Long-term Health Benefits from Investments in Children's Education

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Abstract

In this paper, we hypothesize that education of adult children has a separate effect on health and survival of their elderly parents that is independent from children's SES status, income and financial support given to their parents. In particular, we investigate the role of children's education for health and mortality risks of elderly parents in the context of Mexico. Our analyses are based on the Mexican Health and Aging Study (MHAS) that is one of the handful datasets for developing countries combining detailed information about the health dynamics of elderly people and transfer behaviors between them and their adult children. A unique aspect of our analyses is the attempt to resolve the endogeneity of children's education by incorporating the instrumental variable approach. The proposed methods provide for the first time a systematic attempt using instrumental variable estimation to establish the effect of child education on parental health at old ages.

1 Introduction

Numerous studies have investigated the association between supportive relationships, social networks, intergenerational transfers and health and survival to old age. These studies have presented considerable evidence suggesting that individuals with a high level of social integration and a strong network of family members and friends enjoy better health in late life (Blazer 1982; Cattell 2001; Gliksman et al. 1995; Grundy and Sloggett 2003; House et al. 1988; Ren et al. 1999; Seeman et al. 1987; Sugisawa et al. 1994; Walker et al. 1977). In this context, a strong emphasis has been placed on the role of the family and in particular on the role of adult children as providers of both instrumental and emotional support to their aging parents. For example, a supportive family network and in particular support received from adult children has been linked to physical and psychological well-being, to fewer depressive symptoms and to greater life satisfaction among elderly parents (Dean et al. 1990; Eggebeen and Hogan 1990; Kessler et al. 1985; Mutran and Reitzes 1984; Ross et al. 1990; Rossi and Rossi 1990; Silverstein and Bengston 1991; Strain and Chappell 1982). In addition, social relationships and intergenerational transfers are perceived as important mechanisms that modify and mediate SES-related health disparities at older ages (Antonucci et al. 2003; Vaillant et al. 1998).

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The role of the family and the social and economic support received by family members and the transfers from adult children to elderly parents becomes particularly important in the developing country context. In most developing economies, where institutional support is lacking and financial markets are unstable or largely non-existent, the laterally and vertically extended family is a central institution through which investments in human and social capital are secured. The family is in the center of critical human capital investment decisions as well as the source of financial and other intergenerational transfers (Pörtner 2001). Thus, in the developing-country context, where few public resources are available to support the elderly, family networks consisting of adult children and their elderly parents may be particularly important for the financial and social well-being of the elderly.

The children's ability to provide financial, social and emotional support to their parents is likely to depend, at least in part, on the children's own financial and human capital resources, sex, marital status, social and geographic mobility, etc. Many of these characteristics, such as human capital or financial well-being, in turn are determined by the children's level of education. Most previous theoretical and empirical analyses of intergenerational transfers have focused on aspects of old-age financial and emotional security, in particular on intergenerational financial flows and support, from children to their parents. How the educational attainment of the adult children themselves affects parental health and survival remains a neglected topic in the literature. This gap is at least in part due to methodological difficulties arising from the endogeneity and reverse causation of children's education and the health of parents, i.e., the educational attainment of children is likely to depend on the human and financial endowments of parents. In addition, availability of appropriate data sets from developing countries that make the investigation of the effects of children's education on parental health possible is limited.

In this paper, we hypothesize that education of adult children has an independent effect on the health and survival of elderly parents—independent of the children's SES status, their level of income, and the financial support they give to their parents. In particular, we investigate the role of children's education for health and mortality risks of elderly parents in Mexico. Our analyses are based on the newly released Mexican Health and Aging Study (MHAS) that is one of a handful of datasets for developing countries that combine detailed information about the health dynamics of the elderly and intergenerational transfers. A unique aspect of our study is the attempt to resolve the endogeneity of children's education by using an instrumental variable approach in the estimation of the effects of the children's schooling on the health of their parents.

2 Why Does Children's Education Matter for Old-Age Health of Their Parents—Specific Aims of Our Study

Education is a composite socioeconomic variable that is correlated with a number of factors known to affect health status and health transitions. For example, education affects the accumulation of material resources over the life course, earning potential of individuals, the quality of housing, health insurance coverage and utilization of health care services, including preventive health behaviors and dietary practices. Moreover, education is also related to individual personality traits (Freedman and Martin 1999; Schoeni et al. 2002).

