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Asset effects for children with disabilities: Analysis of educational and health outcomes

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ASSET EFFECTS FOR CHILDREN WITH DISABILITIES:

ANALYSIS OF EDUCATIONAL AND HEALTH OUTCOMES

by

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Abstract

In the last two decades, asset-based social policies, which encourage families, especially low-income families, to accumulate assets by providing appropriate institutional settings, have received increasing attention from policymakers and researchers. Various programs and strategies have been outlined to improve saving and asset ownership opportunities in disadvantaged populations. Although there are multiple proposals of asset-based programs for children with disabilities, few of them have been implemented.

To better inform asset-based policy practices for children with disabilities, this study examines asset effects for this population using the secondary survey data. Asset effects refer to the hypothesized positive influences of household assets on child development. A sample of children with disabilities is created from the Child Development Supplement of the Panel Study of Income Dynamics (PSID-CDS). This study has two specific aims: (1) To examine the relationship between household assets and children's educational and health outcomes; and (2) To examine the mechanism of asset effects on children's educational and health outcomes.

From the life course perspective, the dissertation hypothesizes that household assets have cumulative effects on child development. Child well-being is a function of not only current household assets but also all previous household assets invested in the child. I propose four empirical strategies to test the hypothesis of asset effects for children with disabilities. The first set of analyses focuses on household assets measured before childbirth. The second strategy uses propensity score classification, which categorizes children into multiple groups based on households' expected asset values. The third set of analyses applies the fixed-effects model to control for time-invariant unobserved factors. The final analyses test the hypothesis of asset effects in a dynamic model using Structural Equations Modeling (SEM).

The study finds that household assets have positive associations with child outcomes for children with disabilities, especially with health outcomes. Positive associations are more likely to be seen when household net worth is greater than $40,000 or liquid assets are greater than $10,000. Although the findings suggest that household assets in early childhood are more important for child well-being than household assets at a later stage, positive associations exist in both periods. The findings indicate the importance of having assets for the entire childhood. The study also shows that marginal effects of household assets are greater for low-income and low-wealth households.

Findings of this study have important policy implications. Asset building should be included in the new vision of successful development for children with disabilities. For families raising children with disabilities, asset accumulation should start early and last long with a specific focus on health and health services. The minimum savings goal should be set at around $10,000. Asset-based programs for children with disabilities should be progressive toward low-income and low-wealth populations.

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Chapter 1: Specific Aims

This dissertation aims to test the associations between household assets (wealth) and child outcomes for children with disabilities, and to explore how household assets affect child development. It is a study of transformation of household financial capital to children's human capital and health capital. The research questions are defined mainly by the focal independent variable—household assets. Findings of this study provide an empirical justification for the development of asset-based social policies, especially for the population of children with disabilities.

Asset-based social policies (e.g., Individual Development Account [IDAs] and Child Development Accounts [CDAs]) encourage families, including disadvantaged families, to accumulate assets by providing appropriate institutional settings and financial incentives (Blank & Barr, 2009; McKernan & Sherraden, 2008; Prabhakar, 2008; Regan, 2001;Regan & Paxton, 2001; Retsinas & Belsky, 2005; Schreiner & Sherraden, 2007; Sherraden, 2005; Sherraden & McBride, 2010). Initially suggested by Sherraden (1988, 1991), asset accumulation is becoming a new paradigm to guide policy efforts in helping people find a path out of poverty and achieve economic security. Various programs and strategies have been outlined to improve opportunities of saving and asset ownership in disadvantaged populations (Cramer et al., 2010; Cramer, O'Brien, & Lopez-Fernandini, 2008).

At present, practices of asset-based programs for children are mainly based on theoretical discussions of asset effects for children. The hypothesis of asset effects suggests that asset accumulation can lead to positive economic, psychological and social outcomes for families and family members (Sherraden, 1991; Shanks, Kim, Loke, & Destin, 2009).[1] For example, household assets indicate economic protection. Children in wealthy households are well protected from economic hardship, have better access to education, and gain better educational and health outcomes. In the long run, household assets also contribute to a child's social mobility and generate positive psychosocial effects on a child's self-efficacy, future orientation, and civil engagement.

However, few studies empirically test the hypothesis of asset effects for children, which presents a challenge to the development of asset-based policies. To better inform practice and policy, this study uses longitudinal data from the Panel Study of Income Dynamics (PSID) to examine asset effects for a specific population—children with disabilities. The study has two aims:

Aim 1: To examine the relationship between household assets and educational and health outcomes for children with disabilities.

Aim 2: To examine whether asset effects on educational and health outcomes for children with disabilities are mediated through parenting behaviors.

Focusing on children with disabilities, the current study is motivated by several policy developments for children with disabilities. As a disadvantaged group, these children can benefit substantially from asset-based policies that match their development goals. For instance, the Social Security Administration is planning to develop Individual Development Accounts for youth with disabilities in Miami (SSA Office of Program Development & Research, 2008). A bill for the Disability Savings Act was proposed in the Senate in 2008 to use tax-advantaged savings tools to encourage individuals with disabilities and their families to save private funds for disability-related expenses, including education, medical services, employment

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1 The study uses the term *asset effects* hereafter to refer to this hypothesis.

training and support, transportation, and other related services. In addition, the National Council of Disability (NCD) has proposed asset-based policies for youth with disabilities in its annual national disability policy progress reports (NCD, 2004, 2005, 2006, & 2007).

Another consideration of studying children with disabilities is that asset effects may vary by child characteristics. Childhood disability may create greater needs for economic resources for quality care, health services, and parents' non-working time. In other words, the marginal effect of household assets for children with disabilities may be different from that for children without disabilities.

This study contributes to the knowledge base in several ways. It examines asset effects on a specific population (i.e., children with disabilities), and extends current research to include health status (in addition to education) as a child outcome. This study also discusses several important questions related to the development of asset-based policies, including what amount of assets is needed to generate asset effects, which population benefits more from asset accumulation, and what empirical strategy is better to test the hypothesis of asset effects.

Chapter 2: Background

The research question regarding asset effects for children (and children with disabilities) is important for the development of asset-based policy. The conceptual discussion regarding this question is extensive (see Lerman & McKernan, 2008), and it relates to the research, originated in the late 1960s and early 1970s, on the association between child well-being and family background (Duncan, Featherman, & Duncan 1972; Hogan, 1981; Marini 1978). Asset effects for children with disabilities can be examined from a number of theoretical perspectives, including the theory of asset-based welfare (Sherraden, 1991), disability models (Bickenbach, 1992; Bickenbach, Chatterji, Badley & Üstün, 1999; Oliver, 1990), and theories regarding family backgrounds and child development (Conger & Donnellan, 2007). However different they are, there seems more consistency than controversy in their respective theoretical predictions of asset effects.

Assets are rights or claims related to tangible or intangible property, including (1) money savings; (2) stocks, bonds, and other financial securities; (3) real property; (4) hard assets, such as automobiles, jewelry, art, and collectibles; (5) machines, equipment, tools, and other tangible components of productions; (6) durable household goods; (7) natural resources; and (8) copyrights, patents, and other intellectual property (Nam, Huang, & Sherraden, 2008; Sherraden, 1991). In general, households with assets perform better than those without in multiple family functions. The process of accumulating household assets not only changes parenting behaviors, parental characteristics, and home environment, but it also provides a supportive family context for child development. Children living in households with assets have better economic, social, and psychological well-being (Sherraden, 1991). More specifically, assets effects are achieved through the use of assets (asset spending) as well as the ownership of assets (asset holding) (Schreiner & Sherraden, 2007). Table 2.1 lists possible asset effects.

TABLE 2.1 ABOUT HERE

2.1 Asset Effects on Economic Security

Household assets can be used to meet children's basic needs and protect them from economic hardship, such as food insecurity and homelessness (Haveman & Wolfe, 1995; Lerman & McKernan; 2008; Sherraden, 1991). Such effects on consumption smoothing and economic well-being are often examined in conjunction with negative income shocks and economic crises. Severe economic hardship can lead to dysfunctional families and negative outcomes for both parents and children. Economic hardship and pressures increase the risk of emotional distress, behavioral problems, and marital conflicts (Conger & Donnellan, 2007), all of which may impair parental nurturance and involvement in child development. Assets in a family then provide a "firewall" against economic hardship and economic pressures. For those with sufficient household assets, negative financial events (such as job loss) may not necessarily translate into hardship or generate massive economic pressures. Therefore, household assets are negatively associated with economic hardship and pressures. To use assets for consumption smoothing allows families to maintain their socioeconomic status and avoid social and psychological problems (e.g., depression, marital breakup, child and spouse abuse, alcohol and drug use, and so on) (Lerman & McKernan, 2008).

Using assets for consumption smoothing presents an effect of asset spending. Asset effects on household economic security, however, are not limited to asset spending. Asset holding itself may have positive effects on household economic security as well (Schreiner& Sherraden, 2006). The process of accumulating assets is a sign of planning for the future, which in turn may reduce the risk of experiencing negative income shocks.

Asset effects on economic security are especially important for families that have children with disabilities. In many cases, having a child with a disability impairs a family's earning capacity (Seligman & Darling, 2007) because parents (usually mothers) have to reduce their labor force participation and spend more time on child care (Breslau, 1983). It is perhaps not surprising that a large proportion of families raising children with disabilities live in poverty (Wang, 2005). These families are vulnerable to income fluctuation and have greater need of financial backup.

2.2 Asset Effects on Access to Services and Support

Household assets can be used to purchase services, such as medical treatment, rehabilitation, assistive technology, long-term care, and other health services, in desired quantity and quality for children with disabilities (WHO, 2001). Children with disabilities may require health-related services beyond the need of children without disabilities (Newacheck et al., 2009). Depending on the type of disability and the health condition, children may need a wide array of physicians and specialty care providers, and they are among the most vulnerable of all populations to any limitation or disruption in health services (Kogan, et al., 2009; Mithchell & Gaskin, 2004). For example, children with disabilities have greater need of respite care, babysitting and medical care (Darling, 1987). The biggest differences in health service utilization between children with and without disabilities are hospital days (464 vs. 55 days per 1000 children) and home health care (Newacheck, Inkelas, & Kim, 2004).

Services for children with disabilities are expensive. The need for specific medical care and frequent use of medically related services, such as physical, occupational, and language therapy, also contribute to the higher cost of health care.

Previous research has identified physical and occupational therapy, physician visits, and hospitalizations as the largest out-of-pocket expenses for families raising children with disabilities (Darling, 1987; Lukemeyer, Meyers, & Smeeding, 2000). Some children may need special equipment and supplies for daily living, which could be expensive as well. Other costs may be incurred as a result of housing and vehicle modifications. All of these add to a family's financial burden. The average direct out-of-pocket expenditure for families of children with disabilities is more than twice that for other families. According to Kuhlthau et al (2005), four out of every ten families caring for children with disabilities report financial concerns.

The literature also shows a higher level of unmet needs among children with disabilities (Mithchell & Gaskin, 2004). More than 30% of children with special health care needs are classified as underinsured, due to a lack of adequate primary and preventive services, uneven access to subspecialty care and specialized therapies, poor service coordination, and barriers to other direct services (Kogan, Newacheck, Honberg, & Strickland, 2005; Perrin, 2002). About 10-20% of children with disabilities do not receive specialty care, therapy services, home health services, and mental health services as needed (Mithchell & Gaskin, 2004). Studies consistently find that underinsured children with disabilities are overrepresented in low-income families, and their families have more financial problems and difficulty in obtaining specialty referrals (Davidoff, 2004; Parish, Shattuck, & Rose, 2009).

Given the high unmet needs and high costs of health services, household assets are a key determinant of health care for children with disabilities, in addition to various possible sources of support (Korpela, Siirtola, Koivikko, 1992; Parish et al., 2009; Perrin, 2002; Shattuck & Parish, 2008). The existence of the public health services provided by the government (such as Medicaid, Medicare, and State

Children's Health Insurance Program) is not likely to diminish the importance of household economic resources because health services provided by the public health system may be inadequate and therefore necessitate families' pursuit of health services from other sources.

Household economic resources can have a unique role in healthcare even for families covered by health insurance. With employment-based private insurance, families raising children with disabilities typically have higher total expenditures and out-of-pocket expenditures than those covered by public insurance (Honberg et al., 2009; Kogan et al., 2009; Newacheck et al., 2000). As the cost of employment-based health insurance is increasingly shifted toward employees (Kogan et al., 2009), family economic resources have become more important than ever. Undoubtedly, household assets also provide necessary protection when families lose their insurance coverage. In the face of job loss and ineligibility for public insurance, families may spend down their savings to purchase commercial health insurance (Kogan et al., 2009).

2.3 Asset Effects on Family Investment in Child Development

Households with assets have financial resources to invest in children's human capital, improve their life chances (Mayer, 1997), and provide a ladder for social mobility (Conley, 2001; Shapiro, 2004). This idea is rooted in the belief that the more families invest in children the more likely they will succeed in the future.

Assets are connected, in a number of ways, to family investment in children. One such investment is health services discussed above. Another important investment is children's academic and cognitive development (Conley, 2001; Nam & Huang, 2009; Orr, 2003; Yeung & Conley, 2008; Zhan, 2006; Zhan & Sherraden, 2003). Compared to those of wealthy families, low-wealth children often live in physical environments offering less stimulation and fewer resources (e.g., educational toys and books) for learning. In contrast, wealthy families are more likely to provide opportunities for children to receive high-quality education, and even pay for their post-secondary education. Second, home equity is generally the most important asset in a family, and home ownership indicates not only a family's standard of living but also its school and neighborhood environments. Wealthy families can choose a home located in a good neighborhood and school district. Last but not least important, families with assets are more likely to have high expectations for children and be more willing to invest in child investment.

Household assets are found to be positively related to children's academic performance, measured by standardized test scores or grades controlling for a range of covariates (such as household characteristics, parental characteristics, parenting behaviors, and children's characteristics) (Orr, 2003; Shanks, 2007; Zhan, 2006; Zhan & Sherraden, 2003). But the magnitude of asset effects varies. For example, children's math scores increase by .29, .34, 1.01, and 1.57 units, respectively, as a result of doubling household net worth as reported in Elliott (2008), Orr (2003), Yeung and Conley (2008), and Zhan (2006).

Household assets also have indirect effects on children's academic performance through parenting behaviors and home environment. Orr (2003) indicates that asset effects decrease by 15% when parenting variables and home environment are included in analyses (e.g., educational resources in home and parental involvement). When a mother's expectation for a child's educational attainment is included, the grade difference between children of homeowners and renters decreases by nearly 40% (Zhan & Sherraden, 2003). As both home ownership and the mother's savings are positively related to the mother's expectations, the results suggest that asset effects are partially mediated by mother's expectations

(Zhan & Sherraden, 2003; Zhan, 2006).

