



## The effect of children on adult demands for health-risk reductions

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### ABSTRACT

We examine patterns in adults' willingness to pay for health-risk reductions. We allow both their marginal utilities of income and their marginal disutilities from health risks to vary systematically with the structures of their households. Demand by adults for programs which reduce their own health risks is found to be influenced by (1) their parenthood status, (2) the numbers of children in different age brackets currently in their households, (3) the ages of the adults themselves, (4) the latency period before they would fall ill, and (5) whether there will still be children in the household at that time. For younger adults, willingness to pay by parents is greater than for non-parents, and increases with each additional young child. For middle-aged adults, willingness to pay for corresponding risk reductions falls when teenagers are present and falls further with each additional teenager in the household.

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### 1. Introduction

Parents can choose to invest in their own health and in the health of their children. Jacobson (2000) developed a theoretical model of family-provided health to more fully explain the determinants and dynamics of health investments in adults and children. In her model, investments in each family member's health are jointly determined by the allocation of income and time made by other family members. Subsequently, Bolin et al. (2001, 2002a,b) have considered models of non-unitary household decision-making to predict inter-adult household allocations of investment in health. This growing and heterogeneous theoretical literature has yet to be confronted with much empirical data on patterns in actual households' investments in health.

We begin to fill this gap in the literature by conducting an empirical assessment of the extent to which adults may change their investments in their own health as a function of the numbers and ages of children present in their households. While health invest-

ments may take many forms, we focus on investments that reduce current and future health risks from major illnesses. We provide examples of estimates, for specific types of adults in specific types of households, of their willingness to pay (WTP) to reduce the risk of sick-time and lost life-years as a function of household structure. The theoretical predictions of existing models are ambiguous with respect to the direction of adult investment in health-risk reductions in the presence of children, so our empirical findings do not provide a head-to-head testing of existing theories. However, our findings may contribute to future theoretical models by (1) revealing empirical regularities relevant to presently ambiguous theoretical predictions, and (2) highlighting patterns of behavior for which no theory yet exists.

Researchers have, of course, looked at many empirical aspects of child health more generally, and at parents' WTP for improvements in the health of their children.<sup>1</sup> Numerous studies also explore a

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<sup>1</sup> Some examples from the child health literature include Currie and Hotz (2004), who find that a requirement of more education for day-care providers leads to fewer accidents involving the children in their care. Currie and Moretti (2003) find that an increase in a mother's education will, among other things, improve the health of her infant. Currie and Neidell (2005) and Chay and Greenstone (2003) look at the measurable negative effects of air pollution on infant health.

parent's propensity to invest in their children's health by reducing the child's risk of illness or death through improved access to medications and better safety measures.<sup>2</sup> Our work differs from these prior studies because we focus on adults' *WTP* for health-risk reductions for themselves as a function of the presence of children of different ages. Perhaps Cropper and Sussman (1988) come closest to the issues addressed in this paper. They are concerned that "one must know the difference between the willingness to pay of single people and those with dependents for a change in own risk of death" (p. 259). Their research, however, considers *WTP* for health-risk reductions—over the life-cycle and in the presence of families—from a primarily theoretical perspective.

Our analysis also contributes to the literature concerned with estimation of the "value of a statistical life" (*VSL*).<sup>3</sup> The main contribution of the present paper is to show how *WTP* of adults varies in the presence of children. This is important because some of the current literature focuses on whether it is appropriate to use some fraction or multiple of a parent's *WTP* to reduce their own health risks as an estimate of their *WTP* to reduce their child's risk. However, if *WTP* is different for parents and non-parents, this "benefits transfer" strategy may be inappropriate.<sup>4</sup> We take advantage of a unique data set drawn from an extensive existing stated preference survey described in Cameron and DeShazo (2009) that allows us to control for household structure and distinguish between the *WTP* amounts for parents and non-parents. The stated preference survey elicits individuals' demands for programs to reduce their risks of a variety of specific major health threats. A methodological advantage of our approach is that we are able to estimate the adult's marginal utility of income as well as separate (and non-constant) marginal disutilities of distinct future periods of illness and years of lost life. The contribution of this paper is to extend the general utility-theoretic choice modeling framework developed in Cameron and DeShazo (2009) to permit each of the marginal utilities in that paper to vary systematically with the gender of the adult and the nature of the household to which they belong.<sup>5</sup>

We provide the first empirical evidence of differences between parents and non-parents in willingness to pay to reduce the risk of suffering a future time profile of adverse health states. We show

how the *WTP* to reduce the risk of an adverse health profile differs for males and females according to the number of children in different age groups presently in the household, across single- versus dual-income households, and as a function of whether children will still be present in the household when the illness or injury strikes (if there is a latency period involved).

