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Less money or better health? Evaluating individual's willingness to make trade-offs using life satisfaction data

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ABSTRACT

Health care practitioners are increasingly required to make more efficient decisions when it comes to allocating health care expenditure. This requires not only information relating to the costs of medical interventions, but also the benefits of such interventions on individual's overall well-being. In order to calculate the well-being losses associated with health conditions, this study uses the compensating income variation approach (CIV), to calculate the amount of extra equivalent household income to make someone who suffers from one of 15 health conditions, as well off in terms of life satisfaction as someone who does not have these health conditions. To help put these findings into perspective, this study also calculates CIVs for many other factors commonly found to be significantly associated with subjective well-being (e.g. unemployment, widowhood, separation and indicators of social capital). This paper builds on previous work using CIVs in health by addressing the issue of income endogeneity in life satisfaction and also testing how robust the derived CIVs are to the inclusion of personality measures, namely the Big Five personality traits. The analysis suggests that health conditions significantly affect individual's quality of life and that the amount needed to make someone with a health condition as well off as someone without those health conditions can be substantive, albeit less than is commonly reported in the literature using the CIV approach to date.

1. Introduction

Faced with ever increasing costs, policymakers need to make informed decisions about which types of health care interventions should be prioritised over others. In addition to considering the costs of such interventions, decision making about the allocation of resources in the health domain requires information about the value attached to health improvements (Groot and van den Brink, 2006). When it comes to assessing the value of health care interventions, there are a number of different economic methodologies used. The simplest method commonly employed is cost-effectiveness analysis as the benefits are measured as a single unidimensional outcome, e.g. cases prevented, conditions diagnosed or life years gained. An important limitation is that this unidimensional approach may mean that other potentially important outcomes are ignored. In comparison to cost effectiveness analysis (CEA), cost utility analysis (CUA) considers a broader measure of health related outcomes such as quality adjusted life years (QALYs). QALYs are a generic measure of disease burden which reflects both the quality as well as quantity of life saved. It assumes that living a year in perfect health is worth one QALY and living a year with less than perfect health is worth somewhere between 0 and 1, depending on the severity of the health condition.

A variety of procedures have been developed to determine preferences for health states that are less than perfect (i.e. less than one), by eliciting hypothetical choices (Dolan and Kahneman, 2008). The most common being the visual analogue

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scale (VAS), the standard gamble (SG) and the time tradeoff (TTO) (see Dolan, 2000 for a useful review of these methods). The VAS requires respondents to rate health states on a scale (typically represented by a vertical "thermometer-type" line) with "worst" and "best" endpoints, usually represented by 0 and 100, respectively (Dolan, 1999). While simple to use, it is subject to a number of biases such as context and spreading bias, and end-point aversion (Dolan, 2000). As valuations derived from the VAS are elicited in a *choiceless* context, i.e. don't require individuals' to make trade-offs, health economists generally prefer the choice based SG and TTO methods (Dolan, 2000; Tolley, 2009). For the SG approach, respondents choose between a health state that is certain (for example, frequent asthma attacks) and a gamble with one better (e.g. full health) and one worse (e.g. death) outcome possible. With the TTO, respondents choose between living for a defined period of time in a specified poorer health state or living for a shorter period of time in full health (Dolan, 1999). Some recent studies have sought to elicit more 'informed' preferences when using SG and TTO methods. For example, Dolan et al. (2013) elicited preferences for health states via a TTO that incorporated various levels of satisfaction with life alongside the standard health state descriptors.

An alternative preference based approach which more directly monetises the benefits of health care states is through contingent valuation (CV). With SG and TTO methods the unit of the scale is a quality adjusted life year, whereas with CV respondents are asked how much they would be willing to pay for a hypothetical change from one health state to another or simply their WTP for the elimination of specified health risks. One advantage of this approach is that it more easily allows a direct comparison of the benefits of a health care intervention with its costs than other choice based methods. Second, by determining an individuals' willingness to pay (WTP), we can also measure potential benefits of health care other than just health gain. An additional advantage of this method is that it allows preferences for health to be considered alongside other non-health attributes, that the individual values, i.e. allow a comparison between the value individuals place on improvements in health relative to other arguments in their utility function (Dolan, 2000). The validity and reliability of the contingent valuation method is, however, the subject of heated controversy, as it is argued that the methodology is susceptible to hypothetical bias and framing problems (Carson et al., 2001; Murphy et al., 2005; Lusk and Norwood, 2009). More specifically, respondents are usually presented with hypothetical choice tasks – choices they may have no personal experience with – meaning that they may find it difficult to fully understand and comprehend the actual scenario they are being asked to assess. A further criticism of all stated preference approaches is that people will typically underestimate the extent to which they and others will adapt to changed circumstances, and as such, elicited choices under these methods may not accurately reflect the utility associated with different health states (Dolan and Kahneman, 2008). Further common criticisms of some of these choice based methods are that they can be relatively time-consuming and cognitively challenging for respondents (Dolan, 2000; Tolley, 2009).

Another widely used approach for obtaining WTP for health outcomes is through using revealed preferences, where people's preferences for health conditions are 'revealed' from observed behavior in the market (Mark and Swait, 2008; Romley and Goldman, 2011). The hedonic pricing approach, using wages, is an example of such an approach where the amount that individuals need to be compensated for risks to health is ascertained by determining how wages differ in response to changing on the job health risks (Viscusi and Aldy, 2004). One limitation with this approach arises from the issue of self-selection as, for example, workers who choose a certain occupation with high health risks are likely to be a select group for whom health risks weigh less heavily than the general population (Cropper et al., 2011). One further pervasive problem with all revealed preference methods is that consumer decisions are based on perceived rather than objective perceptions. If adequate information on occupational risks is missing, then people's subjective assessment and objective measures may not correspond with each other very well, thus leading to biased estimates of individuals' willingness to pay (Frey et al., 2010).

More recently, the compensating income variation (CIV) approach (also commonly referred to as the subjective well-being valuation approach) has been proposed as an alternative to preference based measures (e.g. stated and revealed preferences) for determining how much individuals value improvements in health (Groot and van den Brink, 2006; Ferrer-i-Carbonell and Van Praag, 2002; Powdthavee and van den Berg, 2011). The CIV method involves regressing a measure of life satisfaction on different health conditions, controlling for other personal characteristics such as income. The output from such a regression analysis can then be used to calculate how much individuals are willing to trade off income for better health, by estimating how much extra income an individual would require, to offset a given loss in life satisfaction arising from a health condition. In this paper, we use this approach to calculate the level of compensation that is required to make an individual indifferent between having and not having 15 different health conditions, using a large nationally representative survey in the UK. Since this approach does not rely on stated valuations, it is less prone to bias than CV, and since it involves a randomly selected representative sample of individuals it is not subject to problems of self-selection, commonly associated with revealed preferences

In calculating CIVs for health conditions, this paper addresses major issues in the existing literature in this area. First, to the best of our knowledge no study has accounted for endogeneity in income when it comes to calculating compensating income variations of health conditions. Failure to account for endogeneity in income means that the effect of income on life satisfaction is likely to be significantly understated and consequently derived CIVs which reflect health-income trade-offs will be biased upwards. Second, through the inclusion of measures of individuals' personality traits, commonly not available in large scale surveys, we account for any personality induced bias in the regression estimates. Personality induced bias may have affected previous estimates of CIVs in health as people with different personality traits may be more/less affected by differences in health conditions and personality traits have also been shown to significantly affect life satisfaction (see