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Abstract
This paper investigates the influence of aggregate country-level characteristics on health system responsiveness, using data on 62 countries present in the World Health Survey. While evidence exists on variations in reported levels of health system responsiveness across countries, the literature is sparse on the determinants of responsiveness, particularly of system wide characteristics (World Health Report, 2000). We attempt to bridge this gap in the literature by considering simultaneously several plausible country-level characteristics as potential determinants of health system responsiveness. These characteristics refer to the way health care systems are organised and funded, the socio-demographic traits of the populations served and the economic, cultural and institutional characteristics of countries. We pay particular attention to the role of health care expenditures per capita while controlling for potential confounding factors. Data on responsiveness and socio-demographic characteristics of respondents are taken from the World Health Survey, a survey launched by the World Health Organization in 2001. Information on the country-level characteristics are obtained from the United Nations Development Program (UNDP), the World Value Survey and the Polity IV Project database. The empirical analysis is performed by adopting a two step procedure. First, we increase the cross-country comparability of the data by adjusting for variation in the way survey respondents rate an objective level of responsiveness using the hierarchical ordered probit (hopit) model. Secondly, we investigate the influence of health spending per capita and other country characteristics on the adjusted country-level measures of responsiveness. Our results suggest that the most relevant determinants of responsiveness appear to be health expenditure per capita, health care expenditure in the public sector and population levels of education.

Keywords: Health systems responsiveness; Anchoring vignettes; Health care expenditures.

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Introduction

Health system responsiveness has been identified as one of the intrinsic goals of health care systems, together with health outcomes and fairness of financial contributions (World Health Report 2000). Responsiveness relates to a system's ability to respond to the legitimate expectations of potential users about non-health enhancing aspects of care (Murray and Frenk, 2000) and in broad terms can be defined as the way in which individuals are treated and the environment in which they are treated encompassing the notion of an individual's experience of contact with the health system (Valentine et al. 2003a). The concept is operationalised through measurement across eight domains which aim to distinguish between aspects of health systems related to the rights of patients as human beings (e.g. domain of dignity) and aspects related to how the system meets the needs of patients as clients of the system (e.g. quality of health care facilities).

While there exists evidence on variation in reported levels of health system responsiveness across countries (Valentine et al. 2003b, Valentine et al. 2009, Sirven et al. 2008, Rice et al,. 2010a) there has been little investigation of the determinants of responsiveness, particularly of system wide characteristics (World Health Report, 2000). Of the few studies that do exist attention has focused on health care spending per capita revealing a positive association with responsiveness (World Health Report, 2000, Anderson and Hussey 2001). However, it has been argued that responsiveness is not just a matter of health spending, since some of its elements, such as the respectful treatment of patients, are almost costless to implement (World Health Report, 2000). In addition, characteristics such as institutional factors have been suggested as important determinants of whether a country's health system meets its citizens' expectations (Blendon et al. 2001, Azfar and Gurgur, 2008). This point appears to be corroborated by empirical evidence showing that a positive and significant relationship between health care

spending and responsiveness exists only for specific groups of countries and specific types of treatments (Valentine et al., 2003b, Valentine et al. 2009).

The paper investigates the influence of aggregate country-level characteristics on health system responsiveness, using data on 62 countries present in the World Health Survey (WHS). Potential determinants considered include the characteristics of health systems, the structure of the population served and the economic, cultural and institutional characteristics of countries. We pay particular attention to the role of health care expenditures per capita while controlling for potential confounding factors. Data on responsiveness in the WHS are self-reported and measured on an ordinal categorical scale. A common problem with such scales is that individuals when faced with the instrument are likely to interpret the meaning of the available response categories in a way that systematically differs across population or population sub-groups (Salomon et al., 2004). This compromises the comparability of data, particularly for cross-country analyses and has been termed differential item functioning (Kapteyn et al. 2007). To address this issue our empirical approach adopts a two step procedure. First we adjust for differential item functioning by making use of information on the set of anchoring vignettes available in the WHS and by applying the hierarchical ordered probit model (hopit: Tandon et al., 2003; Terza, 1985). This provides more comparable data purged of variation in reporting behaviour. Secondly, we investigate the potential influence of health spending per capita and other country characteristics on the adjusted country-level measures of responsiveness. Since our analysis is based on aggregate, country-level cross-sectional data, caution needs to be used in drawing strong inferences about causality from these results.

1) *Health system responsiveness and its potential determinants*

The concept of responsiveness as a measure of health system performance was developed and promoted by the World Health Organisation (WHO) and covers a set of non-clinical and

non-financial dimensions of quality of care that reflect respect for human dignity and interpersonal aspects of the care process (Valentine et al., 2009). Human rights include concepts such as respecting patient autonomy and dignity, while interpersonal aspects of care, or client orientation, focus on aspects that are commonly expressed as hotel facilities, for example, the quality of basic amenities. Increasingly, patients' views and opinions are being recognised as an appropriate source of information on non-technical aspects of health care delivery and the measurement of health system responsiveness has largely been based on surveys of user views. In principle, the concept of responsiveness covers both interactions with health services together with broader experiences and interactions with health systems, including, for example, health promotion campaigns, and public health interventions (Valentine et al., 2009). For the purpose of this analysis, we focus on the former where respondents are asked to rate their most recent (in the previous year) experience of contact with health services within each of eight domains. The concept of responsiveness is viewed as a multidimensional concept, with each domain measured on a categorical scale for which there is an assumed underlying latent representation.

We consider several plausible country-level characteristics as being potential determinants of health system responsiveness. These refer to the way health care systems are organised and funded, the socio-demographic characteristics of the populations served and the economic, cultural and institutional characteristics of countries.

In particular we focus on the role of health expenditures per capita which has been shown to have a positive relationship with responsiveness (World Health Report 2000, Anderson and Hussey 2001). However, responsiveness may not simply be a matter of the level of health spending: while some elements of responsiveness are likely to be costly (e.g. quality of facilities) other elements are not (e.g. dignity and communication), and may simply require a moderately increased level of training and awareness (World Health Report 2000, Blendon et al. 2001). Moreover, as indicated by Azfar and Gurgur (2008), an increase in funding for the health sector

does not necessarily lead to the provision of better services where institutions fail to function efficiently. Empirical evidence suggests that health care spending influences responsiveness differentially across countries and types of treatments (Valentine et al., 2003b, Valentine et al. 2009).