In addition to academic performance, household assets are positively related to children's school and educational attainment, including total schooling years (Conley, 2001; Nam & Huang, 2009), high school graduation (Zhan & Sherraden, 2003), college attendance (Conley, 2001; Nam & Huang, 2009), college graduation (Zhan & Sherraden, 2010), and the number of post-high school years (Conley, 2001). When household net worth is doubled, the total number of schooling years increases by about a year (Conley, 2001; Nam & Huang, 2009). Zhan and Sherraden (2003) indicate that children whose mothers have savings higher than $3,000 have the odds of high school graduation 1.3 times greater than those whose mothers have no savings. In addition, when parental net worth increases by 100%, the probability of college attendance increases by 8.3% (Conley, 2001).

2.4 Asset Effects on Psychological Well-being

Asset holding can shape positive psychological well-being (Schreiner & Sherraden, 2007; Sherraden, 1991). People with assets tend to be oriented toward long-term goals and plan for the future. Life chances on the basis of accumulated assets can be internalized into the cognitive structure of individuals, particularly during early stages of the life cycle. Children from families owning assets are more likely to develop future orientation, self-esteem, and self-efficacy, which are of great importance for children with disabilities (Goodley & Lawthom, 2006). Previous studies find a connection between household assets and children's educational expectation and aspiration (e.g., Zhan & Sherraden, 2003). Families holding assets often convey high expectations for children, help children shape the behaviors needed to achieve educational goals, and even present themselves as role models for children to emulate (Shanks et al., 2009; Davis-Kean, 2005; Goyette & Xie, 1999; Singh et. al, 1995).

Asset spending can also create positive psychological well-being. During economic hard times, owning assets for consumption smoothing not only ensures the level of consumption, but also creates a sense of control, safety, and greater life satisfaction (Sherraden, 1991).

2.5 Supportive Family Context and Conceptual Model

The above mentioned asset effects on family functioning for children with disabilities and their families are proposed as indirect effects through parenting behaviors, parent-child interaction, and home environment, because children generally do not have direct control over household economic resources. Similar to the mediation mechanism suggested by previous studies (e.g., Berger, Paxson, & Waldfogel, 2009), holding assets may bring changes in parents' behaviors and home environment, which eventually translates into better family functioning (in economic support, health care, recreation, socialization, self-identity, affection, and education) that influence child development (Marshak, Seligman, & Prezant, 1999). If we see home environment, parental characteristics, and family functioning altogether as family context, then it is by providing a supportive family context that household assets exert effects on children.

FIGURE 2.1 ABOUT HERE

Figure 2.1 describes the mediation mechanism linking household assets and child well-being. According to the life course theory and studies of household income and child well-being (e.g., Berger et al., 2009; Mortimer & Shanahan, 2006), parental characteristics broadly include socioeconomic characteristics, parental attitudes, parenting behaviors, and parent-child interaction. Home environment is defined as the physical environment. Child well-being may include but is not limited to economic well-being, health status, cognitive development and educational achievement.

It seems reasonable to suggest that household assets have effects for children with disabilities similar to those for children without disabilities, since psychological studies already show the importance of a supportive family context for children with disabilities (Lewis, 2003). For families raising children with disabilities, there may be unique challenges and negative experiences related to child disability, such as financial strain, parenting stress, and parental mental illness. In turn, these problems become environmental barriers for child development. It is not clear if there is any interaction between asset effects and these negative experiences related to child disability. But as expected, parents of a child with a disability may relocate family resources by investing more in child's health care than other domains of child development. Also, child disability may influence (increase or decrease) parents' willingness to invest in child development, given the uncertainty of investment return. Figure 2.2 depicts possible linkages from household assets to child well-being, with a consideration of child disability. Child disability may also influence family economic resources, family context, parenting behaviors (e.g., educational expectation), and child well-being.

FIGURE 2.2 ABOUT HERE

2.6 Summary

To sum up, there is a positive relationship between assets and many measures of child well-being. Parents with assets have more economic resources to invest in child development and to purchase services, and they have more control over their life style and family relations. Asset holding adds to their coping ability in dealing with disability-related challenges and stress, and it also increases family stability. Asset holding can shape parenting behaviors and improve the well-being of children with disabilities. This study will first test the associations between household assets and educational and health outcomes of children with disabilities in reduced-form models controlling for household demographics and socioeconomic characteristics; it will further test the hypothesized mediation mechanism from household assets to parenting behaviors and then to child well-being. It is hypothesized that, (1) for children with disabilities, household assets have positive effects on academic achievement, school attainment, health service access, and global health status; and (2) the mechanism of asset effects for children is that household assets affect children though parenting behaviors, such as parental involvement in child development and parental warmth.

Chapter 3: Data and Measure

3.1 Data Overview

Data for the study are from the Child Development Supplement (CDS) in the Panel Study of Income Dynamics (PSID). The PSID is a longitudinal survey that is publicly available through the Institute for Social Research at the University of Michigan (ISP, 2009). The PSID collects demographic information and socioeconomic characteristics from a nationally representative sample of individuals and their families annually from 1968-1997 and biennially thereafter.

Beginning in 1997, the PSID researchers supplemented its core data with additional information from a group of children 0-12 years old (N=3,563) and their parents from 2,380 families in the Child Development Supplement (CDS). The same children were interviewed in 1997, 2002, and 2007, respectively, if they were still younger than age 18 at the time of each interview. After age 18, the child exits the CDS, and enters another PSID supplement, Transition into Adulthood (TA), which has been conducted twice (2005 and 2007). Figure 3.1 shows the connection between the CDS and the TA.[2] The actual sample size of each wave is listed in the figure.

FIGURE 3.1 ABOUT HERE

The CDS includes measures of a broad array of child developmental outcomes, such as physical health and disability, emotional well-being, cognitive and academic achievement, and social relationships with family and peers (ISP, 2009). The CDS data are collected from multiple individuals using varied methodology. There are several modules in the CDS: (1) the primary caregiver interview, (2) the child interview (for those aged 10 and older), (3) the standardized educational achievement

2 This study does not use the information in the PSID-TA.

assessment, (4) time diary of child activities, and (5) the other caregiver questionnaire. A combination of the CDS and the PSID family data can be used to examine the association between household assets and developmental outcomes for children with disabilities.

The PSID main files and the CDS supplemental files contain major variables of interest, including household assets, child disability, and child's educational and health outcomes. Household assets have been measured in 1984, 1989, 1994, 1999, and biennially thereafter. Detailed information regarding these measures is provided in the measurement section below, and the interview years of these measures are provided in Table 3.1. In addition, the repeated measures in the PSID-CDS are preferred over cross-sectional data. Taking advantage of the longitudinal information provided by the PSID-CDS, this study can choose with flexibility the appropriate measures and samples to investigate the questions of interest.

TABLE 3.1 ABOUT HERE

The PSID-CDS, however, has several limitations to the questions of interest. First, its sample size is relatively small (3,563 in Wave I; 2,907 in Wave II; and 1,506 in Wave III). When the sample is limited to children with disabilities, it becomes even smaller. Second, measures of major variables are not included in every wave of the PSID (see Table 3.1). In addition, the three CDS waves with long intervals in between (five years) are not sufficient to show developmental trajectories of the CDS children. While some of these limitations can be addressed by alternative data sources, such as the Survey of Income and Program Participation (SIPP) or the National Longitudinal Survey of Youth 79 Children (NLSY'79) (both of which have greater sample sizes), these alternative data have their own disadvantages. For example, the SIPP does not have all major variables of the study in each wave and is limited by its short panels

(2.5-4 years) for each sample. The short panel restricts a long-term examination of asset effects. While the NLSY'79 includes major variables in most of its interviews, its asset measures have relatively lower response rates than those in the PSID. Comparatively, the PSID produces more reliable asset measures because of the way its asset questions are set up (Yeung and Conley, 2008). It would be desirable to test asset effects using all three datasets discussed above. The two alternative data sources are left for future examination.

3.2 Sample Selection

The study sample includes only the CDS children with disabilities. Child disability measures are indicated by health conditions recorded in the CDS, and the measure of child disability will be discussed in greater detail in the measurement section. Several criteria in addition to child disability are utilized for sample selection. The study includes the CDS children with disabilities who are (1) white or black; (2) living in households headed by American citizens; and (3) living with at least one biological parent when reporting disability. The study includes only white or black children because of the small sample sizes for other racial or ethnic groups. For example, in the CDS-I, there are only seven children with disabilities identified as other ethnic groups. For the same reason, immigrants are excluded from the study sample. There are 52 children living in households headed by immigrants in the CDS-I. Based on these sample selection criteria, the sample includes a total of 1,065 children with disabilities in at least one of the CDS waves: 518 children in Wave I, 563 in Wave II, and 389 in Wave III.

3.3 Measures

3.3.1 Child Disability

The CDS asks primary caregivers to report child's health and mental health, including a series of chronic health conditions (such as epilepsy or convulsions, speech impairment, and so on). The same list of chronic conditions can be found in other major child surveys, such as the National Longitudinal Survey of Youth 1979 Cohort-Children (NLSY79 Children) and the National Longitudinal Study of Adolescence Health (ADD Health). According to the Individuals with Disabilities Education Act (IDEA 2004),[3] there are 14 specific primary conditions under the lead definition of "child with a disability." Ten of these primary conditions are recorded in the CDS. Therefore, a CDS child who has a positive response on any of these conditions is considered a child with a disability and is included in the study sample.[4]

To combine different types of health conditions under a unified measure of child disability, however, raises a concern because different types of disability may indicate different development trajectories and outcomes. To address this issue, the study uses dichotomous indicators of these health conditions as control variables.

3.3.2 Educational and Health Outcomes

Pollard and Lee (2003) provide a unified definition of child well-being as "a multidimensional construct incorporating mental/psychological, physical, and social dimensions" (p.64). This definition includes five operationalized domains: physical, psychological, cognitive, social, and economic. The focus of this study—educational and health outcomes—covers both physical and cognitive domains.

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3 Child with a disability means a child evaluated in accordance with §§300.304 through 300.311 of IDEA as having mental retardation, a hearing impairment (including deafness), a speech or language impairment, a visual impairment (including blindness), a serious emotional disturbance (referred to in this part as "emotional disturbance"), an orthopedic impairment, autism, traumatic brain injury, other health impairment, a specific learning disability, deaf-blindness, or multiple disabilities, and who, by reason thereof, needs special education and related services. (IDEA, § 300.8)

4 These conditions in the CDS are epilepsy, speech impairment, hearing difficulty, difficulty seeing, retardation, emotional disturbance, orthopedic impairment, developmental delay, learning disability, autism, and hyperactivity.

The CDS includes a series of indicators of educational achievement of children. The study uses four educational outcomes: Two subsets of the Woodcock-Johnson Revised Tests of Achievement (WJ-R), repeated grade, and school suspension or expulsion in childhood. The WJ-R is a well-established and respected measure with information on several dimensions of intellectual ability, including degree of mastery in mathematics and reading (Woodcock & Mather, 1990). Two subsets of the WJ-R (the Applied Problem test and the Broad Reading test) are administered in all three waves of the CDS for children aged three years and older and are considered measures of math and reading achievement (academic achievement). The standardized scales of these two tests range from 0-200. The CDS also reveals whether a child has ever repeated a grade (Yes=1/No=0) since kindergarten and whether a child has ever been suspended or expelled from school (Yes=1/No=0).

The outcome measures regarding health status and service utilization in childhood include the global health status (a Likert scale variable from Excellent to Poor reported by primary caregivers), the number of school days missed due to physical illness (a count variable), the frequency of hospitalization in the last five years (a count variable), the number of doctor visits for physical illness last year (a count variable), and visiting a doctor for emotional problems or not (Yes=1/No=0). The variable of global health status, a commonly used health measure, is recoded into a dichotomous one (Excellent=1/Otherwise=0) in all analyses. In some analyses, the count variables are recoded as dichotomous measures (Frequency greater than 0=1/Otherwise=0).

3.3.3 Asset Measures

Two continuous asset measures—household net worth and liquid assets—are created and used as the focal measures of household assets. The wealth modules in the

PSID family files (see Table 3.1) collect information on multiple household asset types, including (1) home, (2) business/farm, (3) other real estate, (4) vehicles, (5) checking/savings, (6) stocks and mutual funds, (7) other savings, and (8) unsecured debts. However, it is not feasible to examine all of these asset types in the study. Household net worth is the sum of all of these asset types net of all debts. It indicates economic resources available to households if they sell all these assets, and it reveals a household's net economic position. Liquid assets are the sum of checking/savings, stocks and mutual funds, and other savings; it is relatively easy to convert liquid assets into cash. Previous studies have shown that liquid assets are more likely to affect child outcomes (Conley, 2001; Nam & Huang, 2009).

Following the convention in the literature to address skewness and to obtain a semi-elasticity explanation (Conley, 2001; Nam & Huang, 2009; Orr, 2003), the logarithm of net worth and liquid assets are created for regression analyses. Zero liquid asset values and zero/negative net worth values are recoded as 1 prior to the transformation. In addition, to capture the nonlinear effects of household assets, a four-level categorical variable is created for net worth (<$0, $0-10,000, $10,001-40,000, and >$40,000). These thresholds are chosen for two reasons. First, they are very close to the quartiles of the net worth distribution in the sample but easier to remember than the exact quartile numbers (which can be helpful in result interpretation). The three quartiles of net worth in the sample are $50, $9,400, and $39,000, respectively. Results of analyses using this categorical net worth measure do not differ from those using the quartiles. Second, negative net worth values are categorized into one group since negative net worth may have effects on child outcomes different from other groups (Nam & Huang, 2009). A four-level categorical variable for liquid assets is also created using the thresholds close to the exact quartile values of liquid assets ($0, $1-1,000, $1,001-10,000, and >$10,000).[5]

3.3.4 Other Measures

TABLE 3.2 ABOUT HERE

The study includes four groups of control variables (see Table 3.2). The first group is child's characteristics, including age, gender (Male=1/Female=0), race (Black=1/White=0), disability types, timing of reporting disability (Wave I, II, or III), special education (Yes=1/No=0), and health insurance coverage (No insurance=0, Employer provided=1, and Government provided=2).[6] The second group includes indicators of household header's characteristics, such as gender and employment (Employed=1/Otherwise=0). The analyses also include mother's characteristics, such as age, education (Less than high school=0, High school=1, Some college=2, and Four-year college and above=3), and marital status (Married=1/Otherwise=0). Third, household characteristics are indicated by household size, number of children, average household income in previous five years (logarithm), and public program participation (AFDC/TANF, Food Stamp, and Supplemental Security Income).