We find that the number of children in different age groups affects the adult's marginal utility of income (which reflects competing demands on the household's budget that may edge out expenditures on the adult's own health-risk reduction efforts). Concurrently, we find evidence that the number of children in different age categories affects the adult's expected disutility from prospective sick-time and prospective lost life-years—especially when the illness profile in question will affect the adult while there are still likely to be children under the age of eighteen in the household. Evaluating the net effects on *WTP*, we find that for younger adults, willingness to pay by parents is greater than that by non-parents, and it increases with each additional young child. In contrast, for middle-aged adults, willingness to pay for corresponding risk reductions is lower when teenagers are present and falls further with each additional teenager in the household.

The next section briefly reviews the literature, emphasizing recent theoretical interest in the issues explored here. Section 3 outlines the survey method and the available data. Section 4 explains the structural indirect utility-based choice model we use to explain our respondents' stated choices. This model forms the basis for our empirical specifications. Sections 5 and 6 discuss our parameter estimates and illustrate their implications for *WTP* for health-risk reductions under different circumstances, and Section 7 concludes.

## 2. Literature on family structure and demand for health

Early theoretical models of the family, such as Becker and Tomes (1976) and Leibowitz (1974), focus on parents' investments in their children rather than in themselves. However, parents' investments in their own health may also represent indirect investments in the well-being of an individual's children. Jacobson (2000) developed a theoretical model of family-provided health to more fully explain determinants of health investments in both adults and children.<sup>6</sup> The health of a child is determined both by the family's allocation of market goods to the child and by its allocation of health-denominated parental time to the child.

Consequently, we would expect that utility-maximizing parents explicitly consider the role that their own health plays in determining the health and human capital development of their children. Jacobson also shows that parents need not be altruistic to invest in their children's health (although most parents probably are altruistic toward their own children). Even parents who are entirely selfish (e.g. those who do not appear to derive utility directly from the happiness of their child) will invest in the health of that child since failing to do so may have negative consequences for parents' incomes (e.g. a sick child may reduce the time a parent may allocate to the labor market or to consumption activities).

This model by Jacobson (2000) shows that family members, instead of equalizing health outcomes for each family member, equalize the marginal utility of lifetime health normalized by the price of health for that family member. Health influences income in two separate ways—good health allows a parent to work and good health increases the parent's wage rate. Since children require both income and time from a parent, we would expect our empirical

<sup>2</sup> Among these, Thomas (1990) and Strauss and Thomas (1998) compare investments in the health of children by mothers and fathers, but not parental investments in their own health as our paper does. Liu et al. (2000) focus on Taiwanese mothers' *WTP* to reduce the duration and severity of a cold for themselves and their children, and Jenkins et al. (2001) focus on parents' *WTP* for safer bicycle helmets for their children. Dockins et al. (2002) and Scapecchi (2006) both address the question of whether there are differences in *WTP* to reduce health risks for children versus adults. Hammit and Haninger (2010) find *WTP* of adults is approximately twice as large as for children using a stated preference survey on food-borne illness due to pesticide residues. Other examples include Agee and Crocker (1996), Barron et al. (2004), Chenevier and LeLorier (2005), Dickie (2005), Dickie and Gerking (2006, 2007), Dickie and Messman (2004), Evans et al. (2009) and Maguire et al. (2004).

<sup>3</sup> A *VSL* is an average, scaled willingness to pay to reduce mortality risk. Estimates of *WTP* by an individual are based on small reductions in mortality risks. Each available estimate typically corresponds to a different-sized risk reduction, so it is not possible to average the underlying unscaled *WTP* estimates. Thus, *WTP* estimates need to be standardized on some common size of risk reduction before an average can be taken. The convention is to use the ratio of the marginal utility of a risk reduction to the marginal utility of income (a marginal rate of substitution), which is equivalent to scaling all of these tiny risk reductions and their corresponding *WTP* estimates to a vastly larger 1.00 risk change. The average of a set of scaled-up *WTP* estimates is termed the "value of a statistical life".

<sup>4</sup> We are grateful to an anonymous referee for suggesting that we include this point.

<sup>5</sup> Cameron and DeShazo (2009) develop and estimate a new structural model of willingness to pay for microrisk reductions in health threats with different time profiles of illness. The basic model in this earlier paper is for adults with homogeneous preferences, except for differences in age (nominal remaining life-years). There is no discussion of the effects of children, or any other aspects of household structure, on an individual's demand for health risk reductions.

<sup>6</sup> Jacobson extends Grossman (1972) who models the individual as the producer of health.

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