In addition to the level of health care funding we consider the proportion of total health care expenditures consumed by the public sector provision of care (from here on termed public sector health expenditure). Previous studies have attempted to explain the variation across countries in the share of publically provided health care (Epple-Romano 1996, Gouveia 1997), its redistributive impact (Besley and Coate 1991, Castro-Leal et al. 2000, Sahn and Younger 2000, O`Donnell et al. 2007) and the relative efficiency of public versus private provision (Besley and Gouveia 1994, Handson et al. 2008). Poutillard (2007), Bennet et al., (2005), Brugha et al. (1998), and Angelopoulou et al., (1998) have suggested that publicly funded health care is characterised by higher technical quality than privately funded provision. As far as responsiveness is concerned, it has been hypothesised that the quality of health services is contingent on market incentives. Since private providers are not usually subsidized by governments and depend on payments from clients, they will be more likely than public providers to meet patients' expectations about non-technical aspects of care (Andaleeb, 2000). This hypothesis appears to be supported by empirical evidence (Andaleeb, 2000; Angelopoulou et al., 1998).

The demographic structure of a population is generally considered a useful indicator of its health care needs and forms an important component of capitation formulae used to distribute health care resources (for example, see Rice and Smith, 2001, Smith et al. 2001, Gravelle et al. 2003). Concern over rising health care expenditures have further led to a debate about the relationship to age or proximity to death as the driving factor (i.e. Zweifel et al. 1999, Felder et al. 2000, Dow and Norton 2002, Seshamani and Gray 2004). The demands placed on a health

system will have implications for the resources available for non-health enhancing aspects of care, such as the responsiveness of the system to patients expectations and preferences and accordingly we account for the demographic structure of a population using the proportion of the population over the age of 65 years. Additionally, since it is likely that higher educated citizens will also demand more from health services including the way it responds to legitimate expectations of quality, we further include the population average level of education.

Further, responsiveness is expected to be greater in more economically developed countries due to an increased availability of human capital and better developed infrastructure (Valentine et al. 2009). We attempt to verify that countries at a more advanced state of economic development are characterized by more responsive health systems. We further include the level of inequality (via income inequality) within a country which has been found to be a determinant of health via for example, life expectancy (Vollmer and Ziegler 2009) as a potential determinant of health system responsiveness.

It has been suggested that the beliefs, values and social norms prevailing in a country influence the organizational culture present in health care organizations (Davies et al. 2000). The generic question of whether organizational culture impacts on performance has not been explored extensively (Davies et al. 2000), however, with regard to the health sector, it has been shown that cultural factors are important components for health systems' reforms leading to quality improvements (Marshall et al. 2002). We use a measure of beliefs, values and social norms derived via the World Values Survey (Inglehart and Welzel, 2005) as a plausible determinant of responsiveness. In addition we consider the political history of a country**.** Past political control will have important consequences for the way in which the health care sector is organized; for example, a past soviet system is likely to retain remnants of a highly centralised and planned public sector. Recent studies have shown that a stable democratic political system favours economic development (Gerring, et al. 2005, Persson and Tabellini, 2008) and we

hypothesize that countries with a long history of democracy are associated with higher levels of health systems responsiveness compared to those where democratic political processes have more recently been introduced.

2) *Data*

We make use of data from the World Health Survey (WHS). The WHS is an initiative launched by the World Health Organization in 2001 aimed at strengthening capacity to monitor health outputs and outcomes across countries through the fielding of a comparable household survey instrument (see Üstün et al., 2003). The basic survey mode was an in-person interview, consisting of either a 90-minute in-household interview (53 countries), a 30-minute face-to face interview (13 countries) or a computer assisted telephone interview (4 countries). In total, seventy countries participated in the WHS 2002-2003, and all of them, with the exception of Turkey, reported data on responsiveness. All surveys were drawn from nationally representative frames with known probability resulting in sample sizes of between 600 and 10,000 respondents across the countries surveyed. Samples have 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 inter-country comparability (Ustun et al., 2003).

The WHS responsiveness module gathers basic information on utilization for both inpatient and outpatient health services. In the analysis that follows we make reference only to inpatient services. 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. talk privately), “dignity” (respectful treatment and communication),

"prompt attention" (e.g. waiting times), "quality of basic facilities" and "access to family and community support".[1] We present analyses for the following six domains: *Dignity, Prompt Attention*, *Clarity of Communication, Choice, Confidentiality*, *Quality of Facilities.* [2] When rating their experience of contact with services the following categories were available to respondents: "very good", "good", "moderate", "bad", and "very bad". Definitions of these domains together with examples of the questions asked to survey respondents are provided in Figure 1. In addition to respondents' ratings of own contact with health services, the WHS contains a number of anchoring vignettes describing the experiences of hypothetical individuals within each of the eight domains. Respondents are asked to rate these vignettes using the same scale available when reporting their own experiences of health system responsiveness. Examples of vignette questions are presented in Figure 2. Information from the vignettes is used to anchor respondent reports to a common scale when comparing reported responsiveness across countries.

The WHS further contains information on respondent characteristics. We make use of age, gender, level of education and income. Level of education is a continuous variable measuring the number of years in education. Gender is a dummy variable coded 0 for women and 1 for men. Income is derived from a measure of permanent income based on information on the physical assets owned by households (Ferguson et al., 2003). We construct dummy variables to indicate the tertiles of the within-country distribution of household permanent income to which individuals belong. For the analysis presented here, the first income tertile is considered as the baseline category.