The fourth group includes four parenting behaviors that are proposed mediators in the study. Parental involvement is indicated by a composite scale created by the PSID to measure parents' cognitive stimulation and emotional support for child development. Examples of survey questions on this scale are how many books child

5 I used different measures of net worth and liquid assets for sensitivity tests. For example, different thresholds for categorical asset measures are tested. In one sensitivity test, I include both categorical and continuous net worth measures as independent variables: The continuous measure is log-transformed net worth value, and the categorical measure indicates whether households have negative, zero, or positive net worth.

6 Eight children with private insurance are included in the category of employer-provided insurance.

has and how often child eats with mother and father. Items on this scale vary in the three waves of the CDS; therefore, the range of parental involvement also varies. For example, in the CDS-I, the value of parental involvement ranges from 7 to 27, with higher scores indicating more involvement. Two indicators of the quality of parenting are parenting stress and parental warmth. Parenting stress is measured by a seven-item index indicating the primary caregiver's feelings and perceptions about caring for the child (e.g., "There are some things that (child) does that really bother me a lot."). The six-item parental warmth scale measures the warmth of the relationship between the child and parent in the month prior to the interview, including the frequency of showing physical affection, emotional support, and appreciation, and playing with the child or participating in the child's favorite activities. Developed by Child Trends, Inc. (Hofferth, Davis-Kean, Davis, Finkelstein, 1998), both scales range from 1 to 5, with a higher score indicating a greater degree of the measured constructs (stress and warmth). In addition, this study includes a three-level measure of parents' educational expectations for children (High school or below=1, Some college=2, and Four year college or above=3).

3.4 Missing Data

Missing data in a longitudinal survey can be a complicated issue. In the case of the PSID-CDS, missing data result from long-term attrition, changes in interview eligibility, imputation procedures already applied by the PSID,[7] and the data frame defined by each specific study. The PSID-CDS user's guide suggests using appropriate sampling weight or multiple imputation methods to deal with the missing

7 PSID imputes missing values on wealth variables. Among all interviewed families, there are 307 cases (4.4%) in the 1999 family data and 347 cases (4.7%) in the 2001 family data receiving imputation on wealth variables. PSID imputes these missing values using inflation-adjusted wealth values in previous waves of PSID first. If previous values are not available, a mean wealth value after categorizing by family income and age of head in the group is used for imputation.

data (ISR, 2009). This study uses a multiple imputation (MI) procedure to deal with missing data. The MI is a repeated imputation approach that creates a small number of copies of the data, and each copy has missing values imputed. Each copy of the data is analyzed by standard statistical methods, and the results are combined to produce estimates and confidence interval (Rubin, 1987). MI procedure in this study is based on an iterative multivariate regression technique (Royston, 2004, 2005a, & 2005b), and ten simulated datasets (or imputed datasets) are created.[8]

8 Twenty imputed datasets are used for sensitivity tests.

Chapter 4: Empirical Strategies

4.1 Cumulative Effects of Household Assets

The hypothesis of asset effects for children with disabilities can be expressed in a population model of Equation 4.1:

$$Y_t = F(A_0, A_1, A_2 ......A_t, O) \quad (4.1)$$

Where t indicates a child's age, Y indicates a child outcome measure, A is household assets, and O is other factors affecting child well-being (such as genetic inheritance, child characteristics, disability status, home environment, parental characteristics, social support, neighbor and school environment, policy context, and so on). In a word, child outcome at age t is a function of not only current household assets (A_t), but also all previous household assets from A_0 to A_t.[9] It is reasonable to hypothesize that current child outcome is a cumulative effect of all previous investments, indicated by household assets at different ages of a child from A_0 to A_t.

It is still not clear what the specific functional form ($F()$) in Equation 4.1 is. The theoretical development of asset effects for children is not sophisticated enough to specify this functional form. For simplicity, suppose $F()$ is a linear and additive function on regression coefficients:

$$Y_t = \beta_0 A_0 + \beta_1 A_1 + \beta_2 A_2 + ...\beta_t A_t + O_t \gamma_t + \mu_t \quad (4.2)$$

β, a scalar, is a regression coefficient of assets at a certain age (i.e., β_t for age t); γ_t is a $N \times 1$ matrix if O_t includes N factors; and μ_t is the error term in the model. Since the PSID-CDS children are observed three times in the data, Equation 4.2 can be further specified for the three observation periods (4.3):

9 Theoretically, future assets may affect current child outcome as well. For example, by knowing that their families have sufficient financial resources for future college costs, children may have desirable educational outcomes.

$$Y_t = \beta_0 A_0 + \beta_1 A_1 + \beta_2 A_2 + ... + \beta_t A_t + O_t \gamma_t + \mu_t$$
$$Y_{t+1} = \beta'_0 A_0 + \beta'_1 A_1 + \beta'_2 A_2 + ... + \beta'_t A_t + \beta'_{t+1} A_{t+1} + O_{t+1} \gamma'_{t+1} + \mu_{t+1}$$
$$Y_{t+2} = \beta''_0 A_0 + \beta''_1 A_1 + \beta''_2 A_2 + ... + \beta''_t A_t + \beta''_{t+1} A_{t+1} + \beta''_{t+2} A_{t+2} + O_{t+2} \gamma''_{t+2} + \mu_{t+2}$$

The model of Y_{t+1} includes one more predictor (A_{t+1}) than the model of Y_t, and, similarly, the model of Y_{t+2} adds another predictor (A_{t+2}) based on the model of Y_{t+1}. Since household assets have a hypothetically positive relationship with child outcomes, the mean of regression coefficients of asset measures in each model ($\bar{\beta}$, $\bar{\beta}'$, and $\bar{\beta}''$), or the average effects of previous household assets on current child outcome, is likely to be greater than 0. Each individual coefficient (β, β' and β''), however, is not necessarily greater than 0.

There are several possibilities regarding the pattern from β_0 to β_t in the model of Y_t. One possibility is that the closer the times household assets and child outcome are observed, the bigger the regression coefficients of asset measures are ($\beta_m < \beta_n,\ if\ \ m < n \le t$). In other words, current assets are considered more important than earlier assets for current outcome measures. If this is the pattern, it seems reasonable to say that $\beta''_t < \beta'_t < \beta_t$ across three models of Y_{t+2}, Y_{t+1}, and Y_t. A specific example of this pattern may be the relationships among household assets, household liquidity constraints, and children's college entry: Household assets measured closer to children's college entry are more important than those measured in an earlier stage regarding children's college entry.

The second possible pattern is the opposite, in which household assets in early childhood are more important than later assets for child development ($\beta_m > \beta_n,\ if\ \ m < n \le t$). Studies by Heckman and his colleagues (e.g., Cunha & Heckman, 2010) suggest that family investment in early childhood is more efficient than that in late childhood. The third possibility is that for specific outcome measures, household assets have expected positive effects only in certain age ranges ($\beta_t > 0,\ if\ \ m < t < n$). These age ranges are key stages for particular development goals. The third pattern seems consistent with theoretical discussions of child growth and development stages. Finally, the fourth possibility is that asset effects at different ages are similar ($\beta_0 \approx \beta_1 \approx \beta_2 ...... \approx \beta_t$). Nonetheless, the pattern from β_0 to β_t may vary by child outcome measures, and different patterns have variant policy implications.

4.2 Four Empirical Strategies

To test asset effects for children with disabilities, all factors specified in *O* of Equation 4.2 (e.g., genetic inheritance, child characteristics, disability status, home environment, parental characteristics, social support, neighbor and school environment, policy context, and so on) should be controlled for in the model, especially those affecting both household asset accumulation and child outcomes. If at all possible, an experiment with randomly assigned assets would be the best option to control for these factors. Unfortunately, this is not possible for the current study for which the observed secondary data are used. Therefore, I include some of these factors as control variables in regression analyses, a conventional practice in the literature. Four groups of control variables are proposed in Chapter 3 (see Table 3.2).

The strategy of adding control variables is robust in general, but not without limitations. First, factors correlated with household assets and child outcomes, if not observed or measured in the data, can by no means be controlled for. This is the so-called “omitted variable bias.” For example, children’s genetic inheritance, parents’ saving taste and financial capability, and parents’ future orientation may affect both household assets and child outcomes, but they are not measured in the PSID-CDS. In addition, as the theory in this area is far from adequately developed, some factors important for both household assets and child outcomes yet not defined are likely not to be included in analyses. Second, the strategy of controlling variables works well under the assumption that the confoundedness between household assets and control variables is correctly specified and the sample data on control variables are balanced by the level of the focal independent variable. Failure to meet these assumptions would create the problem of estimation bias. For example, to simply add variables, such as household income and household head's education and employment, as control variables in the model may cause misspecification because such a model assumes linearity when the way these variables affect asset accumulation and child outcomes is actually nonlinear.

FIGURE 4.1 ABOUT HERE

To address these two issues, the study proposes four empirical strategies, focusing on several key confounding variables that affect both household assets and child outcomes. As shown in Figure 4.1, some factors may influence household assets (that is, household assets are endogenous variables). These factors include child characteristics (e.g., disability types), program and services (e.g., Medicaid & SSI), household socioeconomic status (e.g., income and education), and child outcomes. The solid-line arrow in Figure 4.1 is the research interest of the study—asset effects on child outcomes. In order to have a consistent estimate of asset effects, confoundedness represented by the dotted-line arrows should be addressed.

Clearly, both child characteristics and programs/services can affect parents' saving behaviors. For example, as a result of expensive health services needed by their children with disabilities, parents are less likely to save, or parents may have strong motives for precautionary savings for children's health expenditure. In addition, the dependent measures of child outcomes (e.g., health service utilization and health status) are likely to affect household assets as well. High levels of health service utilization (indicated by the number of doctor visits and hospitalization) may decrease household assets. Similarly, public service utilization or means-tested programs may change parents' saving behaviors as well. Public programs may crowd out the need for private financial resources (e.g., savings).

4.2.1 Assets Measured Before Childbirth

Taking the advantage of longitudinal data, the first empirical strategy uses household assets measured before childbirth. Specifically, the 1984, 1989, and 1994 asset measures are used for children born between 1985-1989, 1990-1994, and 1995-1997, respectively. This design is to address the above concern that household assets may be affected by child outcome measures, other child characteristics, and program services. Logically, everything that occurs after childbirth—such as children's disability type, development outcomes, and programs/services children receives—cannot affect household assets measured before childbirth.

FIGURE 4.2 ABOUT HERE

Child outcome measures in the first strategy are defined at the second wave (2002) of the PSID-CDS. This way, analyses can include all children who have a disability in the first or second wave. This results in a slightly larger sample size (N=732). By contrast, to choose outcome measures in the first wave (1997), those reporting disabilities in the second wave would be excluded from the study sample; if outcome measures in the third wave (2007) are chosen, then missing values raise a concern because a high proportion of children are not interviewed as they are aged out of the CDS survey (see Figure 3.1).

Household characteristics (the second and third groups of control variables, see Table 3.2) in this set of analyses are measured in the same year as asset measures are. The other two groups of control variables—child characteristics and parenting behaviors are defined at the first wave (1997) of the CDS. Figure 4.2 illustrates the design of the first strategy. It is a simplified version of Equation 4.2 without including asset measures in childhood (from A_1 to A_t):

$$Y_t = \beta_0 A_0 + O_t \gamma_t \quad (4.4)$$

Analyses employing the first empirical strategy have five model specifications for each outcome measure. First, Model 1, the baseline model, includes only household and child's characteristics as independent variables. The second and third models (Models 2 and 3) add the continuous and categorical asset measures, respectively. Models 4 and 5 extend Models 2 and 3 by adding parenting behavior variables. These five models are the major model specifications (with minor modifications) in the other three empirical strategies as well.

4.2.2 Propensity Score Classification

The first strategy, although useful, cannot address the confoundedness of household assets and other indicators of household socioeconomic status (e.g., household income and household head's education). The confoundedness between household assets and household socioeconomic status is unlikely to be linear and additive. In this situation, the conventional approach of adding control variables in regression may not address the confoundedness issue. Hence, the current study uses propensity score classification (Imai & Van Dyk, 2004) in the second empirical strategy. The same study sample for the first strategy (N=732, see Figure 4.2) is used. An obvious advantage of the propensity score analysis is that it does not assume the confoundedness between assets and other socioeconomic characteristics (e.g., income and education) to be additive or linear. More important, it can be used to balance socioeconomic variables for households with different levels of assets.

The propensity score method was originally proposed by Rubin (1974, 1977, 1978, & 1986). There is extensive literature on this method (e.g., Guo & Fraser, 2009). Briefly speaking, the propensity score method suggests that asset effects can be consistently estimated only when individuals who have similar values on the confounding variables are compared. If there is only one confounding factor, such as household income, the practice is to first categorize the sample into multiple groups by household income and then to estimate asset effects within each group. This approach becomes rather cumbersome, however, if there are multiple confounding variables, because it is difficult to simultaneously categorize multiple variables (the high-dimensional issue).

To solve this problem, the propensity score approach estimates an individual's expected value on the focal independent variable using all observed confounding variables.[10] The expected value (also called the propensity score) is a one-dimensional balancing score for observed confounding variables. The study sample can be classified, weighted, or matched based on this propensity score before the effect of the independent variable is examined. Following this procedure, the study uses household characteristics and household head's characteristics (the second and third groups of control variables) to predict asset values. The study sample then is categorized into three groups by the predicted asset value. As indicated in Equation 4.5, asset effects for children with disabilities are assessed within each group,

$$Y_{tg} = \beta_{0g} A_{0g} + O_g \gamma_g \quad (4.5)$$

where the new subscription *g* indicates the number of groups created by propensity

10 In the case of a dichotomous focal independent variable or a dichotomous "treatment" variable, its expected probability is estimated. Propensity score analysis has been commonly used for this type of "treatment" variables.

score classification. To be clear, in this strategy household assets are still measured before childbirth (A_0). More detail about propensity score classification is provided in Appendix A.

4.2.3 Fixed-Effects Models

Unobserved factors highlighted in Figure 4.1 may seriously bias the estimated asset effects, but neither of the above discussed strategies can address this problem. Time-invariant unobservable factors are typically addressed using the fixed-effects regression model. The third empirical strategy proposes fixed-effects analyses to further examine the effects of household assets for children with disabilities. Different from the sample used in the first two strategies, the study sample of the third strategy includes all PSID-CDS children reporting disability in any of the three waves (N=1,056), and, theoretically, each subject is observed three times.[11] Table 4.1 displays the timing of the measures in the three observations.

