2009) compare the proportion of respondents reporting good or very good responsiveness across income quintiles for each domain; and in a similar way, Deckovic-Vukres et al. (2007), assess inequality by comparing levels of responsiveness across socio-economic groups.

To place these median based measures in context, we compare the indices derived for responsiveness to the limited literature that draws on empirical examples in explaining the theoretical and methodological development of the indices. Madden's (2010) illustration of the evolution of inequality in self-assessed health in Ireland over the years 2003–2006 is a useful starting point. The self-assessed health variable used is a five-category ordered variable (ranging from *very poor* to *very good* health) with the fourth category (*good*) being the median. The reported inequality index using symmetrical weights ranges from 0.356 in 2003 to 0.333 in 2006 with an average across the four years of 0.344. The corresponding range of inequality when greater weight is placed on the lower part of the distribution, ($\alpha = 1$, $\beta = 4$), is 0.478 (2003) to 0.466 (2006) with an average of 0.472. These figures are lower than the corresponding values for responsiveness for Ireland ($\alpha = \beta = 1$: dignity

[13] The reported exception is the case where $\alpha = 1$, $\beta = \infty$ such that virtually no weight is given to disparities above the median category (*good health*, corresponding to the 4th category). It should be noted, however, that in Madden's example comparison is made across four years of data, which is considerably less than the 25 countries reported here. Accordingly, we should expect greater variation in ranks across weighting parameters.

[14] There are exceptions to this – for example, France shows relatively low inequality for confidentiality but relatively high levels for dignity. Similarly, Latvia has relatively low inequalities for the domains prompt attention and clarity of communication, but high inequality for dignity and confidentiality. Given the health systems goals of reducing inequalities in responsiveness we interpret lower levels of inequality as good performance and high levels as representing poor performance.

[15] This is based on the rankings of countries alone and does not consider sampling variability in generating the rankings.

[16] Strictly, comparison should be made across countries with the same median category. But to generalise results and in view of the fact that for three of the domains three or less countries have a median that differs from the forth category, we also present results across all countries.

Table 3
Summary statistics for inequality and polarisation in responsiveness by domain.

	Countries with median category *good*				All countries			
	Inequality index		Polarisation	Number of countries	Inequality index		Polarisation	Number of countries
	$I_{\alpha,\beta}$		P_I		$I_{\alpha,\beta}$		P_I	
	$I_{1,1}$	$I_{1,4}$			$I_{1,1}$	$I_{1,4}$		
Dignity								
Mean	0.28	0.41	0.22		0.29	0.38	0.24	
Range: min	0.185	0.306	0.142	16	0.185	0.229	0.142	25
max	0.356	0.486	0.302		0.356	0.486	0.302	
Prompt attention								
Mean	0.34	0.45	0.26		0.34	0.44	0.28	
Range: min	0.258	0.361	0.205	23	0.258	0.274	0.205	25
max	0.412	0.529	0.343		0.412	0.529	0.343	
Confidentiality								
Mean	0.32	0.44	0.25		0.33	0.44	0.27	
Range: min	0.214	0.314	0.165	24	0.214	0.314	0.165	25
max	0.461	0.567	0.383		0.461	0.567	0.383	
Clear communication								
Mean	0.32	0.44	0.25		0.32	0.43	0.27	
Range: min	0.203	0.325	0.156	22	0.203	0.302	0.156	25
max	0.467	0.568	0.403		0.467	0.568	0.403	

0.350, prompt attention 0.397, confidentiality 0.386, communication 0.362; $\alpha = 1$, $\beta = 4$: dignity 0.474. prompt attention 0.519, confidentiality 0.509, communication 0.485). Similarly, Abul Naga and Yalcin (2008) present results for a measure of self-assessed health across seven areas of Switzerland again based on a five-point categorical variable ranging from *very poor* to *very good health* (median category = *good*).[17] The average level of inequality across the seven regions is: 0.208 ($\alpha = 1$, $\beta = 1$), and 0.334 ($\alpha = 1$, $\beta = 4$). These figures are lower than the corresponding means for the domains of responsiveness reported in Table 3.

Empirical examples of polarisation in self-assessed health from twelve waves of the British Household Panel Survey (BHPS) are provided by Apouey (2007). Once again the median category for the ordered variable is *good* health. The reported polarisation index ranges from 0.231 (1995) to 0.248 (1997).[18] Our measure of polarisation for responsiveness for Great Britain ranges from 0.283 (Dignity) to 0.331 (Clarity of communication). While caution should be exercised when making generalisations based on comparisons of only two countries (Ireland and Great Britain) these results suggest that inequality and polarisation in system responsiveness within countries may be at least as great as that observed for health.[19]