Information on the country-level determinants of responsiveness are obtained from the United Nations Development Program (UNDP). Cross-country data on health expenditures per capita, health expenditures in the public sector and total health expenditures relate to 2001 and are expressed in 1000 US$. Data regarding the demographic structure and aggregate level of education in a country also relate to 2001. The education index provided by the UNDP data is

scaled from 0 (the country with the lowest level of education) to 1 (country with the highest levels of education). All other countries have an index lying between these extremes. Country level income inequality is measured via the Gini index.[3] The index takes the value of 0 in the case of absolute equality and 100 in the case of absolute inequality. We rescale the index to lie between 0 and 1. The degree of economic development is measured through the GDP per capita in 2001, in US$. We compute a discrete variable to represent countries with less than the median level of GDP per capita (value of 0) and countries with greater than the median level (value of 1). [4] Countries with low GDP per capita are considered as the reference group.

To proxy the social norms and values prevailing in a country we make reference to the World Value Survey (Inglehart and Welzel 2005), which identifies a set of basic values common across countries. We focus on the Traditional/Secular dimension of cross-cultural variation which reflects the contrast between societies in which religion is considered as an important element of life and those in which it is not. We include a dummy variable to indicate whether a country is characterised by secular versus traditional values.

Information on a country's democratic history is provided by the Polity IV Project database, which offers information for 163 countries over the period 1800-2008 (http://www.systemicpeace.org/polity/polity4.htm). The Polity Score represents the level of democracy on a spectrum from 0 to 10 with 10 representing a fully democratic political system. We have computed an index of democratic history for each country as the average of the Polity Score over the last 35 years, divided by 10. Descriptive statistics for the set of explanatory variables of health system responsiveness at country level are presented in Table 1. Average health expenditures per capita is approximately 560 US$. There is, however, substantial variation across countries with a range of 3 to 2580 US$.

3) ***Empirical approach***

Data on responsiveness are usually self-reported and measured on an ordinal 5 point categorical scale, ranging from "very good" to "very bad". A common problem with such scales is that individuals, when faced with the instrument, are likely to interpret the meaning of the response categories in a way that systematically differs across populations or population sub-groups (for example, see Salomon et al., 2004). Accordingly, respondents' self-reports will not be comparable across populations if they do not correspond to the same underlying level of the responsiveness construct. This has been termed differential item functioning (Kapteyn et al. 2007). To address this issue we make use of information on the set of anchoring vignettes in the WHS that allow us to benchmark self reports of responsiveness to a common scale using what has been termed the hierarchical ordered probit model (hopit: Tandon et al., 2003; Terza, 1985). The approach allows us to enhance the cross-country comparability of the data prior to exploring the potential drivers of country level responsiveness. Accordingly, we adopt a two step procedure: first we control for differential item functioning using the hopit model and secondly we investigate the influence of health spending per capita and other country characteristics on the adjusted country-level measures of responsiveness.

Hopit model

The standard ordered probit model which is often used to model ordered categorical responses makes use of a set of constant thresholds applicable to all individuals to map responses on a latent scale to observed outcomes. For an ordered variable with c categories these can be represented as $\mu^0, \mu^1, \ldots, \mu^c$ with $\mu^0 = -\infty$ and $\mu^c = \infty$ and $\mu^{j-1} < \mu^j$ for $j = 1, \ldots, c$. Where the assumption of constant thresholds does not hold, estimates of the impact of explanatory variables on outcomes of interest will be biased. The hierarchical ordered probit model (hopit) developed by Tandon et al. (2003) (also see Terza, 1985) is an extension of the ordered probit model that

relaxes the restriction of constant thresholds by allowing these to vary across individuals. The method draws on the use of responses to a set of anchoring vignettes to provide a source of external information that facilitates the identification of the thresholds for respondent, *i*, as a function of covariates, z_i, such that $\mu_i^j = z_i\gamma^j$, with $\mu_i^0 = -\infty$, $\mu_i^6 = \infty$ and $\mu_i^{j-1} < \mu_i^j$ for $j = 1, \ldots, 6$. γ^j are parameters to be estimated. The idea is that since the vignettes are fixed descriptions of responsiveness in hypothetical situations, variation across respondents in their ratings of the vignettes can be used to identify differential item functioning and hence estimation of the parameters,γ^j. Note that in the above specification, the impact of the covariates is allowed to vary across thresholds such that it is greater at some levels of the ordered outcome than others – this has been termed non-parallel threshold shift (Jones et al., 2007).

The hopit model can be specified in two parts. The first part draws on the use of vignettes to identify the thresholds as a function of relevant characteristics – termed the *reporting behaviour equation*. The second part of the model - the *outcome equation* - maps individual socio-economic and other characteristics to underlying health system responsiveness while controlling for differences in reporting behaviour obtained through the first step:

$$R_i^* = W_i\beta + \varepsilon_i, \ \varepsilon_i|W_i \sim N(0,1)$$

where W_i represents a vector of regressors, including country dummy variables, predictive of outcomes (responsiveness) and β is a conformably dimensioned vector of parameters to be estimated.[5] R_i^* represents an unobserved latent variable and we assume that the observed categorical response, r_i, relates to R_i^* in the following way: $r_i = j$ if $\mu_i^{j-1} \leq R_i^* < \mu_i^j$, where μ_i^j are defined as above through the use of vignettes. Full details of the estimation method can be found,

for example, in King, et al. (2004); Kapteyn et al., (2007), Bago d'Uva et al., (2008), Rice et al. (2010a).

The use of vignettes to identify differential reporting behaviour relies on two assumptions. The first is response consistency. This assumes that individuals classify the vignettes in a way that is consistent with the rating of their own experiences of health system responsiveness. The second is vignette equivalence where it is assumed that "the level of the variable represented by any one vignette is perceived by all respondents in the same way and on the same unidimensional scale" (King et al., 2004; p.194).