TABLE 4.1 ABOUT HERE

Fixed-effects estimation of asset effects for children can be expressed as:

$$Y_{it} = \alpha_i + \beta A_{it} + O_{it}\gamma + \varepsilon_{it},\ i = 1...1056,\ t = 1,2,3 \qquad (4.6)$$

Where *i* is individual and *t* is time points from Wave I to III, and the other notations are consistent with the above equations. In this framework, α_i estimates the heterogeneous individual effect that is fixed over time for each subject. This estimation also takes into account all unobserved factors that are time-invariant.

While it may seem reasonable to use the fixed-effects model to control for unobserved effects, this does not appear to be completely consistent with the

11 Not all children have three observations in three waves of the PSID-CDS due to missing data and changes of eligibility rules. For example, more than half of CDS children were not eligible for CDS Wave III because they were older than 18 in 2007.

conceptual model proposed in Equations 4.3. The fixed-effects model in Equation 4.6 can be further specified for the observations at the three waves, respectively:

$$\begin{aligned} Y_{it} &= \alpha_i + \beta A_{it} + O_{it}\gamma + \varepsilon_{it} \\ Y_{it+1} &= \alpha_i + \beta A_{it+1} + O_{it+1}\gamma + \varepsilon_{it+1} \\ Y_{it+2} &= \alpha_i + \beta A_{it+2} + O_{it+2}\gamma + \varepsilon_{it+2} \end{aligned} \qquad (4.7)$$

A comparison of Equations 4.7 and Equations 4.3 reveals several differences. For convenience, Equations 4.3 is slightly modified as follows (Equations 4.8):

$$\begin{aligned} Y_{it} &= (\beta_0 A_{i0} + \beta_1 A_{i1} + \beta_2 A_{i2} + ... + \beta_{t-1} A_{it-1}) + \beta_t A_{it} + O_{it}\gamma + \mu_{it} \\ Y_{it+1} &= (\beta'_0 A_{i0} + \beta'_1 A_{i1} + \beta'_2 A_{i2} + ... + \beta'_t A_{it}) + \beta'_{t+1} A_{it+1} + O_{it+1}\gamma' + \mu_{it+1} \\ Y_{it+2} &= (\beta''_0 A_{i0} + \beta''_1 A_{i1} + \beta''_2 A_{i2} + ... + \beta''_t A_{it} + \beta''_{t+1} A_{it+1}) + \beta''_{t+2} A_{it+2} + O_{it+2}\gamma'' + \mu_{it+2} \end{aligned}$$

First, it allows for different regression coefficients of asset measures ($\beta_t, \beta'_{t+1}, \beta''_{t+2}$) over the three waves, while the fixed-effects model assumes a fixed regression coefficient of asset measures over time (β). This inconsistency may not cause a problem because the varied regression coefficients can be modeled in fixed-effects analysis by adding the interaction term of assets and time.

Second, the fixed-effects model uses a fixed term α_i to replace the three terms in the parentheses in Equations 4.8. Theoretically, these terms are cumulative effects of previous assets (current assets not included), and they are not likely to stay the same over time. To fit the format of the fixed-effects model, Equations 4.8 can be further modified as 4.9 below:

$$\begin{aligned} Y_{it} &= \alpha_i + \beta_t A_{it} + O_{it}\gamma + (\beta_0 A_{i0} + \beta_1 A_{i1} + \beta_2 A_{i2} + ... + \beta_{t-1} A_{it-1} - \alpha_i + \mu_{it}) \\ Y_{it+1} &= \alpha_i + \beta'_{t+1} A_{it+1} + O_{it+1}\gamma' + (\beta'_0 A_{i0} + \beta'_1 A_{i1} + \beta'_2 A_{i2} + ... \beta'_t A_{it} - \alpha_i + \mu_{it+1}) \\ Y_{it+2} &= \alpha_i + \beta''_{t+2} A_{it+2} + O_{it+2}\gamma'' + (\beta''_0 A_{i0} + \beta''_1 A_{i1} + \beta''_2 A_{i2} + ... \beta''_t A_{it} + \beta''_{t+1} A_{it+1} - \alpha_i + \mu_{it+2}) \end{aligned}$$

In the model of Y_{it}, the term in the parentheses is likely to be related to α_i and A_{it}. So are those in the models of Y_{it+1} and Y_{it+2}. The three terms in the parentheses of

Equations 4.9, unfortunately, are left out in the error term in the fixed-effects analyses, and, therefore, violate the exogeneity assumption. This is a limitation of this strategy.

4.2.4 Dynamic Models

The violation of the exogeneity assumption in the fixed-effects model is in part caused by the fixed-term α_i. The first-difference estimator may better estimate asset effects than the fixed-effects estimator because the former can control for unobserved effects without imposing a fixed term. Approximately, the first difference estimation of asset effects for children can be expressed as follows:

$$\begin{aligned} &Y_{t+1} - Y_t = \beta(A_{t+1} - A_t) + (\varepsilon_{t+1} - \varepsilon_t) \quad or \\ &\Delta Y_{t+1} = \beta \Delta A_{t+1} + \Delta \varepsilon_{t+1} \end{aligned} \qquad (4.10)$$

Where ΔY_{t+1} is the difference of Y_{t+1} and Y_t, and ΔA_{t+1} is the difference between A_{t+1} and A_t. This expression of the first-difference estimation, however, shows an inconsistency from the conceptual estimation of asset effects for children in Equations 4.3. To take the first difference in Equations 4.3 with the assumption of $\beta_t = \beta_t' = \beta_t''$, the obtained equation should be as follows:

$$\Delta Y_{t+1} = \beta_{t+1}' A_{t+1} + \Delta \varepsilon_{t+1} \quad (4.11)$$

The key difference is that Equations 4.10 uses ΔA_{t+1} but Equation 4.11 uses A_{t+1} as the main predictor. The former suggests that changes in the child outcome measure between age *t* and *t+1* is caused by changes in household assets between the two time periods. The latter, however, suggests that all assets at time *t+1* are responsible for the improvement or decline of child outcome at time *t+1*. Since household assets have cumulative effects on child well-being, there is no need to assume that only asset difference or new assets are important.

The limitations of the fixed-effects and first-difference models indicate the dynamics on child outcomes which, however, is not made explicit in Equations 4.3. For example, it is relatively easy to see that the models of Y_{t+2} and Y_{t+1} in Equations 4.3 include all the terms used by the model of Y_{t+1} and Y_t, respectively. Therefore, a different approach to this idea in Equations 4.3 is

$$\begin{aligned} Y_t &= \delta Y_{t-1} + \beta_t A_t \\ Y_{t+1} &= \delta' Y_t + \beta'_{t+1} A_{t+1} \\ Y_{t+2} &= \delta'' Y_{t+1} + \beta''_{t+2} A_{t+2} \end{aligned} \qquad (4.12)$$

Child outcomes at age *t* are determined by child outcomes at age *t-1* and household assets at age *t*. Equations 4.12 clearly show the dynamic relationships between child outcomes over time and their interactions with household assets. The dynamic panel data can be estimated by the Arellano-Bond estimator (Arellano & Bond, 1991). Simply put, this estimator uses the difference of first difference in the dependent variable as an instrument variable. For example, $[(Y_{t+2} - Y_{t+1}) - (Y_{t+1} - Y_t)]$ is an instrumental variable for Y_{t+1} in the model of Y_{t+2}. Unfortunately, this method works only for observations in the last wave of the CDS because it requires information from the two previous waves. The same method cannot be applied to the data in the first and second waves because this requirement cannot be satisfied.

FIGURE 4.3 ABOUT HERE

Allison (2009) discusses a method to estimate the dynamic fixed-effects model in the framework of Structural Equations Modeling (SEM). The key of this method is to allow an estimation of the correlation between the independent variable (such as assets) at the current stage and the error term of the dependent variable at the previous stage. The fourth empirical strategy adopts this method suggested by Allison (2009), and Figure 4.3 shows an elaboration of this method; the study sample for this strategy is the same as that in fixed-effects analyses. Not a measurement model here, the latent variable α_i in Figure 4.3 corresponds to the individual fixed term in Equations 4.7. Different from the fixed-effects model, Figure 4.3 also estimates b_{t+1} (correlation between ε_t and A_{t+1}) and b_{t+2} (correlation between ε_{t+1} and A_{t+2}). The model in Figure 4.3 can also be demonstrated in Equations 4.13. Detailed information on this strategy can be found in Appendix B.

$$\begin{aligned} Y_{it} &= \alpha_i + \beta A_{it} + \varepsilon_{it} \\ Y_{it+1} &= \alpha_i + \beta A_{it+1} + \delta Y_t + \varepsilon_{it+1} \\ Y_{it+2} &= \alpha_i + \beta A_{it+2} + \delta Y_{t+1} + \varepsilon_{it+2} \\ b_{t+1} &= Corr(A_{t+1,} \varepsilon_t) \\ b_{t+2} &= Corr(A_{t+2,} \varepsilon_{t+1}) \end{aligned} \tag{4.13}$$

4.3 Summary

Proposing an empirical model of cumulative asset effects in Equations 4.3, this chapter discusses four empirical strategies to test asset effects for children with disabilities. In the first set of analyses, the study focuses on the effects of household assets measured before childbirth. The second set of analyses categorizes the sample used in the first strategy into multiple groups according to the propensity score of household assets. The first two strategies are essentially analyses based on a cross-sectional design. The third and fourth strategies then utilize the three-wave longitudinal data from the PSID-CDS. The third set of analyses applies the fixed-effects model to control for time-invariant unobserved factors when estimating asset effects for children with disabilities. The final analyses further test asset effects for children in the dynamic model using Structural Equations Modeling (SEM). Four strategies are developed with two considerations: (1) to address key confounding factors using various methods, and (2) to include in analyses household assets measured at different time periods. Results of analyses using these different strategies can be compared, which may offer insights into how asset effects change over the course of child development.

Chapter 5: Results of Cross-Sectional Analyses

This chapter discusses results of cross-sectional analyses in the first two strategies (results are also summarized in Table 5.1). These two strategies use assets measured before childbirth to avoid simultaneous effects between household assets and child outcomes, and to avoid interactions between household assets and children's characteristics or services they received. The second strategy further applies propensity score classification to tackle the potential confoundedness of household assets and household background variables. The analyses are conducted on ten imputed datasets created by the multiple imputation procedure (MI)[12], and are weighted using the weight variable provided by the PSID. Each imputed dataset has 732 observations.

TABLE 5.1 ABOUT HERE

Overall, assets have expected associations with children's educational and health outcomes in the first set of analyses. As summarized in Table 5.1, net worth is positively related to the applied problems score and the broad reading score, and negatively associated with children's school suspension or expulsion. Children living in households with more liquid assets are less likely to repeat a grade or have school suspension or expulsion. Household assets also have positive associations with children's global health status and are associated with reduced numbers of school days missed due to physical illness, hospitalization, and doctor visits for physical illness. The asset-health outcome association is consistently supported across different asset measures (continuous vs. categorical), asset types (net worth vs. liquid assets), and dependent variables. Health outcomes appear to be better measures than

12 I also conducted analyses on the original dataset without imputation. The results on the original data through listwise deletion are similar to those from imputed datasets.

educational outcomes in testing asset effect for children with disabilities. The findings, especially those of categorical asset measures, also show that non-linear relationships between assets and child outcomes can be identified when the amount of assets exceeds certain thresholds.

The second set of analyses confirms the hypothesized asset effects on global health status, school days missed due to illness, and the likelihood of hospitalization for children with disabilities. These findings are consistent across different asset types (net worth vs. liquid assets) and asset measures (continuous vs. categorical). By comparing the results between groups with high and low expected asset values, the second strategy also finds that household assets show greater influences in the group with low expected asset values.

5.1 Descriptive Results

TABLE 5.2 ABOUT HERE

Table 5.2 reports descriptive statistics of the variables in this study. Children in the sample are 12 years old on average in 2002. More than half of them are male, and two out of every ten are black. Reported by primary caregivers, about 60% of children have a disability condition in 1997 and 80% in 2002. Main disability types among these children are hearing difficulty, seeing difficulty, learning disability, and ADD/ADHD. Nearly 30% of children have special education experiences. In 2001, 6% of these children do not have any medical insurance, and one-fourth are covered by government-provided programs (i.e., Medicaid, state-sponsored program, or military health care). Since very few children are covered by private insurance plans, they are grouped together with those who have employer-provided insurance plans (71%).

At the time when household assets are measured, 80% of households are led by males, and nearly 80% of household heads are employed. The mean household size and number of children are 3.4 and 1.3. A proportion of households in the sample receive public assistance, such as Food Stamps (21%), AFDC (37%), and SSI (31%). The average household income in the previous five years is less than $30,000.[13] At the time when child outcomes are observed (2002), the mean age of children's mothers is 38, and about 70% of them are married. More than half of these mothers have some college.

For educational outcomes, the mean standardized scores of the applied problems test and the broad reading test are 102. About one-sixth of children have repeated a grade. Similarly, one-sixth of children have been suspended or expelled from school. Regarding health outcomes, half of the primary caregivers report children having excellent health. On average, children have 3.4 school days missed due to physical illness and 2.4 doctor visits for illness in the previous 12 months. Nearly 40% of children have seen a psychiatrist, psychologist, doctor, or counselor about an emotional, mental, or behavior problem. In the last five years, the average number of hospitalization is .28. The maximum number of school days missed, doctor visits for illness, and hospitalization is 55, 20, and 60, respectively.

The mean and median of household net worth in the sample are $64,000 and $12,000, respectively. Five percent of households have zero net worth, while one-sixth have a net worth value below zero. Households with net worth from $0-$10,000, $10,001-$40,000, and above $40,000 take 28%, 24%, and 30% of the sample, respectively. The mean ($21,243) and median ($1,600) of household liquid assets are substantially smaller than those of net worth. About 20% of households have no liquid

13 Household economic resources are not inflation-adjusted in analyses. The inflation-adjusted measures of household economic resources (income and assets) do not generate different results in sensitivity tests.

assets whatsoever, and one out of every four households has liquid assets in the range of \$1-\$1,000. Twenty-seven percent of children live in households with liquid assets ranging from \$1,001 to \$10,000, and another 27% own liquid assets greater than \$10,000. Table 5.2 describes the distribution of each parenting variable. More than 60% of parents expect their children to finish at least a four-year college.