Parents invest in the human capital (i.e., education) of their off-spring for a number of reasons, including the expected returns from children to their aging parents. Better educated children have higher social capital that is reflected in their financial well-being as adults, but also in their social networks, and abilities to

provide financial, social and emotional support to their parents. We hypothesize that in addition to different types of monetary or care-giving support, better educated children also influence the health of their parents through *a)* the communication and an exchange of better knowledge about disease causation and symptom recognition; *b)* a reinforcement of healthier dietary practices and preventive health behaviors; and *c)* help in navigating the health care system and communicating with medical personnel.

Parents, in particular in a developing country context, do not always have the resources to invest in their children's education. As a result, both generations may belong to the same educational category (i.e., both, parents and children may have low education). We hypothesize that even in this setting, we will be able to detect an effect of children's education on parental health which occurs due to the differences in the characteristics of the educational systems that occur over time. That is, younger people, even if they have the same number of completed years of education as their parents, may be much more knowledgeable compared to the cohort of their elderly parents due to improvements in the educational system that occur over time.

The study of the effects of children's education on the health and mortality of their elderly parents, independent of financial and care-giving transfers, involves several methodological challenges. In particular, children's education is not independent of parental characteristics, including parents' educational attainment, health endowments, and wealth. A substantial body of literature shows that aspects of a child's home environment, peer group, and family expectations strongly condition the level of children's education (Hauser et al. 2000; Miech and Hauser 2001; Sewell and Hauser 1976). In order to disentangle these problems related to reverse causality, we will apply an instrumental variable approach in modeling the effects of children's education on parental health and mortality in this paper.

3 The Mexican Health and Aging Study (MHAS)

The proposed research will use data from the newly released Mexican Health and Aging Study (MHAS).[1] This panel study is one of the few studies that collects detailed information on economic status, intergenerational transfers and health outcomes of elderly individuals in developing countries. Mexico's population is characterized by burdens of both acute and chronic disease, substantial inequalities in health and wealth, virtually no capital markets, and dominance of the extended family as the institution providing social, human and financial capital. Thus, the data are well suited for the analyses we propose in this paper.

The Mexican Health and Aging Study (MHAS) is a prospective panel study, modeled after the Health and Retirement Study (HRS), which served as a template for MHAS. At its baseline in 2001, MHAS was representative of the 13 million Mexicans born prior to 1951. Respondents were selected in conjunction with the 4th Quarter 2000 National Employment Study/Encuesta Nacional de Empleo (ENE), a nationally representative survey conducted by the Instituto Nacional de Estadistica, Geografia, e Informatica (INEGI), the counterpart of the U.S. Census. The ENE provides coverage of both urban and rural residents in all 32 states of Mexico. The entire MHAS sample was drawn from the 64,475 ENE households of which about 40.5% contained one or more persons eligible for MHAS. Households in the 6 Mexican states accounting for 40% of all migrants to the U.S. were oversampled at a ratio of 1.7 to 1. The MHAS sample includes men and women 50 to 105 years old from both rural and urban areas.

[1] Detailed information about the Mexican Health and Aging Study (MHAS) can be found at http://www.ssc.upenn.edu/mhas/.

The second wave of MHAS including next-of-kin interviews for diseased respondents was completed in the fall 2003. As in HRS, spouses or partners who separate were independently followed. New spouse/partners (and children from an earlier marriage or union) are also included in the second wave. The attrition rate between the two waves is 7.31% (1,110 persons of the initial sample are lost).

In the two-year period between the first and second waves of the survey, 542 (3.8%) individuals had died. The number of deceased individuals between the two rounds of the survey is remarkably consistent with the expected number of deaths in the MHAS population during a two-year interval, using Mexican life tables (Wong and Espinoza 2004). Next-of-kin interviews with detailed information about the demographic characteristics, health and disease history prior death, family relationships and help received from children, were obtained for all deceased individuals.