We apply the hopit model across the pool of sixty-seven countries present in the WHS, by specifying a set of dummy variables for country of residence together with a set of respondent characteristics (age, gender, level of education and income).[6] The estimated country coefficients obtained from the responsiveness equation represent the mean level of responsiveness on a latent scale for each country. These estimates are purged of variation in reporting behavior and can be used as the regressand in the modelling of the potential determinants of responsiveness. Throughout Mexico is taken as the baseline country.[7]

Estimation of the characteristics of responsiveness

To investigate country-specific determinants of responsiveness we use an estimated dependent variable model (Lewis and Linzer, 2005) and regress the coefficients of the country dummy variables derived from the application of the hopit model on the country-level characteristics. The coefficients of the country dummies contain information on the relative levels of responsiveness present in countries controlling for differential item functioning. For example, if country A has a greater (positive) coefficient than country B, we can assume that the health care system in country A is more responsive than that in country B all other things being

equal. Hence we can exploit the variability in the coefficients of the country dummies in order to investigate the influence of country characteristic.

The model is first estimated on a pool of 62 countries.[8] The use of the estimated dependent variable model is likely to induce heteroskedasticity due to sampling variation in the estimated levels of country specific responsiveness (Lewis and Linzer, 2005). Accordingly, we apply Huber-White estimated standard errors (White, 1980). To investigate heterogeneity in the impact of regressors on responsiveness across different groups of countries, we stratify the countries into European and Non-European (25 and 37 countries respectively), and estimate the model separately on the two sub-samples. We also stratify the countries into low and medium HDI and high HDI countries (38 and 29 countries respectively). The HDI is a composite index of human development which combines indicators of life expectancy, educational attainment and income (United Nations Development Program, 2006). Grouping countries into more homogeneous groups aids analysis and interpretation of the results by facilitating comparison across countries that are more similar in their stage of social and economic development (for example, see Hollingsworth and Wildman, 2003).

4) **Results:**

All countries.

Table 2 presents the results of the application of the hopit model to correct for differential item functioning for the domain of *Dignity* which is chosen as an example. The table reports the coefficients and standard errors separately for the responsiveness equation and the reporting behaviour equation. For brevity we report only the coefficients of first ten of the countries in alphabetical order. For each country, the effects are significant in at least one of the four thresholds. This indicates that differential item functioning is present in the data and is associated with the country in which the respondent resides. Conditional on differential item functioning the

majority of the estimated coefficients on the country dummies in the responsiveness equation are significant. These coefficients reflect observed differences in the adjusted levels of responsiveness across countries relative to the baseline country of Mexico and are subsequently used as the regressand in the second step of the estimation procedure.

Table 3 reports the estimates obtained from regressing the coefficients of the country effects obtained through the hopit model on the country-wide determinants of responsiveness. Three different specifications are reported: column (1) includes health system and population socio-demographic characteristics; column (2) additionally includes measures of country wealth and its income distribution, while column (3) is a saturated model which includes the regressors of column (2) plus institutional factors. In this latter model the R^2 is higher for the domains *Dignity*, *Clarity of Communication*, *Confidentiality* and *Quality of Facilities* (between 54% and 64%), than for *Prompt Attention* (33%) and *Choice* (13%). Comparing across the three specifications for any particular domain it is noticeable that there are, in general, few large changes in the sign, magnitude and statistical significance of the coefficients of variables common to all models. This suggests that the regressors in specification (3) do not suffer from high collinearity and that we are able to estimate robustly the independent effect of each variable. Results of a link test for specification (3), shown in Table 3, also suggest that the functional form of the model is correctly specified.[9]

The results of the saturated model show that health care expenditure per capita has a positive association with responsiveness across all domains. The coefficients are significant with the exception of *Prompt attention* and *Choice*. Of other plausible determinants of responsiveness the proportion of health care expenditure in the public sector and population levels of education appear most relevant. For both, the related coefficients are statistically significant (at the 10% level or below), with the exception of the domain of *Dignity*. The percentage of health care expenditure in the public sector has a negative association in all domains. This result tends to

confirm previous literature suggesting that public sector services are less likely to respond to the preferences of users compared to private sector provision (Andaleeb, 2000; Angelopoulou et al., 1998). As expected, population levels of education are positively related to responsiveness. GDP per capita is consistently positively related to responsiveness but only attains statistical significance for the domain *Clarity of Communication*. The percentage of the population over 65 and country secular social norms and values generally appear negatively associated with responsiveness**,** while democratic history and income inequality mostly have a positive association. The coefficients of these regressors, however, fail to reach statistical significance.

Sub-group results

Table 4 reports, for each domain, results for the estimated coefficients and standard errors for the saturated model estimated separately for European and Non-European countries.[10] In estimating these models we are reliant on small samples (25 European and 37 non-European countries) which have implications for the precision of the estimated relationships. Accordingly, we should be cautious in drawing inferences from the results, particularly for the set of European countries. Within these country groupings health care expenditure per capita generally continues to be positively associated with responsiveness, with the exception of *Prompt Attention* and *Choice* for Low and Medium HDI countries. For Non-European countries education is positively associated with responsiveness in five domains and statistically significant in three of the six domains. As before we observe a negative relationship with the percentage of health care consumed in the public sector across all domains, which obtains statistical significance in four domains. The consistency of results across domains suggests that this characteristic is important for Non European countries. For democratic history, no consistent pattern across the two groups of countries and domains is apparent; however, this regressor appears to be positively associated with responsiveness in a large number of cases.

We also estimate saturated model on countries stratified into two groups according to their level of the HDI Index, results for which are presented in Table 5.[11] Adopting this stratification, the coefficients of health care expenditures per capita continue to have a positive sign, with the exception of *Prompt Attention* for Low and Medium HDI countries. The relationship between education and responsiveness follows a similar pattern to that observed for European and Non-European countries. The percentage of health care consumed in the public sector appears to have a negative association with responsiveness for all domains and for both high HDI and low-medium HDI countries, with the exception of *Choice* for high HDI countries.

5) **Conclusions**

This paper investigates the potential influence of aggregate country-level characteristics on health system responsiveness, using data on 62 countries present in the World Health Survey. While there exists evidence on variation in reported levels of health system responsiveness across countries (Valentine et al. 2003b, Valentine et al. 2009, Sirven et al. 2008, Rice et al,. 2010a) there has been little investigation of the potential determinants of responsiveness, particularly of system wide characteristics (World Health Report, 2000). To our knowledge no other study exists that considers simultaneously several plausible country-level characteristics as being potential determinants of health system responsiveness. Other studies have considered only bivariate associations between health care spending per capita and responsiveness (World Health Report, 2000, Anderson and Hussey 2001, Valentine et al., 2003b, Valentine et al. 2009) and do not control for other potential influences. Moreover, the majority of those studies rely on data that are not as extensive as those offered by the WHS and do not consider the issue of country-level differences in the reporting of responsiveness (differential item functioning) which arises when dealing with self-reported survey data.