5.2 Household Assets and Educational Outcomes

TABLES 5.3 AND 5.4 ABOUT HERE

Sections 5.2 and 5.3 discuss results of the first empirical strategy. Tables 5.3 and 5.4 report the regression coefficients and their significance of major variables in the five models (see the discussion of model specifications in Chapter 4). OLS regression is applied to the continuous educational outcomes (the applied problems score and the broad reading score); Probit regression is conducted for the dichotomous outcome measures (children's experiences of repeating a grade, school suspension or expulsion, and doctor visits for emotional problems); and Negative Binomial regression is used for the count outcome measures (number of school days missed, hospitalization, doctor visits for physical illness). Results for the control variables have expected directions and are discussed briefly in Chapter 7. The full results can be requested from the author of the dissertation.

5.2.1 Applied Problems Score

The baseline model (Model 1, See Panel A of Table 5.3) includes only the five-year average of household income and other control variables. Household average income is positively and significantly related to children's applied problems scores ($b=3.75$, $p<.05$); a 100% increase in income raises the score by $3.75*\log(2)=2.6$ points. The income variable remains significant in other models, but its regression coefficient ($b=2.95$, $p<.1$) reduces by 25% when asset variables and parenting behavior variables are added.

Log-transformed net worth, however, does not have a significant association with children's applied problems scores. When net worth is categorized into four groups, children with the highest level of net worth (>$40,000) have applied problems scores significantly greater than those with net worth in the ranges of $0-10,000 and $10,001-$40,000 (b=5.40, p<.1, see Model 3). To practically interpret this five-point difference, the finding can be compared to income effects. To lift the applied problems score by five points, household income should increase by nearly 200%. This amount of change in income does not seem likely because income is a "flow" variable, and household human capital tends to be fixed in the short term. The second approach is to compare the estimated asset effects on the applied problems score with the score gap between the CDS children who have finished high school and those who have not. Table 5.5 reports the means of two WJ-R test scores by the educational attainment of the PSID-CDS children.[14] It shows that the CDS children who have finished high school have the applied problems score five points higher than those who have not.

TABLE 5.5 ABOUT HERE

As suggested in Model 3 with the categorical measure of net worth, children living in households with negative net worth have higher scores than those in the reference group ($0-$10,000), but the difference is not statistically significant. Negative net worth may indicate households have access to the credit market. These households may be better off than zero-net-worth households with borrowing

14 The statistics in Table 5.5 only include the CDS children who are 18 years old and above in 2007.

constraints (Nam & Huang, 2009; Zhan & Sherraden, 2010).

FIGURE 5.1 ABOUT HERE

The insignificance of net worth in Models 2 and 4 may be due to the fact that this continuous measure fails to capture the nonlinear relationship between net worth and the applied problems score. Based on the estimation from Models 2 and 3, Figure 5.1 plots the predicted applied problem score by net worth for a typical child in the sample.[15] The top of the vertical dotted lines represents the predicted applied problems score by the categorical measure of net worth; the predicted applied problems score is 106.8, 103.7, 103.7, and 109.1, respectively, for the four net worth groups from low to high. The solid black line is the predicted score by continuous net worth (log-transformed), and the predicted score is nearly the same across different net worth values, ranging from 105.3 to 105.7. Comparing these two estimates, it seems clear that the continuous measure is not able to capture the U-shape relationship between household assets and the dependent variable.[16] The U-shape trend makes the slope of the solid line close to 0.

Among the four hypothesized mediators, parental involvement in child development and parents' educational expectations are positively related to children's math scores. In Model 5, one point increase in parental involvement suggests an increase of 0.7 points in the applied problems score ($b=.73$, $p<.05$). Parents' expectations for children to have an education at a four-year college and above are

15 A typical child has all control variables defined at their median values. Please see Table 5.2 for these variables' median values.

16 It is important to note that both measures, log-transformation and four categorical levels, are arbitrary without theoretical support.

associated with a 6-point gain in the score (b=5.58, p<.05).[17] The directions of these results are consistent with previous studies (e.g., Zhan, 2006). However, to include parenting behavior variables hardly changes the regression coefficient of net worth. The proposed mediation mechanism is not supported.

Table 5.4 replaces net worth with liquid assets and homeownership. Results of control variables are consistent (Full results can be requested from the author of the dissertation). Homeownership is positively but not significantly related to children's applied problem scores. However, in the models with the categorical measure of liquid asset, children living in households with zero liquid assets (the lowest category) show the highest average score on the applied problems test, nearly six points greater than that for the second lowest category ($1-$1,000). Those with liquid assets ranging from $1,001-$10,000 (the second highest category) have the lowest score. Figure 5.2 illustrates the trend of liquid asset effects for a typical child in the sample. Due to the nonlinear nature of asset effects, the asset effect hypothesis may or may not be supported depending on which distribution segment is under examination.

FIGURE 5.2 ABOUT HERE

What is puzzling is that the lowest liquid asset category ($0) actually has the highest predicted score. In the case that children with negative net worth have relatively high scores, a possible explanation is that their families may have access to the credit market, but it is not clear why children with zero liquid assets have the highest score. Different model specifications are tested by adding other asset measures, such as the total unsecured debt value, home value, home equity value, and

17 While parents' educational expectation is measured in 1997 and the applied problem score is in 2002, it is possible that there is a two-way causality between these two variables.

even total net worth value[18] in the model, respectively. Results of liquid assets do not change significantly. Another possibility is that there is measurement error in liquid assets, which causes the unexpected results discussed above. For instance, some households do not report accurate information regarding their liquid assets. Those having a value zero on the liquid assets measure report a lower value than what it actually is.

5.2.2. Broad Reading Score

Results on children's broad reading scores (see Panel B of Tables 5.3 and 5.4) are consistent with those on the applied problems scores, and therefore are briefly discussed here. Children in households with the highest net worth category (>$40,000) have broad reading scores five points higher than those with net worth from $0 to $10,000 (b=5.17, p<.05, Model 3). Again this five-point difference is equal to the score gap between those who have finished high school and those who have not (see Table 5.5). If educational or cognitive achievement is an important determinant of high school dropouts, the effect size of household assets is substantial.

Children in households with liquid assets from $1 to $1,000 have the lowest broad reading score, and those with zero liquid assets instead have the highest score. The difference between these two groups is 7.48 (p<.05, Model 3). An interesting finding here is that parental warmth is negatively associated with children's reading scores.

5.2.3 Repeated Grades

Panel C of Table 5.3 focuses on the net worth measures; none of the reported variables has a statistically significant association with the outcome measure of

18 When total net worth value is controlled for, the model is testing the association between liquid assets and the applied problems score given that households have the same level of net worth.

repeating a grade. However, children living in households with liquid assets in the range of \$1-\$1,000 are most likely to repeat a grade (Panel C of Table 5.4); the differences between this and other three categories are all statistically significant. On one hand, it suggests that children are more likely to repeat a grade when household liquid assets increase from \$0 to \$1-\$1,000 (b=.55, p<.05). This finding is puzzling. On the other hand, it shows that, excluding those with zero liquid assets, the more liquid assets households have, the less likely children are to repeat a grade. To include parenting variables does not change the results of household assets.

FIGURE 5.3 ABOUT HERE

To show the effect size of liquid assets for a typical child, the predicted probability of repeating a grade by the level of liquid assets is plotted in Figure 5.3. All the four categories have relatively low probabilities (from 2.3% to 10%). However, a comparison of these categories suggests the importance of liquid assets: children in households with \$1-\$1000 liquid assets have a predicted probability of repeating a grade about three times higher than those with liquid assets in the two highest liquid asset categories.

5.2.4 School Suspension or Expulsion

FIGURE 5.4 ABOUT HERE

Analyses of children's school suspension or expulsion show a different pattern in the results. First, the continuous measure of net worth becomes statistically significant and is negatively related to the probability of school suspension or expulsion (b=-.03, p<.05). As displayed in Figure 5.4, this result is caused by an explicit negative association between net worth and school suspension or expulsion. A comparison of those with negative and positive net worth can show this more clearly.

For the categorical net worth measure, children in households with negative net worth are statistically more likely to experience school suspension or expulsion than other children (b=.48, p<.05, Model 3). Those with negative net worth are about two times more likely to experience school suspension or expulsion than others. Among the four parental behavior variables, only parental involvement reduces children's probability of school suspension or expulsion (b=-.10, p<.05, Model 5).

FIGURE 5.5 ABOUT HERE

Results of liquid assets tell a different story. The continuous liquid asset measure does not have a significant relationship with the outcome measure. For the categorical one, the category of \$1-\$1,000 is related to the highest likelihood of school suspension (28% in Figure 5.5), statistically different from the other two liquid asset categories (\$0 and \$1,001-\$10,000). The *N*-shape effects of liquid assets displayed in Figure 5.5 provide an explanation of why the continuous liquid asset measure does not have a significant association with this outcome measure. But substantively it is not clear why there is an N-shape liquid asset effect. The outcome difference between the two categories, \$1-\$1,000 and \$1,001-\$10,000, is not statistically significant after controlling for parenting behavior variables, which may support the proposed mediation mechanism.

To sum up the results regarding the educational outcomes in the first empirical strategy, the categorical measure of net worth has expected association with all educational outcomes except repeated grades. The continuous net worth measure is statistically significant only in the analyses of school suspension or expulsion. The hypothesis that high liquid assets are associated with low probability of repeating a grade and school suspension or expulsion is partially supported depending on which distribution segment is examined. An unexpected finding is that, compared to the other groups, children with zero liquid assets do not have the worst performance, as indicated by these educational outcomes, and, surprisingly, they even have the highest scores on two WJ-R tests. This result could be caused by the measurement error in liquid assets, especially for those reporting zero liquid assets. The hypothesized mediation mechanism of asset effects through parenting behavior variables is not supported except for one analysis of school suspension or expulsion.

5.3 Household Assets and Health Outcomes

Tables 5.6 (net worth) and 5.7 (liquid assets) describe the relationships between household assets and health outcomes of children with disabilities in the first empirical strategy.

TABLES 5.6 AND 5.7 ABOUT HERE

5.3.1 Global Health Measure

Results on the continuous net worth fail to support the hypothesis of asset effects on the global health. In Model 3 for the categorical measure, parents with net worth above $10,000 are more likely to report "excellent health" for their children (b=.33, p<.1 for net worth from $10,001-$40,000 and b=.41, p<.05 for net worth greater than $40,000). None of the parental behavior variables shows a significant association with children's global health status. Theoretically, parents' educational expectations can be excluded from the analyses of health outcomes, but they are still kept in these models for the purpose of comparing analyses of health outcomes and educational outcomes.

FIGURE 5.6 ABOUT HERE

Figure 5.6 displays the predicted probability of reporting excellent health by net worth for a typical child in the sample. The probability of having excellent health is .66, .63, .75, and .77, respectively, for the four net worth categories. If households have net worth more than $10,000, the likelihood of reporting excellent health (75%) is about 10% higher than those with net worth less than $10,000.

FIGURE 5.7 ABOUT HERE

Results are even stronger when household net worth is replaced with liquid assets. Both log-transformed liquid assets (b=.06, p<.01) and the categorical liquid asset measure (b=.63, .39, and .69, respectively, for three liquid asset groups, p<.1) are positively associated with children's global health status. Figure 5.7 plots the predicted probability of having excellent health by liquid assets. It suggests that the positive slope of the continuous liquid asset measure mainly captures the difference between households with zero liquid assets and those with positive liquid assets. A comparison of Figures 5.6 and 5.7 indicates that liquid assets have larger impacts on children's global health status than net worth. For instance, the predicted probability of children having excellent health is 63% for households with net worth $1-$10,000, but is 75% (the mean of 78% and 71%) for those with liquid assets $1-$10,000.

5.3.2 School Days Missed due to Illness

FIGURE 5.8 ABOUT HERE

In Panel B of Table 5.6, an increase in net worth decreases the number of school days missed due to physical illness (b=-.02 for the continuous measure, p<.05; b=-.35 and -.56 for the two top net worth categories, p<.05). As predicted from the continuous net worth measure, the number of school days missed is from 3.4 to 2.9 (see Figure 5.8). Results regarding the categorical net worth measure indicate a greater effect: the number of school days missed for the lowest net worth group (3.3 days) is about 1.7 times of that for the highest net worth group (1.8 days).

FIGURE 5.9 ABOUT HERE

Analyses of liquid assets yield similar findings (see Figure 5.9). Liquid assets, either continuous (b=-.05, p<.05) or categorical (b=-.42, p<.05 for the highest-liquid-asset group), reduce children's school days missed due to physical illness. For the same outcome variable, liquid assets have greater influences than net worth. At the level of $1,000, the predicted number of school days missed is 3.2 for net worth and is 2.6 for liquid assets.

5.3.3 Hospitalization

FIGURES 5.10 AND 5.11 ABOUT HERE

The frequency of hospitalization in the previous five years decreases when parents' net worth increases (b=-.04, p<.1, Model 2 in Panel C, Table 5.6). In the analyses using the categorical net worth measure, asset effects are mainly reflected in the difference in the frequency of hospitalization between the highest category of net worth and the other categories (b=-.79, p<.1, Model 3). As expected, the predicted frequency of hospitalization is very small (from .02 to .06 in Figure 5.10) since hospitalization rarely happens. Although the absolute frequency is extremely low, the relative effects across different levels of net worth are substantial. Children in the lowest net worth group (<$0) are hospitalized three times more than those in the highest net worth group (>$40,000).

It is somehow unexpected that parental warmth is statistically and positively related to children's hospitalization in Models 4 and 5, possibly because children's health services may affect parental warmth. Children who are more likely to be hospitalized also receive more attention from parents. Finally, similar to net worth, liquid assets reduce the number of children's hospitalization (b=-.19, p<.01 for the continuous measure; b=-.83, -2.38, and -1.80, p<.05 for the three liquid asset groups; see Panel C in Table 5.7 and Figure 5.11). As indicated in Figures 5.10 and 5.11, the marginal effects of liquid assets seem greater than those of net worth.

5.3.4 Doctor Visits for Illness

FIGURE 5.12 ABOUT HERE

Results of doctor visits due to physical illness show the same pattern as those of school days missed due to physical illness, probably because both outcome measures are related to children's physical illness. Reported in Panel D of Table 5.6, the continuous (b=-.02, p<.1) and categorical (b=-.28 and b=-.51 for the two highest-net-worth groups, p<.1) net worth measures are negatively related to the number of doctor visits for physical illness. Compared to children in the reference category of net worth (see Figure 5.12), the number of doctor visits due to physical illness in the last 12 months is 90% higher if households have negative net worth, and is 10% lower if households have net worth in the highest category ($40,000). Liquid assets are negatively linked to children's doctor visits for illness (b=-.06, p<.05 for the continuous measure; b=-.37 and b=-.44 for the two highest-liquid-asset groups, p<.1, see Panel D in Table 5.7), and seem to be more important on the number of children's doctor visits than net worth.