This paper makes use of the family of inequality measures proposed by Abul Naga and Yalcin (2008), based on the Allison and Foster (2004) ordering, together with a measure of bi-polarisation using an extension to ordered data proposed by Apouey (2007, 2010). While our measures of inequality and polarisation are not directly comparable, the results presented in Table 2 show that the rank correlations of the two measures are positive and high. Accordingly, countries exhibiting greater levels of inequality in responsiveness generally exhibit greater levels of polarisation. While there are some exceptions (for example, Austria in the domain of confidentiality is ranked twelfth out of twenty four ($\alpha = \beta = 1$) for inequality and sixth for polarisation; Ukraine is ranked tenth for inequality and fifth for polarisation), the similarity of the ranks of the countries across the two indices suggests that the informational content of the two measures, applied to the specific context of responsiveness and in these data, is similar. This result cannot, however, be generalised and clearly may not hold in other applications.

van Doorslaer and Masseria (2004) provide a comprehensive analysis of inequality in the use of various health care services and compare these across twenty-one countries within the Organisation for Economic Cooperation and Development (OECD). Data were mainly taken from the seventh wave (held in 2000) of the European Community Household Panel (ECHP), and where this was not possible, from country specific surveys.[20] Inequality in access and use of services was measured using the concentration index while a measure of horizontal inequity was based on the concentration index of the needs standardised distribution. These are provided separately for utilisation of physician care, general practitioner care, specialist care, hospital (inpatient) care and dental care. Inequality and inequity in both the total use and the probability of use were analysed. In Table 4 we present the set of inequality measures observed across countries for the four domains of responsiveness together with the inequality measures of the use and frequencies of specialist visits and hospital admissions provided by van Doorslaer and Masseria (2004). While the indices are not comparable the ranking of countries by the different indices can be compared.

The table presents the set of countries common to both our analysis and that of van Doorslaer and Masseria (2004) and for which the median category across all four domains of responsiveness was *good*. This results in a set of ten countries for which the ranks of inequality can be compared across the various indices. Health system responsiveness has been suggested as complementary to securing access to health services (see Valentine et al., 2009) through ensuring high quality care and satisfaction with the care

[17] Switzerland is not contained within the data analysed in our paper.

[18] Apouey (2007) computes the polarisation index for twelve years of data (1992–2004) and for a range of values of α. For comparison we report results using $\alpha = 0.73$.

[19] While these comparisons are useful in understanding observed levels of inequality and polarisation it is worth reiterating that inequality in responsiveness is assigned half the weight of inequality in health attainment by the WHO and accordingly for policy purposes carries less importance for performance assessment.

[20] In the data we report, Portugal, Spain, The Netherlands, Belgium, Finland, Italy and Ireland were taken from the ECHP. Hungary and France were taken from country specific surveys held in 2000, and Germany from the German Socio-Economic Panel (GSOEP) held in 2001.

Table 4
Country ranking of inequality.

Country	Dignity	Prompt attention	Confidentiality	Clarity of communication	Specialist visits		Hospital visits	
	Index, $I_{1,1}$	Index, $I_{1,1}$	Index, $I_{1,1}$	Index, $I_{1,1}$	Number	Prob	Number	Prob
Portugal (PRT)	10 (0.185)	8 (0.290)	10 (0.214)	10 (0.203)	1 (0.140)	2 (0.086)	3 (−0.192)	10 (−0.016)
Spain (ESP)	9 (0.204)	9 (0.276)	7 (0.292)	9 (0.219)	7 (−0.026)	5 (0.022)	5 (−0.168)	4 (−0.076)
The Netherlands (NLD)	8 (0.237)	5 (0.351)	8 (0.284)	5 (0.336)	4 (−0.051)	10 (−0.011)	7 (−0.158)	2 (−0.085)
Germany (DEU)	7 (0.260)	10 (0.271)	9 (0.260)	8 (0.274)	10 (−0.003)	6 (0.019)	8 (−0.059)	5 (−0.064)
Belgium (BEL)	6 (0.296)	6 (0.325)	5 (0.312)	6 (0.333)	6 (−0.031)	7 (0.017)	2 (−0.222)	1 (−0.141)
Finland (FIN)	5 (0.306)	4 (0.360)	4 (0.345)	7 (0.306)	2 (0.110)	1 (0.105)	4 (−0.17)	6 (−0.053)
Italy (ITA)	4 (0.307)	7 (0.307)	3 (0.346)	1 (0.362)	3 (0.072)	3 (0.071)	9 (−0.036)	9 (−0.024)
Hungary (HUN)	3 (0.339)	2 (0.391)	1 (0.405)	4 (0.347)	8 (−0.019)	8 (0.014)	6 (−0.16)	7 (−0.047)
France (FRA)	2 (0.344)	3 (0.366)	6 (0.307)	3 (0.349)	5 (0.037)	4 (0.034)	10 (−0.019)	8 (−0.037)
Ireland (IRL)	1 (0.350)	1 (0.397)	2 (0.386)	1 (0.362)	9 (0.005)	8 (0.014)	1 (−0.261)	3 (−0.081)

Note: Data on specialist and hospital visits are taken from van Doorslaer and Masseria (2004).
The parentheses show the Abul Naga–Yalcin index for the domains of responsiveness and the concentration index for specialist and hospital visits. These indices are not comparable.
Prob is the probability of any visit; number is the number of visits.