The country-level characteristics considered as potential determinants of health system responsiveness refer to the way health care systems are organised and funded, the socio-demographic characteristics of the populations served and the economic, cultural and institutional characteristics of countries. We pay particular attention to the role of health care expenditures per capita while controlling for potential confounding factors. In order to address the issue of differential item functioning we make use of information on the set of anchoring vignettes that allow us to benchmark self reports of responsiveness to a common scale using the hopit model. Accordingly, we adopt a two step procedure: after correcting for differential item functioning using the hierarchical ordered probit model we investigate the influence of health spending per capita and other country characteristics on levels of responsiveness that have been made cross-country comparable by controlling for systematic differences in reporting behaviour. Health expenditure per capita has a positive association with responsiveness across all domains, and its effect is statistically significant for the majority. The other relevant determinants of responsiveness appear to be health care expenditure in the public sector and population levels of education. These variables appear to have a negative and positive association with responsiveness, respectively.

To investigate heterogeneity in influences on responsiveness, we stratify countries into European and Non-European and according to the Human Development Index. Grouping countries into more homogeneous groups allows comparison across countries that are more similar in their stage of social and economic development which aids interpretation of results. This is, however, at the cost of relying on small sample sizes. In general, health care expenditure per capita continues to be positively associated with responsiveness across countries within these sub-groups.

We are cautious in drawing strong inferences about causality from this study. However, the results are plausible and indicate that levels of responsiveness are likely to be positively related

to a country's level of health spending and its educational development. Equally, the negative association with public sector spending is consistent with the hypothesis that private markets for health care generate improved levels of responsiveness as market participants seek to attract patients. We therefore tentatively suggest that policy makers seeking to enhance responsiveness levels might consider sharpening some elements of choice and competition within their systems. However, such experiments should be implemented and evaluated carefully, as there are likely to be numerous other consequences of such reforms.

[1] The long-form questionnaire uses two questions items per domain, while the short-form questionnaire uses only one. We use the eight items that are common to both the long and short form questionnaire.

[2] It has not been possible to perform the analysis on *Autonomy* and *Social Support* due to convergence problems in estimating the hopit model to adjust for reporting behaviour.

[3] In our analysis we use the average of the Gini coefficient across the years 1992-2007, as reported in the Human Development Report 2009.

[4] We use GDP per capita as a dummy variable due to high collinearity between the original continuous variable and health care expenditure per capita (the coefficient of correlation is 0.95).

5 Since model identification is secured through the use of the set of anchoring vignettes, W_i can be specified to be equivalent to Z_i. This contrast with the related generalized ordered probit model where identification is secured through imposing exclusion restrictions on the set of covariates, W_i, in the outcome equation.

[6] We exclude Australia and Norway since data on some of the key domains are not available for these countries.

[7] Mexico is chosen as the baseline due to the large sample size for this country compared to other countries.

[8] Mauritius, Morocco, Sri Lanka, United Arab Emirates and Tunisia are excluded due to missing data on key variables.

[9] The link test is undertaken by performing an auxiliary regression of the dependent variable on the linear prediction from the estimated regression function and its squared value. The test is based on the coefficient for this second term: if significant then the linearity assumption of the original model is likely to be misspecified (Pregibon, 1980).

[10] We do not include in this specification the dummy variable "secular values" since its inclusion would create identification problems, given that the vast majority of European countries appear to be characterized by these values.

[11] Again, as with the stratification by European and non-European countries, the estimates are based on low sample sizes and caution is warranted in drawing strong conclusions from these estimates.

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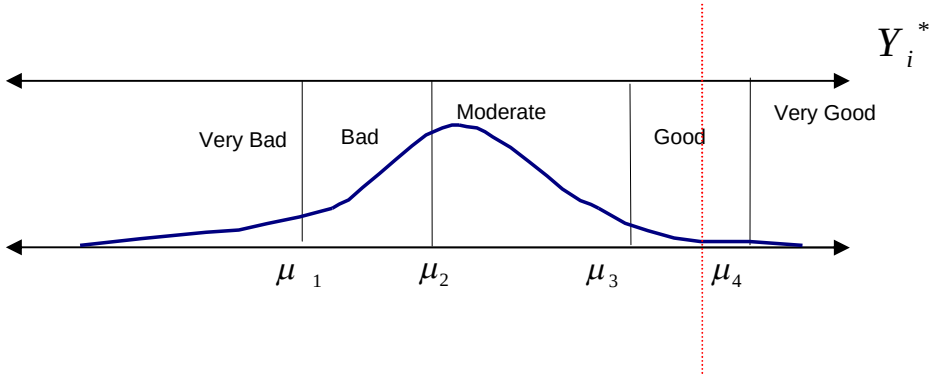
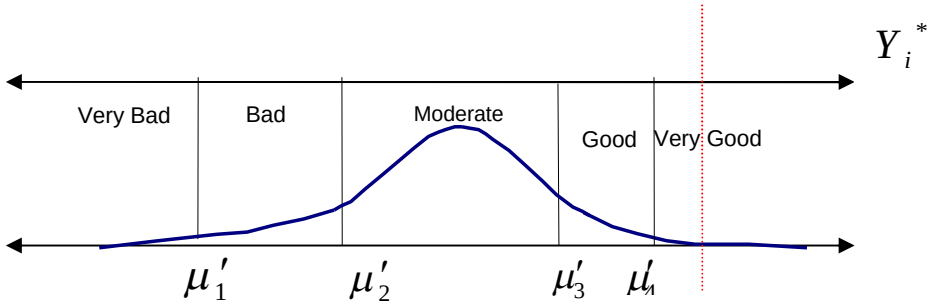
Appendix 1: Illustration of reporting heterogeneity