FIGURE 5.13 ABOUT HERE

5.3.5 Doctor Visits for Emotional Problems

Doctor visits for emotional problems are measured by a dichotomous indicator (Yes/No). None of the variables listed in Tables 5.6 and 5.7 has statistically significant impacts on children's probability of doctor visits for emotional problems in the preceding 12 months.

To sum up, in the first empirical strategy, household assets have expected effects on almost all health outcomes for children with disabilities except doctor visits for emotional problems. These findings are consistent across different asset types (net worth vs. liquid assets) and different measurement of assets (continuous vs. categorical). In general, asset effects on health outcomes estimated from liquid assets or categorical measures are greater than those from net worth or continuous measures.

5.4 Average Asset Effects after Propensity Score Classification

Sections 5.4 and 5.5 report the estimated asset effects after propensity score classification. More detail about the procedure of propensity score classification is provided in Appendix A. Only Models 2 and 3 in the first set of analyses are used since Models 4 and 5 fail to provide evidence of the proposed mediation mechanism (through parenting behavior variables). The continuous asset measures are tested in Model 2, and the categorical asset measures are tested in Model 3. In addition, several dependent variables (frequency of school days missed, hospitalization, and doctor visits for physical illness) are recoded into dichotomous ones (having frequencies greater than 0=1 and otherwise=0) in order for Probit regression to be applied. It becomes more difficult for Negative binomial models to be converged after propensity score classification.

TABLES 5.8 AND 5.9 ABOUT HERE

First, as shown in Tables 5.8 and 5.9, the regression coefficients of log-transformed net worth have the expected direction, but none of them is statistically significant. This is different from results of the first set of analyses in Sections 5.2 and 5.3, in which log-transformed net worth is statistically and negatively related to school suspension or expulsion, school days missed due to illness, and frequency of hospitalization and doctor visits for illness.

Results on the categorical net worth measure are somewhat different from those of the continuous measure. Children living in households with the highest level of net worth (>$40,000) are more likely to report having excellent health (b=.57, p<.1), less likely to miss school due to illness (b=-.99, p<.01), and less likely to have been hospitalized in the previous five years (b=-.97, p<.01). The regression coefficients of the categorical measures of net worth in the models of school days missed and hospitalization, however, cannot be compared with those in the first set of analyses because they are different regression models (Probit in the second set vs. Negative binomial in the first set). The regression coefficient of net worth in the model of global health status (b=.57) is slightly higher than that in Table 5.6 (b=.41).

Findings regarding net worth are well supported by the analyses on liquid assets. The significant associations between net worth and health outcomes are also confirmed in the analyses using liquid assets. Household liquid assets are positively related to the probability of reporting excellent health and are negatively associated with the likelihood of school days missed due to physical illness and hospitalization. Furthermore, the associations between liquid assets and outcome measures appear even stronger. For example, the continuous liquid asset measure shows a significant association with each of these outcome measures, but the continuous net worth measure does not. In terms of the categorical measures, not only children in the highest liquid asset group (>$10,000) but also those in the second highest liquid asset group ($1,000-$10,000) have better health outcomes.

A comparison of the first two sets of analyses suggests that asset effects for children with disabilities may be better reflected in health outcomes, such as global health status, school days missed, and hospitalization. Two empirical strategies generate consistent findings on these outcomes. In addition, these analyses, especially the ones using the categorical asset measures, confirm that asset effects are nonlinear. For future research, it is important to identify the thresholds of asset effects to inform the development of asset-based policies.

5.5 Average Asset Effects for Subsamples

In fact, the average asset effects for the entire sample reported in Tables 5.8 and 5.9 are an aggregation of those in the three groups—households with high-, mid-, and low-expected assets (see Appendix A and Figure A.1). Asset effects for each of these groups are worth a closer examination as well. For asset-based policy to be inclusive (that is, to include low-income and low-wealth population in asset accumulation), it seems particularly important to examine asset effects for those with low-expected assets. With this consideration, this section investigates the average asset effects for those with high- and low-expected assets, respectively.

TABLE 5.10 ABOUT HERE

As shown in Table 5.9 above, liquid assets show stronger associations with health outcomes than net worth does. For simplicity, Table 5.10 lists only the results of liquid assets on three health outcomes for the groups of high- and low-expected assets. For the categorical measure of liquid assets, Table 5.10 only reports the regression coefficients of the highest-liquid-asset group (>$10,000).

First, the regression coefficient of liquid assets is greater in the low-expected asset group than that in the high-expected asset group, indicating greater asset effects for the group of low-expected assets. For example, in the analysis of hospitalization using the log-transformed liquid assets, the regression coefficient for the low-expected asset group is five times that in the high-expected group (b=-.15 vs. b=-.03). Since the estimated standard error is about the same for the two groups, asset effects are more likely to be statistically different from 0 in the low-expected asset group.

Neither the continuous nor the categorical measure of liquid assets is statistically significant in the high-expected asset group. However, several significant associations are identified in the low-expected group. In addition, the *p* value is close to the .1 level for the categorical liquid asset measure in the models of school days missed and hospitalization for the low-expected group. A comparison of asset effects between the high- and low-expected asset groups suggests that it is efficient for asset-based policies to focus on low-income and low-wealth families.

Chapter 6: Results of Longitudinal Analyses

This chapter focuses on the three-wave longitudinal data analyses using fixed-effects models and structural equations modeling (SEM), in which each CDS child with a disability has three observations (ideally). Educational and health outcomes are measured in the three CDS waves (1997, 2002, and 2007), and household assets are measured in 1994, 1999, and 2003, respectively (see Table 4.1 for details). Different from the first set of analyses, for most of the participants in the sample, assets are not measured before childbirth.[19] Also different from the second one intended to control for the "observed" confounders, longitudinal analyses control for unobserved or unmeasured time-invariant factors.

TABLE 6.1 ABOUT HERE

The analyses are conducted on the ten imputed datasets created from the multiple imputation procedure (MI),[20] and are weighted using the weight variable provided by the PSID. Each imputed dataset has 1,065 children and 3,195 (=1065*3) observations. The real sample size is not balanced, however. It varies depending on (1) whether the child is interviewed in a specific wave; (2) whether the child is eligible for certain survey questions on outcome measures; and (3) whether the child has different responses to the same measure in the three waves. For instance, 122 (out of 1,065) children are not interviewed in the CDS Wave II due to the change of survey eligibility and another 500 children aged out of the CDS Wave III. Only children older than three years can take the WJ-R tests, and only those older than five years could have the experience of repeating a grade or school suspension. Since fixed-

19 Children born between 1995 and 1997 have the first asset measure before childbirth.

20 I also conducted analyses on the original dataset without imputation.

effects analysis does not allow time-invariant dependent variables, children who give the same response on the outcome measure in all three waves have to be excluded from analysis.

6.1 Descriptive Statistics

TABLE 6.2 ABOUT HERE

Table 6.2 reports the descriptive statistics from fixed-effects analyses. Consistent with the first study sample used in Chapter 5, children with disabilities have a mean age of 12 years. Pooling all observations together, about 26% of them have special education experiences, and about 50% have disability conditions.

When household asset measures are observed, 82% of household heads are employed. The mean household size and number of children are 4.2 and 2.09, respectively, greater than those in the first strategy. The difference indicates the changes of household composition in 15 years. Households receiving public assistance in this sample are not as many as those in Chapter 5 (i.e., Food Stamp: 17% vs. 21%, AFDC/TANF: 7% vs. 37%, and SSI: 6% vs. 31%), in part due to the drastic policy change after the 1996 welfare reform and in part due to improved family economic status in mid-adulthood. Compared to the sample used for the first strategy, the average income ($61,696 vs. $29,139) doubled in the 15 years largely due to income growth from young to mid adulthood of parents, macro economic development during this period, and inflation.

The mean scores of the applied problems test and the broad reading test are 102 and 100, respectively. About one-seventh observations have a positive response to the question of repeating a grade, and one-seventh have a positive response to the question of school suspension or expulsion. Table 6.2 also reports the percentage of children with dependent variables lacking within-subject variation over time. These children will not be included in fixed-effects analyses (LM2 and LM3). Distributions of health outcomes in this sample are similar to those reported in Table 5.2.

The mean of net worth rises from $64,000 (Table 5.2) to $176,000 (Table 6.2), which substantially changes the distribution of the categorical net worth measure. The mean of liquid assets increases even faster (four times), but, interestingly, the distribution of the categorical liquid assets is about the same for the two samples. This may indicate growing wealth inequality over the years. Increases in liquid assets mostly occur in a small group of households that already had relatively high liquid assets, and as a result, the categorical distribution does not show much change.

6.2 Household Assets and Educational Outcomes

Sections 6.2 and 6.3 report results of fixed-effects analyses. Model specification used for fixed-effects analyses is slightly different from that in the first set of analyses. First, the analyses remove control variables (such as child's gender, race, and disability type) that show no or little change over time. Fixed-effects models cannot estimate coefficients of variables that have no within-subject variation. Second, some variables, while relevant, cannot be included in longitudinal analysis simply because they are not recorded in all CDS waves (e.g., types of health insurance for the PSID-CDS children).

For each asset measure, three models are examined: LM1, LM2, and LM3 (LM stands for Longitudinal Model). LM1 is a pooled cross-sectional baseline model that pools three observations of each child and runs a cross-sectional analysis directly regardless of the fact that they are from the same subject. LM2 is a fixed-effects analysis without including parenting behavior variables, and LM3 adds parenting behavior variables to LM2. Results of LM1 can be examined in comparison to those of the first strategy in Chapter 5 since both have the same cross-sectional estimator.

More comparison can be done with those from LM2 and LM3 to see whether fixed-effects estimator has corrected any unobserved bias.

Specifically, OLS regression is applied to the continuous outcome measures (the applied problems score and the broad reading score); Logit regression is conducted for the dichotomous outcome measures (repeated grade, school suspension/expulsion, global health, and doctor visits for emotional problems); and Poisson regression is used for the count outcome measures (frequency of school days missed, hospitalization, and doctor visits for illness). Logit and Poisson regressions for fixed-effects model are also called conditional Logit and conditional Poisson models. Different from the first strategy in Chapter 5, this strategy does not use Probit regression for the dichotomous outcome measures because the conditional Probit cannot be conducted. Neither does this strategy apply Negative Binomial regression for the count variable because it has been argued that the code to test Negative Binomial fixed-effects analysis in Stata is not a true conditional model (Allison, 2009).

TABLES 6.3 AND 6.4 ABOUT HERE

Tables 6.3 and 6.4 demonstrate asset effects on educational outcomes for children with disabilities in fixed-effects analyses. Full results for the control variables can be requested from the author of the dissertation. Overall, household assets do not appear to be related to cognitive achievement or intellectual ability measured by two WJ-R test scores—the applied problems and the broad reading scores. However, household assets are more likely to affect school attainment. Children in households with more assets are less likely to repeat a grade or be suspended from school.

6.2.1 Applied Problems and Broad Reading Scores (Continuous Variables)

The pooled cross-sectional analyses (LM1 in Table 6.3) shows that the increase in net worth strengthens children's academic performance measured by the applied problems (b=.30, p<.05) and broad reading scores (b=.28, p<.05). This association appears only at the level of $40,000 and above for the categorical net worth measure in LM1. These results are similar to those in the first set of analyses: Log-transformed net worth in fixed-effects analyses shows greater effects probably because the measurement timing of assets is closer to that of the outcome measures in this sample.

However, none of the net worth measures in fixed-effects analyses (LM2&3) shows a statistically significant association with the two test scores, although children in households with the highest net worth category (above $40,000) have better performance on both tests. In other words, after controlling for initial scores, any change in household assets is not related to the child's later cognitive performance. Overall, fixed-effects analyses produce results consistent with those using propensity score classification (see Table 5.8). Among the parenting behavior variables of interest, parental stress negatively correlates with the applied problems score, and parents' educational expectation of four-year college and above is positively related to the broad reading score. Analyses involving liquid assets yield the same results (see Table 6.4).

6.2.2 Repeated Grades (Dichotomous Variable)

The pooled cross-sectional analyses (LM1) of repeated grades again support the asset-effect hypothesis. Household asset holding contributes to a decreased probability of a child's repeating a grade (b=-.05 for the continuous net worth measure, p<.05), especially for those with net worth above $40,000 (b=-.79, p<.05). This association is not supported in the first set of analyses (Table 5.3).

Fixed-effects analyses (LM2&3 in Table 6.3) show stronger impacts of net worth on repeated grades. The regression coefficient of log-transformed net worth increases from -.09 ($p<.01$) in LM2 to -.11 ($p<.01$) in LM3 when parenting behavior variables are entered. The estimation in LM2 with log-transformed net worth suggests that the odds of repeating a grade reduce by 6% when net worth doubles. In LM2 with the categorical net worth measure, the odds of repeating a grade for children in the reference category ($0-$10,000) are only one-fourth of those with negative net worth ($b=1.48$, $p<.01$), but 1.6 times greater than those in the highest net worth category ($b=-.49$, $p<.05$). What needs to be noted is that nearly 65% of children are excluded from the analyses because they have never repeated a grade. Therefore, the findings are only applicable to children included in the analyses.

All parenting behavior variables except for parenting stress are negatively and statistically associated to a child's likelihood to repeat a grade. Interestingly, net worth shows stronger effects when parenting behavior variables are entered, which contradicts the mediation hypothesis above. This may suggest an alternative hypothesis: given the same level of parenting, the more financial assets parents invest in child development, the better outcomes children achieve.

The analyses on liquid assets (Table 6.4) provide consistent but slightly different results. First, when liquid assets increase by 100%, the odds of repeating a grade reduce by merely 4% ($b=-.05$ in LM2 with the continuous liquid assets, $p<.05$), smaller than the estimated effect of net worth. Second, for the categorical liquid asset measure, the highest category (above $10,000) does not show different odds from the reference category ($0). The two categories in the middle ($1-$1,000 and $1,001-$10,000) instead have odds nearly 50% lower than those in the reference category ($b=-.56$ and $b=-.61$ in LM2, $p<.01$). Homeownership is also examined. When parenting behavior variables are controlled for, the regression coefficient of homeownership almost doubles. In LM3, children from families owning a house have about 65% reduced odds of repeating a grade than children from families not owning a house ($p<.01$).

6.2.3 School Suspension or Expulsion (Dichotomous Variable)

Findings regarding this outcome measure are relatively simple. The analyses exclude about 55% of children because they have no experience of school suspension or expulsion. Fixed-effects analyses with the categorical net worth measure find that children from households with net worth from $10,001-$40,000 are less likely to experience school suspension or expulsion than those from households with net worth from $0-$10,000 ($b=-.62$, odds ratio=.54, $p<.05$). For the categorical liquid asset measure, this negative association only appears in the category of above $10,000 as compared to the reference category ($0), with a regression coefficient of -.78 ($p<.01$). Homeownership again is a significant factor protecting children from school suspension or expulsion. The odds of being suspended or expelled from school for children of homeowners are 40% lower ($p<.01$).

