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From Average Joe's happiness to Miserable Jane and Cheerful John: using quantile regressions to analyze the full subjective well-being distribution☆

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ABSTRACT

Standard regression techniques are only able to give an incomplete picture of the relationship between subjective well-being and its determinants since the very idea of conventional estimators such as OLS is the averaging out over the whole distribution: studies based on such regression techniques thus are implicitly only interested in Average Joe's happiness. Using cross-sectional data from the British Household Panel Survey (BHPS) for the year 2006, we apply quantile regressions to analyze effects of a set of explanatory variables on different quantiles of the happiness distribution and compare these results with a standard regression. Among our results we observe a decreasing importance of income, health status and social factors with increasing quantiles of happiness. Another finding is that education has a positive association with happiness at the lower quantiles but a negative association at the upper quantiles. We explore the robustness of our findings in various ways.

1. Introduction

Research into the causes and correlates of human happiness (or synonymously: subjective well-being) has gained momentum in the past years and attracted attention in disciplines such as economics and psychology alike (see recent reviews, e.g. Easterlin, 2003; Frey and Stutzer, 2005; Dolan et al., 2008). With an increase in interest of researchers from various disciplines, happiness research progressed to a point where many of the initial findings are becoming increasingly qualified, theories become more refined and the statistical tools to analyze the complex relationships between happiness and its determinants become ever more sophisticated. One major theme during the last years was, for example, the introduction of panel data techniques that allow to more reliably identify individual responses to changes in external con-

☆ Any resemblance in the title to real-life individuals is purely coincidental. The authors are grateful for having been granted access to the BHPS data set, which was made available through the ESRC Data Archive. The data were originally collected by the ESRC Research Centre on Micro-Social Change at the University of Essex (now incorporated within the Institute for Social and Economic Research). Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here. We wish to thank three anonymous referees and the editor, J. Barkley Rosser Jr., for valuable advice. We also thank Annemarie Strehl for research assistance. Errors are ours.

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ditions (via accounting for time-invariant individual-specific components, "fixed effects", e.g. Ferrer-i Carbonell and Frijters, 2004).

What has been neglected so far is the information that is contained in happiness distributions. Thus, what we want to argue for in the present paper is that happiness research should now also start being less concerned with the mean effects of the explanatory variables on happiness but with their effects on different parts of the happiness distribution. Ordinary least squares regression techniques with their focus on the conditional mean of the dependent variable are only able to give an incomplete picture of the relationship between subjective well-being and its determinants since the very idea of OLS regressions is the averaging out of coefficient estimates over the conditional distribution of the dependent variable: studies based on such regression techniques thus are implicitly only interested in the happiness of "Average Joe", but remain silent on the question of the effects that explanatory variables have on the happiness levels of "Miserable Jane" or "Cheerful John".[1] While average effects certainly are an important feature to examine, from a policy perspective it is often more interesting to understand what happens at the extremes of a distribution. For example, are increases in income as relevant for the happiness of the happiest individuals in a population as they are for the most miserable individuals? Similarly, going beyond the mean is important with regard to individual-specific rates of hedonic adaptation (Diener et al., 2006, p. 311): as recent research on the hedonic treadmill shows, policy makers do have levers to permanently alter individuals' happiness levels but this seems not to be the case uniformly along the happiness distribution. This type of analysis is long known in welfare economics, where scholars are interested in the *distribution* of well-being and not just the average (e.g. when analyzing income inequality). This allows to more comprehensively assess policies, where for instance a policy might be ethically acceptable if it has a small positive effect on everyone's well-being, but it would be no longer acceptable, in ethical terms, if some individuals' gains are counterbalanced by large losses for a minority. In these types of considerations, the focus is no longer on the average effect, but on the full distribution of well-being. We argue that this line of reasoning needs to be extended to happiness research.

These considerations become more urgent when one takes into account the findings that happiness distributions are empirically quite skewed: most individuals have positive happiness values, with a mean of 6.33 on a 0 (most unhappy) to 10 (most happy) scale for a sample of 43 nations (Diener and Diener, 1996; Diener et al., 2006). In heterogeneous distributions, regression methodologies that focus on means might seriously under- or overestimate effects or even fail to identify effects at all (Cade and Noon, 2003). A solution to this lacuna is to extend happiness measurement from ordinary least square regressions to quantile regressions (Koenker and Bassett, 1978; Koenker and Hallock, 2001). Quantile regression enables the econometrician to analyze effects of the explanatory variables on different quantiles of the happiness distribution as opposed to a (incomplete) focus on the mean of the distribution. It is a pragmatic tool for analyzing extreme effects in the happiness distribution and thus gives the researcher a more complete picture of the effects of the explanatory variables on the dependent variable (in our case happiness). While quantile regressions are starting to be recognized as a helpful technique in the case of skewed (non-normal) distributions in other economic sub-disciplines,[2] we are to our knowledge among the first to explore and demonstrate their use in happiness research.[3]

In order to motivate the usefulness of happiness quantile regressions, the paper proceeds in the following way. Section 2 gives an overview over some relevant knowledge in happiness research in order to justify the later selection of explanatory variables. Section 3 then gives an introduction to quantile regressions and relates them to the standard regression estimators such as OLS (ordinary least squares). In Section 4 we then apply quantile regressions to a fairly standard set of explanatory variables (and their effect on happiness) and compare these results with a standard regression. We explore these relationships by using data from the British Household Panel Survey (BHPS), an extensive data set that covers information on many important life domains of a representative sample of the British populace. We explore the robustness of our results in a number of ways. Section 5 concludes.

2. Theoretical background

The literature on subjective well-being (synonymously called "happiness" in this paper) has vastly increased over the last few years (see recent reviews, e.g. Easterlin, 2003; Frey and Stutzer, 2005; Dolan et al., 2008). While we can broadly distinguish between affective and cognitive layers of well-being, most of the (empirical) literature seems to be centred on a cognitive interpretation of subjective well-being. This is reflected in the notion of subjective well-being understood as "life satisfaction": the interest lies in the cognitive aspect, making well-being a cognitive judgement-cum-endorsement, i.e. an attitude which one holds towards one's life (see, e.g., Frey and Stutzer, 2002). Very similar to this tradition is research using the

[1] To be more precise, longitudinal research reveals that at the beginning of adult life, it would be more appropriate to label Janes (i.e. females) as cheerful and Johns (i.e. males) as miserable, while with increasing age, this relationship gradually reverses itself (Plagnol and Easterlin, 2008). To be fair: overall, there is still considerable uncertainty about gender effects in happiness research (Dolan et al., 2008).

[2] For example, Buchinsky (1994) applies quantile regression to analyze the US wage structure, while Coad and Rao (2008) use quantile regression to distinguish between average firms and high-growth firms.

[3] Hohl (2009) discusses the methodological differences between ordinary least squares regressions and quantile regressions and their application in the social sciences, using the life satisfaction–income relationship as an example. We are less interested in providing a toolkit about when to use quantile regressions but more with the additional insights quantile regressions allow for happiness research. Moreover, we investigate the wider interrelationships between happiness, income, health, social relations and education (using BHPS data), not only focusing on the life satisfaction–income relationship.