Differential reporting behaviour can be shown diagrammatically with the following example

Country A



Country B



NOTE:

Y_i^* = latent (and unobservable) possible levels of responsiveness
μ = cut points that divide two different response categories
Red vertical line = (unobservable) level of responsiveness experienced by individual in every country

Assume individuals in country A and country B are asked to rate the responsiveness of their health systems according to the scale ranging from "very bad" to "very good" and assume individuals within a country have the same reporting behaviour. The thresholds (μ) in the figure represent the points that divide the available response categories. Reporting heterogeneity results in respondents in country A applying a different set of thresholds to the underlying latent construct compared to respondents in country B. A casual inspection of the ratings in the two countries would suggest that individuals in country A face poorer health system responsiveness compared to individuals in country B (for example, the proportion of individuals reporting "very good" responsiveness is less in country A than in country B). However, both groups face the same underlying level of responsiveness as depicted by the solid vertical line. Anchoring the location of the thresholds to a common scale is fundamental to comparative analysis across the two countries. The challenge is to model the positioning of the thresholds as functions of observed characteristics of the relevant populations and use this information to benchmark a comparison to a chosen threshold scale. A situation in which the effect of a given characteristic, such as educational attainment, applies equally across all thresholds is termed parallel cut-point shift. More commonly, where the effect of a characteristic varies across thresholds, this is termed non-parallel cut-point shift.

Figure 1: Domains of responsiveness

The eight domains of responsiveness defined by the WHO are as follows (see Valentine et al., 2003a for a full exposition of these domains):

- *Autonomy:* respect of patients' views of what is appropriate and allowing the patient to make informed choices;
- *Choice:* An individual's right or opportunity to choose a health care institution and health provider and to secure a second opinion and access specialist services when required;
- *Clarity of communication:* Clear explaination to patients and family the nature of the illness, details of treatment and available options;
- *Confidentiality of Personal Information:* privacy in the environment in which consultations are conducted and the concept of privileged communication and confidentiality of medical records;
- *Dignity:* the ability of patients to receiving care in a respectful, caring, and non-discriminatory setting;
- *Prompt attention:* the ability to access care rapidly in the case of emergencies, or readily with short waiting times for non-emergencies;
- *Quality of basic amenities:* the physical environment and services often referred to as "hotel facilities", including clean surroundings, regular maintenance, adequate furniture, sufficient ventilation, enough space in waiting rooms etc;
- *Access to family and community support:* the extent to which patients have access to their family and friends when receiving care and the maintenance of regular activities (e.g. opportunity to carry out religious and cultural practices).

Example questions used in the WHS to measure responsiveness include:

- *Autonomy*: How would you rate your experience of being involved in making decisions about your health care of treatment?
- *Choice:* How would you rate the freedom you had to choose the health care providers that attended to you?
- *Communication:* How would you rate your experience of how clearly health care providers explained things to you?
- *Confidentiality:* How would you rate the way your personal information was kept confidential?
- *Dignity:* How would you rate the way your privacy was respected during physical examinations and treatments?
- *Quality of basic amenities:* How would you rate the cleanliness of the rooms inside the facility, including toilets?
- *Prompt attention:* How would you rate the amount of time you waited before being attended to?
- *Access to family and friends:* How would you rate the ease of having family and friends visit you?

The above provide examples only and not an exhaustive list of questions for each domain. The response categories available to respondents were "very good", "good", "moderate", "bad" and "very bad".

Figure 2: Examples of vignette questions used in the WHS

Respectful Treatment

[Anya] took her baby for a vaccination. The nurse said hello but did not ask for [Anya's] or the baby's name. The nurse also examined [Anya] and made her remove her shirt in the waiting room.

Q1: How would you rate her experience of being greeted and talked to respectfully?

Q2; How would you rate the way her privacy was respected during physical examinations and treatments?

Communication

[Rose] cannot write or read. She went to the doctor because she was feeling dizzy. The doctor didn't have time to answer her questions or to explain anything. He sent her away with a piece of paper without telling her what it said.

Q1: How would you rate her experience of how clearly health care providers explained things to her?

Q2: How would you rate her experience of getting enough time to ask questions about her health problem of treatment?

Confidentiality

[Simon] was speaking to his doctor about an embarrassing problem. There was a friend and a neighbour of his in the crowded waiting room and because of the noise the doctor had to shout when telling [Simon] the treatment he needed.

Q1: How would you rate the way the health services ensured [Simon] could talk privately to health care providers?

Q2: How would you rate the way [Simon's] personal information was kept confidential?

Quality of Basic Amenities

[Wing] had his own room in the hospital and shared a bathroom with two others. The room and bathroom were cleaned frequently and had fresh air.

Q1: How would you rate the cleanliness of the rooms inside the facility, including toilets?

Q2: How would you rate the amount of space [Wing] had?

Note that the above provide examples only and not an exhaustive list of possible vignettes for each domain. The response categories available to respondents were "very good", "good", "moderate", "bad" and "very bad".

Table 1: Descriptive statistics on the country variable potentially influencing health system responsiveness

	n. obs	mean	st.dv	min	max
health expeditures per capita	66	0.561	0.821	0.003	2.852
percentage public exp over total exp	66	0.531	0.212	0.06	0.90
percentage population over 65	67	0.088	0.058	0.01	0.20
education index	67	0.783	0.208	0.23	0.99
corruption index	67	0.438	0.224	0.14	0.94
HIGH gdp	67	0.507	0.504	0	1
gini coefficient	63	0.395	0.100	0.25	0.74
secular values	67	0.433	0.499	0	1
democratic history	67	0.494	0.357	0	1
full democracy	67	0.313	0.467	0	1