4 Methods

The identification of children's education on parental health is challenging. First, several children potentially engage in providing care for their parents, and the allocation of care-taking responsibility is the result of negations among children, in part reflecting their sex, age, socioeconomic status, etc. Second, children's education and parental health are likely to be interrelated through unobserved common factors. For instance, unobserved social or genetic endowments are likely to affect parental health and the children's education. Similarly, unobserved aspects of wealth or social status are likely to result in both higher education of children and improved health of the parents. Genetic endowments that result in improved parental health often are potentially associated with higher levels of children's education. If these influences of unobserved endowments are ignored, the analyses are likely to result in an overestimate of the influence of children's education on parental health.

In this paper we address this problem using the rich information on the health of parents and the education of children in combination with instrumental variable estimation. To illustrate this approach, consider the following relation of the parental health Y_p on age, other socioeconomic characteristics of the parents, X_p, and the education of children, Z_c:

$$Y_p = \alpha \times \text{age}_p + \beta \times X_p + \gamma \times Z_c + \mu + \varepsilon_p \tag{1}$$

The residual in this relation consists of and i.i.d. random term, denoted ε_p, and an endowment μ that affects parental health in Eq. (1) and also the children's education through the relation

$$Z_c = \delta \times X_c + \rho \times X_p' + \theta \times \mu + \nu_c, \tag{2}$$

where X_c and X_p' represent the influence of observed socioeconomic factors of either parents or children on children's education, μ represents the influence of endowments and ν are additional child-specific unobserved influences.

If the unobserved endowments μ simultaneously influence parental health Y_p and children's education Z_c, as is the case in Eqs. (1–2) if $\theta \neq 0$, standard analyses of Eq. (1) will result in distorted estimates of the influence of children's education on parental health at older ages.

Fixed-effect analyses within parents, which would seem as a potential solution, are not able to resolve

this problem because both parents (usually) share the same children and thus their child-characteristics. Therefore, we propose to use instrumental variable estimation to purge the child education Z_c in Eq. (1) of its correlation with the residual $\mu + \varepsilon_p$. Acceptable instruments in this context need to be correlated with the children's education Z_c, but not with their endowment μ or the residual ε_p in Eq. (1). Several candidate instruments can be used that are either available in our data or can be obtained from external data sources. These instruments include:

- macro-economic indicators, including inflation, GDP per capita, etc., when children were about 13 years old that may affect parent's decisions about investments in child schooling;
- Rainfall, humidity and temperature data when children were about 13 years old that may affect parent's decisions about investments in children through the relation of income in an agricultural society with weather;
- inter-birth intervals, in particularly, very short inter-birth intervals, sibling sex-composition, and mortality of other siblings that may affect children's education because of its effect on competition for parental resources.

These instruments, including the climate data measured when children were young teens, are likely to predict the education of children but not be correlated with the endowments μ that influence both the children's education and parental health at old ages. The use of such instruments will therefore allow us to properly estimate the effect of children's education on parent's health, net of the influence of endowments.

Several additional methodological issues arise because of differential number of children for the respondents in the MHAS data and of the differential allocation of care responsibility among children. In our initial analyses we will focus on the child that is reported by the parents as the primary provider of support. These analyses will be extended by allowing for the support of several children, distinguished by sex, in Eq. (1). Finally, our analyses will attempt to model the bargaining/negotiation process among children about the caretaking responsibilities using sex and differential education among children, including differences in predicted education based on the socioeconomic situation (measured based on the above variables) when children were in their early teen ages.

In summary, therefore, the methods proposed for this paper provide for the first time a systematic attempt using instrumental variable estimation to establish the effect of child education on parental health at old ages. This approach is possible using the extensive information on parental health contained in the MHAS data combined with comprehensive information on children available in the MHAS and "exogenous" variation in child education resulting from economic and climate condition during the children's early teen years and variation in birth intervals, sibling sex composition and child mortality.

5 Relevance of the Proposed Research

The proposed paper is of particular relevance in that it is one of the few attempts to estimate effects of the educational attainment of adult children on their parents' health. Considerable literature exists on the effects of education on one's own health and the effects of parents' education on children's health. This paper takes this literature a step further and asks the question of whether children's education is beneficial to the health of parents in a developing country context where few public resources are available for the growing number of elderly individuals. As discussed earlier, the identification of children's education on parental health is

challenging because of problems associated with reverse causality. We take specific steps to address this problem and use one of the richest available datasets (MHAS) to study this topic in a developing country.

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