6.3 Household Assets and Health Outcomes

Fixed-effects results on net worth and health outcome, reported in Table 6.5, are similar to those in the first two sets of analyses. These results are discussed by each health outcome respectively below.

TABLE 6.5 ABOUT HERE

6.3.1 Global Health Status (Dichotomous Variable)

Fixed-effects analyses show the odds of reporting excellent health increases by 2% ($b=.03$, $p<.05$), when net worth doubles. It suggests that asset building may be more efficient for those with low wealth because it may be relatively easy to double a small value of net worth. For the categorical net worth measure, the reference group

($0-$10,000) has the lowest odds of reporting excellent health, which are 25%, 50%, and 60% lower than the negative net worth category, the category of $10,001-$40,000, and the category of above $40,000. The positive slope of the log-transformed net worth seems to capture mainly the growing trend of reporting excellent health from $0-$10,000; $10,001-$40,000; and above $40,000.

Although all four parenting behavior variables are highly associated with children's global health status, some of them have unexpected directions. For example, both parental warmth and parents' educational expectations for children to have some college predict children's global health negatively. This negative correlation may suggest a misspecification in analyses—parental warmth could be parents' responses to children's health status. However, it is still a puzzle as to why parents' education expectation at the level of some college (as compared to the expectation of high school graduation) has a negative association with children's global health status.

TABLE 6.6 ABOUT HERE

Results of liquid assets show a greater marginal effect. When liquid assets are doubled, the odds of having excellent health increase by 4% ($b=.06$, $p<.01$). Therefore, households should be encouraged to accumulate liquid assets for the purpose of improving health. The mechanism of asset effects on health outcomes may be related to the liquidity of assets or service purchase.

While it does not appear to be a significant predictor of outcome measures in the first two strategies, homeownership expands children's opportunity to have excellent health, especially when parenting behavior variables are controlled for. Owning a home increases children's odds of having excellent health by 30% ($b=.31$ and $b=.28$ in two LM3s, $p<.05$).

6.3.2 School Days Missed due to Illness (Count Variable)

The estimated effects (b=-.03, p<.05) of the log-transformed net worth on children's school days missed due to illness are very close to those in the first strategy (b=-.02). However, this negative link is not supported by the analyses of the categorical net worth measure, in which not only the negative net worth category (b=.51, p<.01) but also the two other categories with higher net worth values (b=.29 for $10,001-$40,000 and b=.40 for above $40,000, p<.01) have greater coefficients than the reference category ($0-$10,000). In other words, the reference category has the fewest school days missed.

FIGURES 6.1 AND 6.2 ABOUT HERE

To a large extent, this controversy has to do with the selection of the reference category of net worth. When the negative net worth category is chosen as the reference group, the other three categories all have a negative coefficient, statistically significant at the .1 level (see Figure 6.1). Then, the findings do not conflict with those from the continuous measure. The negative slope for the log-transformed net worth reflects the difference in school days missed between children with negative and positive net worth.

The predicted number of school days missed for a typical child is shown in Figure 6.1. A typical child in this analysis is defined as a CDS child who has the median on each control variable and -9 as his or her fixed term. The fixed term is the median value of the estimated individual heterogeneity taken from the first imputed dataset. The solid line represents the predicted number of school days missed using the log-transformed net worth; the predicted number of days reduces from 1.7 to 1.5 when net worth becomes positive. Missed school days as predicted from the categorical measure (the dot line) is very small (less than .5), and the negative category clearly has higher predicted numbers than all the other categories. It is worth noting that the figures shown in this chapter are not directly comparable to those in Chapter 5 because the typical case varies and the fixed term is arbitrary.

Figure 6.2 plots the predicted number of school days missed using liquid asset measures (see Table 6.6 for detailed results); it has a different pattern from Figure 6.1. First, as shown by the solid line, the continuous measure has a positive association with the number of school days missed (b=.03, p<.01), although its impact seems relatively small. For the categorical measure, the zero-liquid-asset group has the smallest number of school days missed, and the predicted number decreases when liquid assets fall into the highest category.

Another important predictor is homeownership. Children of renters have the number of school days missed 1.2 times higher than that of children of homeowners (p<.1). This is consistent with the results of net worth measures (see Figure 6.1) given that home equity is generally a household's most important asset. Homeownership may affect children's health in a way different from that of liquid assets. For example, homeowners' children may be less likely to be sick than children of renters. However, if children have physical illness, households with liquid assets may be more likely to take children from school for health services.

6.3.3 Hospitalization (Count Variable)

FIGURE 6.3 ABOUT HERE

Figure 6.3 displays the predicted frequency of hospitalization for a typical child with a fixed term of -.6. The negative coefficient of the log-transformed net worth (b=-.04, p<.01) mainly reflects the difference in hospitalization between those with positive and negative net worth. Using the typical case as an example, children with positive net worth have .49 times of hospitalization, 17% lower than those with negative net worth (.57). The relationship between net worth and children's hospitalization is not linear and clear-cut if net worth is measured by a four-category variable. In Table 6.6, children with disabilities stay in hospital less frequently if households have their own homes. Their frequency of hospitalization is only 80% of those in households not owning a home. Liquid assets, however, do not have the expected negative association with hospitalization.

6.3.4 Doctor Visits for Illness (Count Variable)

The analyses estimate a positive coefficient (b=.09, p<.01) for the net worth category of $10,001-$40,000, indicating that children's doctor visits for illness may increase when net worth increases from the reference category of $0-$10,000 to the next category. A negative coefficient (b=-.06, p<.1) is generated for the category of $40,000 and above, suggesting fewer doctor visits for children in the highest net worth category. Results for liquid assets follow a similar pattern, in which children of households in the highest liquid asset category (above $10,000) are less likely to visit doctors for illness. In addition, children of homeowners visit doctor 16% more frequently than those of non-homeowners.

6.3.5 Doctor Visits for Emotional Problems (Dichotomous Variable)

The most interesting finding about this outcome is that net worth increases children's likelihood to visit a professional for their mental, emotional, or behavioral problems. A 100% increase in net worth raises the odds of doctor visits for emotional problems by 5%. The odds ratios of the reference net worth category and the two higher categories are .71 (b=-.34, p<.01) and .26 (b=-1.34, p<.01), respectively. When parenting behavior variables are not included in the model, children in zero-liquid-asset households are more likely to have doctor visits for emotional problems than children in the other two liquid asset categories: $1-$1,000 (b=-.28, p<.05) and above $10,000 (b=-.48, p<.01). The statistical significance of categorical liquid asset variables disappears with the addition of parenting behavior variables.

6.4. Results of SEM Analyses

The fourth empirical strategy further tests asset effects on educational and health outcomes for children with disabilities using the three-wave longitudinal data in Structural Equations Models (SEMs). As a possible solution to the endogeneity issue in fixed-effects analyses, it may better capture the dynamic relationships between household assets and child outcomes. For each outcome measure, two models are conducted on the same sample used for fixed-effects analyses. The first model (SEM1) adds an individual heterogeneous term (similar to fixed-effects analyses) and correlates household assets with the error term of dependent variables at the previous stage. The second model specification (SEM2) does not have the individual heterogeneous term in analyses. Instead, SEM2 assumes a dynamic relationship between children's outcomes over time and includes the first-order lag of the dependent variable in analyses. Appendix B provides detailed information of these two models.

6.4.1. Net Worth and Child Outcomes

TABLE 6.7 ABOUT HERE

Results of net worth are summarized in Tables 6.7. I do not report model fit indices for these analyses because the study is mainly interested in the regression coefficients of asset measures.[21] Results from SEM1 are reported in the first column, and those from SEM2 are in the second column. Each row represents a separate analysis for the continuous or categorical net worth measure. For example, for

21 As expected, the model fit indices are poor in these analyses for two reasons: On the one hand, the "measurement" model to estimate a fixed-effect term in SEM1 is not a true "measurement" model. On the other hand, many factors that may affect child well-being are not included in these analyses.

children's applied problems scores, the estimated regression coefficients of log-transformed net worth at the three waves in SEM1 are .04, -.13, and -.23, respectively. The table looks complicated as SEM analyses allow asset effects to vary in the three waves.

First, net worth has expected positive effects on all education outcomes. For the two WJ-R test scores (applied problems and broad reading scores), asset effects are mainly reflected by the score difference between the highest net worth category and the other categories. Roughly, the former has a score three points higher than the other categories ($p<.05$), especially in CDS Waves II and III. Fixed-effects analyses in Table 6.3, however, do not find significant associations between net worth and children's cognitive scores. This result may be caused by the assumption in fixed-effects analyses that asset effects are homogeneous at different observational points. Second, children in the highest net worth category (>40,000) have a lower probability of repeating a grade at the second wave in SEM1. The results are not directly comparable with those from fixed-effects analyses because regression models are different (Probit vs. conditional Logit). Third, log-transformed net worth has a negative association with children's experiences of school suspension or expulsion ($b=-.03$, $p<.05$).

Two regression coefficients have directions opposite from the hypothesis of asset effects. In SEM1, the negative net worth category has higher broad reading scores ($b=2.5$, $p<.1$) than the reference category ($0-$10,000) at the second wave, and the category of $10,001-$40,000 has a higher probability of repeating a grade than the category of $0-$10,000.

SEM analyses and fixed-effects analyses generate similar findings regarding the positive association between net worth and children's global health status. As a note to this, the significant association is found only in the two highest categories at the first wave. Technically, this finding should be explained with caution because, due to the data limitation, the correlation between asset measures at the first wave and the error term of outcome measures at the previous stage cannot be specified. In other words, there is a possibility of overestimation regarding the results of asset measures at the first wave.

SEM1 does not find net worth to be significantly associated with the other health outcomes. The dynamic models (SEM2) indicate that (1) the highest net worth category has a higher propensity of missing school due to physical illness at the second wave; (2) the log-transformed net worth reduces children's occurrence of hospitalization at the third wave; and (3) net worth is positively linked to children's likelihood of visiting professionals for emotional and behavioral problems at the first wave. Overall, these results confirm the findings from fixed-effects analyses.

6.4.2 Liquid Assets and Child Outcomes

TABLE 6.8 ABOUT HERE

Table 6.8 reports the results of SEM analyses of liquid assets and child outcomes. Findings regarding liquid assets are comparable to those on net worth except for two minor differences. First, liquid assets are not associated with children's experiences of repeating a grade. Second, both measures of liquid asset (continuous and categorical) are related to children's doctor visits for illness. For example, at the first wave, households with more assets are more likely to have children visit doctors for physical illness.

6.5 Summary

The results of fixed-effects analyses mostly agree with those reported in the last two chapters and partially support the hypothesis of asset effects for children (see

Table 6.1). Household net worth and liquid assets appear to reduce children's probabilities of repeating a grade and being suspended from the school. Households are more likely to report children having excellent health if they have more net worth. In addition, with more net worth, children have fewer school days missed due to illness and experience hospitalization less frequently.

One explanation for the disagreement between net worth and liquid assets is asset allocation. Different types of assets may affect child development in various ways. Another possible explanation is that some health outcome measures are related to health service utilization (i.e., hospitalization and doctor visits). Health service utilization, as expected, may be affected by household assets in different ways because household assets can provide financial resources for health services or help avoid negative health conditions, thereby reducing the need for health services.

Findings regarding indicators of parenting behavior are quite expected. It is interesting that parents' educational expectations are highly correlated with health outcomes. On one hand, parents' educational expectations may reflect their general expectations for their children beyond education. On the other hand, this association could imply a reverse association between health outcomes and parents' educational expectations. Finally, it is important to note that fixed-effects analyses on categorical outcome measures are conditional models, which have excluded all children lacking variation within the dependent variable. These results may not be generalizable for the entire population of interest. Finally, the SEM tests of the fourth strategy generate the results essentially consistent with those from the fixed-effects models.

Chapter 7: Conclusion: Discussion and Implication

This chapter summarizes the main findings on asset effects and other variables (e.g., parenting behavior variables, disability, and household income), and then discusses research and policy implications of these findings.

7.1 Discussion

7.1.1 The Hypothesis of Asset Effects

The study examines asset effects for children with disabilities on nine child outcomes using four different strategies and four asset measures. The question is whether there is any conclusive evidence to support this hypothesis. Theoretical and policy implications would be clear and simple if there is perfect evidence – that is, household assets have expected, statistically significant, and homogenous marginal effects regardless of the differences in outcome measures, asset measures, and statistical strategies for model testing. The real results, however, seem much more complicated. There are several themes in the observations (see Table 7.1). First, several health outcome measures have statistical associations with household assets, and this finding is consistent in all four strategies. Second, the categorical measures of household assets seem to show asset effects better. Third, household assets may affect children's health service utilization in various ways.

TABLE 7.1 ABOUT HERE

Asset Effects by Child Outcomes. All the child outcomes under examination have statistically significant associations with household assets in one or more tests. Consistent in the four testing strategies, children's global health status, school days missed due to physical illness, and hospitalization are correlated with household assets.

The findings provide insights into the pattern of asset effects. To use children's global health as an example, Table 7.2 summarizes Probit regression results on this outcome measure in the first, second, and fourth strategies. Fixed-effects analysis is not included because it uses conditional Logit model, and includes only children who have within-person variation on global health status. This table shows a decreasing trend regarding the magnitude of regression coefficients from assets measured before childbirth to current assets. For liquid assets, $1,000 is the threshold value for this type of assets to generate statistically significant and positive impact on children's global health in the first strategy, but in the fourth strategy, the threshold value of liquid assets has to increase to $10,000 for the significant results to be detected. It indicates that household assets before childbirth or in early stages of childhood have greater influences on children's global health than those at a later stage.

TABLES 7.2 AND 7.3 ABOUT HERE

Such tables can also be created for other health outcome measures, such as school days missed due to physical illness and hospitalization. Table 7.3 shows a different pattern of asset effects on school days missed. The number of school days missed decreases when household assets (measured before childbirth) increase, and the asset threshold to show this association is $10,000. In SEM analyses, when the asset measures in a later stage of childhood are used, the direction of the association between household assets and school days missed changes, perhaps because household assets before childbirth contribute to a lower probability of physical illness later on (preventive effects) and further reduce the number of school days missed. But asset measures in a later stage of childhood indicate household economic resources for providing services and support for children who are sick.