Table 2: coefficients and standard errors for the responsiveness equation and the reporting behaviour equation of the HOPIT model (first step of the estimation procedure) for the domain "Dignity", for the pool of countries

	responsiveness equation		**reporting behaviour equation**							
			1st cut-point		**2nd cut-point**		**3rd cut-point**		**4th cut-point**	
	Coef.	*Std. Err.*	*Coef.*	*Std. Err.*	*Coef.*	*Std. Err.*	*Coef.*	*Std. Err.*	*Coef.*	*Std. Err.*
dumI2	0.02	0.01	0.04	0.01	0.01	0.01	-0.01	0.01	-0.02	0.01
dumI3	0.09	0.01	0.07	0.01	0.02	0.01	-0.02	0.01	-0.06	0.01
female	0.03	0.01	0.03	0.01	0.02	0.01	0.00	0.01	0.00	0.01
age_yrs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
edu_yrs	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00
ARE	0.11	0.06	-0.01	0.05	-0.05	0.04	0.06	0.04	-0.43	0.04
AUT	0.18	0.07	0.06	0.08	-0.19	0.06	-0.14	0.06	-0.62	0.06
BEL	0.42	0.08	0.67	0.07	0.47	0.07	0.38	0.07	-0.03	0.07
BFA	-0.09	0.04	0.21	0.04	0.21	0.03	0.18	0.03	-0.13	0.04
BGD	-0.19	0.04	0.08	0.03	-0.04	0.02	0.10	0.02	-0.22	0.02
BIH	-0.04	0.06	0.17	0.05	-0.06	0.04	-0.01	0.04	-0.43	0.04
BRA	0.20	0.03	0.48	0.02	0.22	0.02	0.08	0.02	-0.25	0.02
CHN	0.07	0.04	-0.45	0.04	0.03	0.03	0.39	0.03	0.17	0.03
CIV	-0.11	0.05	0.16	0.04	0.26	0.04	0.33	0.04	-0.02	0.04
COG	-0.05	0.07	0.21	0.07	0.43	0.06	0.57	0.06	-0.10	0.06

Table 3: OLS estimates of the influence of all country-specific variables on health system responsiveness

	Dignity			Prompt Attention			Clarity of Communic.		
variables	1	2	3	1	2	3	1	2	3
	b/se	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*
health exp. per capita	0.228***	0.219***	0.206***	0.038	0.035	0.046	0.150***	0.115**	0.106*
	0.046	0.05	0.058	0.044	0.049	0.057	0.039	0.04	0.045
% public exp. over total	-0.204	-0.28	-0.279	-0.432*	-0.539**	-0.572**	-0.322*	-0.467**	-0.452**
	0.155	0.143	0.15	0.187	0.182	0.183	0.157	0.138	0.14
% population over 65	-0.009	-0.003	-0.005	-0.007	0.001	-0.005	-0.006	-0.005	-0.003
	0.007	0.011	0.013	0.009	0.01	0.009	0.008	0.009	0.012
education index	0.528**	0.355	0.354	0.730**	0.649**	0.571*	0.941***	0.724**	0.758*
	0.187	0.214	0.22	0.218	0.24	0.266	0.241	0.266	0.286
high gdp		0.074	0.063		-0.025	0.013		0.213**	0.193*
		0.065	0.075		0.083	0.094		0.077	0.083
GINI index		0.352	0.306		0.18	0.353		0.108	0.018
		0.312	0.329		0.269	0.313		0.316	0.336
secular values			0.006			0.121			-0.051
			0.101			0.092			0.118
democratic history			0.059			-0.032			0.033
			0.113			0.128			0.104
constant	-0.355**	-0.395**	-0.384**	-0.392**	-0.397*	-0.394*	-0.929***	-0.815***	-0.812***
	0.118	0.128	0.135	0.146	0.174	0.169	0.143	0.191	0.195
r2	0.509	0.544	0.546	0.262	0.315	0.334	0.569	0.633	0.636
N	66	62	62	66	62	62	66	62	62
link test			*p-values*			*p-values*			*p-values*
hat			0.000			0.000			0.000
hat^2			0.904			0.306			0.633

Notes: Robust standard errors; *** p<0.01, ** p<0.05, * p<0.1.

Table 3: (cont.)

	Confident.			Quality of Facilities			Choice		
variables	1	2	3	1	2	3	1	2	3
	b/se	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*
health exp. per capita	0.169***	0.159***	0.140**	0.321***	0.282***	0.275***	0.111	0.078	0.111
	0.036	0.036	0.04	0.06	0.064	0.075	0.104	0.108	0.125
% public exp. over total	-0.178	-0.317*	-0.301*	-0.422	-0.658*	-0.637*	-0.592*	-0.634*	-0.624*
	0.146	0.137	0.14	0.287	0.271	0.268	0.289	0.286	0.295
% population over 65	-0.01	0.001	0.002	-0.019	-0.014	-0.01	-0.003	-0.001	0.005
	0.008	0.008	0.008	0.013	0.011	0.012	0.013	0.014	0.017
education index	0.608***	0.446*	0.484*	1.073**	0.900*	0.950*	0.506	0.488	0.515
	0.17	0.18	0.207	0.38	0.416	0.451	0.262	0.263	0.292
high gdp		0.045	0.015		0.173	0.149		0.04	0.059
		0.068	0.079		0.086	0.1		0.12	0.127
GINI index		0.342	0.21		-0.015	-0.122		0.103	0.176
		0.309	0.349		0.604	0.64		0.512	0.603
secular values			-0.052			-0.076			-0.056
			0.087			0.12			0.14
democratic history			0.078			0.017			-0.158
			0.097			0.138			0.227
constant	-0.598***	-0.638***	-0.628***	-0.952***	-0.795*	-0.797*	-0.460*	-0.456	-0.487
	0.108	0.172	0.176	0.25	0.376	0.37	0.176	0.262	0.288
r2	0.462	0.531	0.54	0.55	0.601	0.603	0.094	0.126	0.133
N	66	62	62	66	62	62	66	62	62
link test			*p-values*			*p-values*			*p-values*
hat			0.005			0.000			0.169
hat^2			0.464			0.661			0.522

Notes: Robust standard errors; *** p<0.01, ** p<0.05, * p<0.1.