process which suggests that inequalities in responsiveness may be most closely aligned to inequalities in access to hospital admission and specialist visits. However, as can be seen in Table 4, while the four domains of responsiveness generally show a similar ranking of countries in terms of measured levels of inequality, these rankings bear little resemblance to those obtained through ordering countries on the basis of the concentration indices for inequality in access to health care. For example, income-related inequality, measured using the concentration index, shows greatest inequality in hospital admissions for Ireland, Belgium and Portugal and Ireland, Belgium and The Netherlands for the probability of an admission. France, Italy and Germany show the lowest levels of inequality in the number of visits and Portugal, Italy and France in the probability of an admission. Inequality for responsiveness exhibits a very different ranking of countries and while Germany displays relatively low levels of inequality across the four domains analysed, so does Portugal. In contrast, Hungary displays relatively high levels of inequality across the four domains of responsiveness but relatively low levels of inequality in access to specialist and hospital services. These data do not show a clear link between the ranks of countries based on inequality in responsiveness and based on access to health care. Further research might fruitfully consider how variations in responsiveness might translate to variations in access to health care services and how improvements in responsiveness might improve access, particularly for more vulnerable groups in society.

A potential issue when undertaking comparative analysis of self-reported survey measures of concepts such as responsiveness is that individuals in different socio-economic groups and countries may differ in the use of the available response scales. For a fixed (unobserved) level of responsiveness it is conceivable that individuals will report differently due to conceptions of health services, expectations of treatment, and general cultural influences. This has been termed reporting heterogeneity or differential item functioning, and has recently received attention in the literature (see Bago d'Uva et al., 2008; Kapteyn et al., 2007; Kristensen and Johansson, 2008; Rice et al., 2010). A method for adjusting for potential differential item functioning is to simulate outcomes by anchoring the reporting behaviour of individuals to some chosen benchmark. This is often achieved using what has been termed the hierarchical ordered probit (hopit) model which relies on having survey responses to a set of anchoring vignettes to identify differential reporting behaviour (King et al., 2004).

Using adjusted simulated predictions from the hopit approach, however, is problematic for inequality measurement since variations in simulated responses will, by construction, be less than that observed in the raw data. The extent to which this will impact on inequality measurement will depend on the plausibility of the model specification. In addition, Bago d'Uva et al. (2008), investigate the impact of reporting heterogeneity on the measurement of health disparities in Indonesia, India, and China. Their results suggest that while correcting for reporting heterogeneity tends to reduce slightly estimated disparities in health by education, and to increase those by income, overall the approach does not reveal substantial reporting bias in measures of health disparities. A preliminary analysis of responsiveness using the WHS data shows that the adjusted simulated responses from an application of the hopit model generally results in the same median category as that observed in the raw data, hence leaving the location of the responsiveness distribution unchanged (see note to Table 2). This suggests that any differences observed when adjusting for reporting behaviour compared to the raw data may be due more to model specification than to reporting behaviour per se. For these reasons we do not follow this approach in our application.

6. Conclusions

The World Health Organisation's framework for health system performance assessment places the concept of the responsiveness of a system alongside health and fairness of financing as a fundamental outcome. They argue that systems should strive not only to increase average levels of such outcomes but also to reduce observed inequalities. Health economists have made great strides in developing tools to measure inequalities and inequities in health, health care access and health care finance to aid comparison of health systems. For example, Wagstaff and van Doorslaer (1992), Wagstaff et al. (1999) and van Doorslaer et al. (1999) provide comparisons of equity in the finance of health care and its redistributive effects, van Doorslaer et al. (1997), van Doorslaer and Koolman (2004) and van Doorslaer and Masseria (2004) among others provide international comparisons of inequalities in health and health care. This paper complements this body of literature by extending inequality analyses to health care responsiveness, thereby contributing towards an integrated approach to assessing international comparison of health system goals. In so doing we have adapted a median-based measure of inequality better suited to the ordinal nature of the responsiveness measure than the standard approach to inequality measurement using the concentration index. The Abul Naga–Yalcin index has applicability beyond the outcomes used here and while the index, unlike the concentration index, does not directly capture the socio-economic dimension of inequality, it has the advantage of respecting the ordinality of data. As many population surveys contain self-assessed measures of general health status reported on an ordered categorical scale,

we believe the approach should also be considered as a measure of health inequality.

Our results suggest that inequalities in the responsiveness of health systems exist across a wide range of countries in Europe. The indices vary across countries, with, in general, countries of Northern Europe exhibiting greatest inequality and Southern European countries least inequality. This is the case across all four domains of responsiveness analysed. Further, in general, countries that perform poorly in one domain also perform poorly across other domains. Observed levels of inequality and polarisation of responsiveness appear to be at least as great as those observed for health. This comparison, however, is based on limited published information and requires further research. While the concept of responsiveness has been linked with access to appropriate care, our results indicate that, in practice, inequality in responsiveness does not show a clear link with inequalities in access to specialist or hospital care.

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