Table 4: OLS estimates of the influence of country-specific variables on health system responsiveness, for countries stratified in European and Non-European

	Dignity		Prompt Attention		Clarity of Communic.		Confident		Quality of Facilities		Choice	
variables	European Countries	Non European Countries	European Countries	Non European Countries	European Countries	Non European Countries	European Countries	Non European Countries	European Countries	Non European Countries	European Countries	Non European Countries
	b/se	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*
health exp. per capita	0.173	0.125	0.02	-0.501	0.131	0.686	0.218*	0.464	0.297*	1.021	0.187	-0.434
	0.126	0.278	0.072	0.398	0.093	0.387	0.081	0.361	0.123	0.585	0.187	0.498
% public exp. over total	0.201	-0.468**	-0.567	-0.514*	0.158	-0.417	-0.095	-0.36	0.011	-0.705*	0.36	-0.864**
	0.535	0.157	0.304	0.225	0.395	0.218	0.344	0.203	0.52	0.33	0.794	0.281
% population over 65	-0.006	0.022	0.02	0.017	0.012	-0.001	0.022	-0.019	0.029	-0.044	0.015	0.03
	0.023	0.012	0.013	0.017	0.017	0.017	0.015	0.016	0.022	0.026	0.034	0.022
education index	0.677	0.002	-7.289***	0.503	0.719	0.617*	-1.638	0.677*	-0.133	1.138**	-8.166	-0.252
	2.933	0.189	1.668	0.272	2.169	0.264	1.886	0.246	2.856	0.399	4.355	0.34
high gdp	-0.066	0.150*	-0.053	0.174	0.05	0.127	-0.233	-0.066	-0.063	0.026	-0.079	0.555***
	0.2	0.072	0.114	0.104	0.148	0.101	0.129	0.094	0.195	0.152	0.297	0.13
GINI index	-1.642	0.721*	-0.972	0.227	0.563	-0.353	0.364	-0.019	0.462	-0.661	1.978	-0.046
	1.485	0.294	0.844	0.421	1.098	0.41	0.955	0.382	1.445	0.619	2.204	0.528
democratic history	0.208	0.005	0.811**	-0.124	-0.083	0.141	0.336	0.131	0.11	0.109	0.287	-0.219
	0.432	0.12	0.246	0.172	0.32	0.167	0.278	0.156	0.421	0.252	0.642	0.215
constant	-0.388	-0.407*	6.681***	-0.4	-1.486	-0.659**	0.678	-0.546*	-1.051	-0.566	5.963	-0.076
	2.9	0.153	1.649	0.219	2.144	0.213	1.865	0.198	2.824	0.322	4.307	0.274
r2	0.54	0.62	0.59	0.52	0.48	0.68	0.60	0.45	0.65	0.51	0.31	0.57
N	25	37	25	37	25	37	25	37	25	37	25	37

Notes: Robust standard errors; “High gdp” has been defined relative to the set of countries analyzed; *** p<0.01, ** p<0.05, * p<0.1.

Table 5: OLS estimates of the influence of country-specific variables on health system responsiveness, for countries stratified in High HDI and Low-Medium HDI

	Dignity		Prompt Attention		Clarity of Communic.		Confident		Quality of Facilities		Choice	
variables	High HDI	Medium and Low HDI	High HDI	Medium and Low HDI	High HDI	Medium and Low HDI	High HDI	Medium and Low HDI	High HDI	Medium and Low HDI	High HDI	Medium and Low HDI
	b/se	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*	*b/se*
health exp. per capita	0.24	0.35	0.104	-0.84	0.118	1.392	0.229**	0.796	0.322*	1.756	0.328	0.513
	0.132	0.766	0.068	1.054	0.099	0.998	0.067	0.906	0.137	1.428	0.185	1.572
% public exp. over total	-0.315	-0.561**	-0.658*	-0.630*	-0.567	-0.554*	-0.177	-0.506*	-0.477	-0.753*	0.527	-1.093*
	0.53	0.193	0.271	0.266	0.398	0.252	0.268	0.229	0.548	0.36	0.739	0.397
% population over 65	-0.021	0.016	0.011	-0.016	-0.005	-0.001	-0.001	-0.02	0.002	-0.031	0.018	-0.009
	0.021	0.019	0.011	0.027	0.016	0.025	0.011	0.023	0.022	0.036	0.03	0.04
education index	1.946	0.201	-5.733***	0.573	0.912	0.822*	-1.337	0.638*	-1.646	1.013*	-4.016	-0.037
	2.425	0.249	1.24	0.343	1.82	0.325	1.224	0.295	2.506	0.464	3.38	0.511
high gdp	-0.155	0.052	-0.229	0.086	0.059	-0.023	-0.267*	-0.082	-0.095	0.016	-0.421	0.311
	0.232	0.092	0.119	0.126	0.174	0.119	0.117	0.108	0.24	0.17	0.324	0.188
GINI index	-0.88	0.765	-0.053	0.478	0.233	-0.288	1.12	0.098	0.845	-0.661	2.75	0.029
	1.472	0.384	0.753	0.528	1.105	0.5	0.743	0.454	1.521	0.716	2.052	0.788
secular values	0.038	-0.162	0.194	0.157	0.018	-0.176	0.137	-0.014	0.025	-0.072	0.07	0.029
	0.194	0.162	0.099	0.223	0.146	0.211	0.098	0.192	0.2	0.302	0.27	0.333
democratic history	-0.001	-0.062	0.740**	0.002	-0.199	0.042	0.299	0.051	0.188	-0.003	-0.025	-0.106
	0.402	0.166	0.206	0.228	0.302	0.216	0.203	0.196	0.415	0.309	0.56	0.341
constant	-1.111	-0.442*	4.973***	-0.399	-0.638	-0.703**	0.502	-0.502*	0.987	-0.519	1.771	-0.013
	2.281	0.189	1.166	0.261	1.712	0.247	1.151	0.224	2.357	0.353	3.18	0.389
r2	0.443	0.507	0.672	0.444	0.327	0.549	0.6	0.409	0.542	0.454	0.295	0.359
N	27	35	27	35	27	35	27	35	27	35	27	35

Notes: Robust standard errors; "High gdp" has been defined relative to the set of countries analyzed; *** p<0.01, ** p<0.05, * p<0.1.