Household assets also have significant associations with three outcome measures—children's experience of repeating a grade, school suspension or expulsion, and doctor visits for physical illness—in all strategies except for propensity score classification. A closer examination of the results, however, suggests that the associations of household assets with repeating a grade and school suspension or expulsion are relatively weak and unstable (see Tables 5.3 and 5.4). Only fixed-effects analyses of children who had repeated a grade at least once show a strong association between household assets and repeating a grade. Doctor visits for illness, as an outcome measure, shows a pattern similar to school days missed due to illness in terms of its association with household assets, mostly because both measures are related to children's physical illness.

Children's cognitive ability (or academic achievement), measured by two WJ-R test scores, is positively related to household assets in the first strategy and the fourth strategy (SEM2 only). The insignificance of household assets in propensity score classification may suggest that children's cognitive ability and household assets are both confounded with parental characteristics (such as education and parents' cognitive ability). On the other hand, the insignificance of household assets in fixed-effects analyses and SEM1 of the fourth strategy may indicate that children's cognitive ability is relatively stable. There is not much within-person variation in these outcome measures after taking account of individual heterogeneity as indicated by the fixed term in fixed-effects analyses.

Children's doctor visits for emotional problems show a positive association with household assets in the third and fourth strategies using assets measured in a later stage of childhood. This is similar to the findings on school days missed and doctor visits for illness in the same sets of analyses, implying a positive association between household assets and health service utilization. To sum up, these findings suggest evidence for the hypothesis of asset effects on children's health outcomes. Among the educational outcomes examined, children's cognitive ability is less likely than school attainment to be affected by household assets.

Asset Effects by Asset Types. While the PSID data provide household asset information on multiple asset types, it is not feasible to examine all of them in a single study. The current study focuses on household net worth and liquid assets. As discussed in the last section, findings on children's health outcomes seem to be more consistent across different empirical strategies than educational outcomes, and, therefore, the findings on health outcomes are used to examine asset effects by asset types. In addition, both net worth and liquid assets have the same scale ($), which makes it possible to directly compare their results. There seems a pattern, especially in the first set of analyses, that the regression coefficients of liquid assets are greater than those of net worth. In other words, liquid assets have larger associations with children's health outcomes than net worth. For example, the regression coefficient of the highest liquid asset category (above $10,000) on children's global health is .69, but the coefficient of the net worth category of $10,001-$40,000 is only .33 (see Table 7.2). To identify the varying effects by asset types adds to our understanding of the mechanism of asset effects.

Nonlinear Distribution of Asset Effects. The distribution of asset effects on child outcomes is nonlinear. It is the categorical asset measures (as opposed to the continuous measures) for which statistically significant associations are more often found. The log-transformed net worth, for example, does not predict children's global health in the first and fourth strategies, while the categorical one does. The nonlinear nature of asset effects is not surprising. However, several issues need to be addressed in order to estimate nonlinear asset effects.

First, can nonlinear asset effects be theorized? Chapter 5 illustrates different nonlinear asset effects (e.g., the U-shape and the N-shape), all of which are empirical estimation from the study sample. Some of these findings are puzzling and need to be examined further. The pure empirical investigation of nonlinear asset effects may be subject to mistakes caused by model misspecification, measurement errors, sampling variation, and arbitrary choices of asset categories. Therefore, theorization of nonlinear asset effects (if any) is needed in the future.

Second, a direct implication of nonlinear asset effects is to help us identify a threshold for household assets to generate positive effects on child development. In the first strategy, children living in households with net worth greater than $10,000 have better global health, and are less likely to miss school or visit doctors. But the net worth value has to increase to the level of $40,000 or more to significantly reduce the probability of hospitalization. The threshold for liquid assets to have positive effects is relatively low (see Table 5.7 for details). This is expected because households' net worth value generally is higher than their liquid asset value. Based on the results presented in the last two chapters, it seems reasonable to tentatively propose some asset thresholds: that is, a net worth value of $40,000 and a liquid asset value of $10,000. This may provide a guideline for household saving behaviors.

Third, given the nonlinear nature of asset effects, it seems that to take a logarithm of asset values, a conventional approach to highly skewed asset measures, may not be a good practice in testing asset effects. Specifically, there are two issues with regard to log-transformed continuous asset measures: (1) To estimate nonlinear asset effects using only one slope parameter is rather limited and can be misleading as well. For example, regarding children's applied problems scores (see Figure 5.1), the slope of log-transformed net worth is almost zero because the estimation tends to balance the two high ends of a U-shape asset effect. In contrast, the log-transformed net worth is statistically significant in the model of children's school suspension due to an L-shape asset effect (see Figure 5.4). (2) Asset effects may be overestimated by using the log-transformed asset measures. In order to create log-transformed values, all negative asset values have to be clustered at the value of zero. This may create an artificially steep slope (see Figure 5.8, 5.10, and 5.12 for the Z-shape solid lines; all show a steep slope at the asset value zero). A simulated case in Figure 7.1 also illustrates the possibility of overestimation. Suppose the solid line shows a true slope of -.1 between net worth and the outcome measure in the net worth range of (-$30,000, $0). As displayed in the dash-dot line, when all negative net worth values are clustered at zero, the slope becomes 1.

FIGURE 7.1 ABOUT HERE

Finally, the estimated nonlinear effects may imply serious measurement errors in asset measures. It is suspected that households with negative net worth and those with zero liquid assets may have reporting errors in these two measures. For example, in the first set of analyses, these two groups show better educational outcomes than the other groups with higher net worth or liquid assets. One explanation is that households with negative net worth have access to the credit market and therefore may have more economic resources in the short term. Another possible explanation is that measurement errors (in asset measures) for these households may have interfered with the estimation of true asset effects.

Size of Asset Effects. As discussed above, household assets have statistically positive effects for children with disabilities, especially on health outcomes. From a policy perspective, it is also important to ask whether these asset effects are practically meaningful. Chapters 5 and 6 have discussions of marginal asset effects and the practical meaning of asset effects based on the first and third strategies. The following two examples suggest that household asset accumulation can contribute to child development. First, an increase in household net worth from $0 to $40,000 in early childhood can close the gap in math and reading scores between those who have finished high school and those who have not. Second, for a typical child, an increase of household net worth from $10,000 to $40,000 can raise the probability of having excellent health by 10%.

Asset Effects for Sub-groups. The second strategy, propensity score classification, provides an opportunity to examine asset effects for multiple sub-groups. With propensity score classification, households are categorized into three groups based on their expected asset values. Those with low-expected asset values may have actually accumulated assets higher than expected. Similarly, those with high-expected asset values may have saved only a small amount of assets. The difference between the expected and actual values allows the study to examine different asset effects for the low-expected and high-expected asset groups. As discussed in Chapter 5, asset effects for the group with low-expected asset values are greater than those for the group with high-expected values (see Table 5.10). From a policy perspective, this may imply that it is efficient for asset-based programs to target low-income and low-wealth households.

Fixed-effects analyses for categorical outcome measures in the third strategy are conditional models, which only include children whose outcome measures show within-person variation. For example, children who did not repeat a grade in any wave are excluded from analyses. To some extent, this can be considered an analysis of sub-groups. Asset effects appear to be greater for children who are included in fixed-effects analyses. For instance, for liquid assets to have a positive impact on educational outcomes indicated by repeating a grade, the threshold is as low as $1,000.

Cumulative Asset Effects and Asset Effect Patterns. In Chapter 4, the study proposes the hypothesis of cumulative asset effects for model testing. That is, current child outcome is determined not only by current household assets but also by those at previous stages. This idea leads to three testable research questions.

The first question is, “What is the pattern of asset effects by child’s age?” Possible patterns have been discussed in Chapter 4 (e.g., the increasing or decreasing pattern of asset effects by age). It is important to note that patterns of asset effects by age are different from the nonlinearity of asset effects discussed above. The former refers to asset effects associated with age or development stages of individual children. The latter is a general distribution of asset effects in the population. Although this study is not intended to test the pattern of asset effects by child’s age directly, the use of asset measures at different ages among these strategies and a comparison of the results, can, to some extent, provide insights into this question. For example, the discussion above suggests that household assets play a more important role in early childhood (i.e., a decreasing pattern) than later.

The second question is to estimate average asset effects over childhood while ignoring the asset effect patterns. The first two strategies can be considered example analyses to test this question because they use asset measures at one time period to be a proxy of all household assets invested in child development in childhood.

The third question is to examine the unique effects of household assets measured at a specific time point. For instance, researchers may be interested in asset effects when children reach age six conditional on previous cumulative asset effects. The third and fourth strategies may tackle this question since the individual fixed-term in fixed-effects analyses or the lagged outcome measures in SEM2 can be considered an indicator of cumulative asset effects in previous stages.

7.1.2 Mediation Mechanism and Parenting Behavior Variables

The second aim of the study is to examine whether asset effects for children with disabilities are mediated through parenting behaviors. It is hypothesized that asset accumulation and asset holding affect parents' engagement and investment in child development and further change child outcomes. To test this hypothesis, parenting behavior variables—including parental involvement, parental warmth, parenting stress, and parents' educational expectations—are added in Models 3 and 5 of the first strategy (see Table 5.3) and Longitudinal Model 3 (LM3) of the third strategy (see Table 6.3). If the mediation mechanism exists, then to include parenting behavior variables will reduce the correlation between household assets and outcome measures. In addition, these parenting behavior variables should have a direct association with child outcomes.

This mediation hypothesis is not supported because the addition of parenting behavior variables in the model does not change the estimated asset effects in most of cases. Therefore, parenting behavior variables are not used in the second and fourth strategies. Models with parenting behavior variables actually suggest that, for households with the same level of parental involvement, the more assets households own, the better children develop. The question remains as to how household assets affect child well-being. In the future, there is a need to look into how household assets are associated with physical environment, such as home, school, and community.

TABLE 7.4 ABOUT HERE

Table 7.4 summarizes the relationships between parenting behavior variables and child outcomes. There are two main findings. One is that parental involvement and parents' educational expectations promote child development and improve child well-being. Parental involvement and parents' educational expectations are positively related to children's test scores and negatively related to children's probability of repeating a grade and school suspensions. Second, parental warmth and parenting stress could be affected by child development. For instance, some health utilization variables (such as hospitalization and doctor visits for illness or emotional problems) are positively associated with parental warmth and parenting stress, possibly because children's health conditions and service utilization change the level of parental warmth and parenting stress. Another explanation on the positive association between health services and parental warmth could be that parental warmth may increase parents' sensitivity to children's health and health service needs.

7.1.3 Child Characteristics

This section briefly discusses the results of child characteristics, with a focus on the first set of analyses. One of the child characteristics is child disability. Children's disability status is a control variable in analyses. A measure indicating whether a child has a disability in a specific CDS wave is included in all analyses. In addition, disability types are also considered and added in the first and second strategies.

Findings regarding children's disability types are expected. Detailed results from the first strategy can be requested from the author of the dissertation. In summary, those with hearing difficulty or autism have lower WJ-R test scores;[22] children having visual difficulty or orthopedic impairment are less likely to repeat a grade; and those with learning disability or ADHD have a higher probability of school suspension. It is also found that children with autism have worse health (indicated by

22 I also conduct a robustness test excluding children with autism and emotional disturbance from the analyses of educational outcomes. Results of the robustness test are similar to those reported in Chapter 5.

global health status, hospitalization and doctor visits for illness). In addition, children's emotional disturbance is associated with school days missed, doctor visits for illness, and doctor visits for emotional problems.

The timing of disability also matters. As shown in Table 7.4, having a disability in either CDS Wave I or Wave II is always associated with poor child outcomes except for school suspension or expulsion. Having a disability is related to a lower probability of being suspended or expelled from the school. But the relationship between poor outcomes and having a disability in CDS Wave II is more likely to be statistically significant because child outcomes in the first set of analyses are measured at Wave II. In the fixed-effects analyses, the timing of disability variable actually indicates the change of disability status from the previous wave. Focusing on within-person comparison, therefore, the fixed-effects analyses show how the change of disability status (from non-disability to disability) affects child outcomes. Not surprisingly, the transition to disability is highly related to poor child outcomes. The transition to disability also substantially increases health service utilization.

Another child characteristic is special education status. In the first set of analyses, children who are in special education programs at Wave II have poor outcomes on all dependent measures except for hospitalization and doctor visits for physical illness.

In the first set of analyses, compared to female children, male children have higher applied problems scores, are more likely to be suspended from school, and have fewer doctor visits for physical illness. Black children have lower test scores and a higher probability of school suspension or expulsion than white children.

The analyses also control for child's age and age-squared. The regression coefficients of these two variables always have opposite directions. Child's age is positively related to the applied problems score, the likelihood of repeating a grade, number of school days missed, and doctor visits for emotional problems, but is negatively associated with the other child outcomes. The use of the categorical measure of child's age in sensitivity tests produces similar results.

7.1.4 Household Income

Reported in Chapter 5, household income before childbirth is positively related to children's applied problems scores alone. It does not correlate with any health outcome measures after controlling for child and household characteristics. In fixed-effects analyses, household income is not statistically significant for all outcome measures except children's repeating a grade and doctor visits for emotional problems. Three general issues about household income in testing the hypothesis of asset effects are discussed below.

First, the insignificance of household income, to some extent, increases our confidence in the estimated asset effects. As economic resources, both household income and assets may share similar confounders (i.e., employment, education, family background, and so on) when predicting child outcomes. If the estimated asset effects are biased due to the confoundedness, this problem may occur with household income as well. Given the distinct results on household income and assets, it seems the common confounders have been appropriately addressed.

Second, it is important to consider how to control for other household economic resources (such as income) in analyses. Research on asset effects tries to identify the unique role of household assets different from household income. The conventional approach to add household income as a control variable, however, may not be able to distinguish asset effects additive to income effects (quantitative difference) and those effects unique to household assets (qualitative difference). In fact, this strategy examines whether children from households with more assets have better child outcomes given the same level of household income. In other words, instead of testing the qualitative difference of household assets from income, this strategy actually tests whether more economic resources are associated with better child outcomes.

The study does not intend to address this issue, but it can possibly be done by including two indicators of household economic resources in analysis: One is the total amount of household economic resources (that is, the sum of household assets and income), and the other is the ratio of household assets and household income. To control for the total amount of economic resources means that the analysis compares households with an equal amount of economic resources. Under this circumstance, if the ratio variable has a positive influence on child outcomes, it indicates that assets have effects different from household income (qualitative difference).

Third, what income measure should be used? The current study and previous research use the mean of household income in several years as a proxy of household permanent income because it is less fluctuant than annual income. Household permanent income is a good measure of long-term economic resources. According to the classical theories of savings, such as the Life-Cycle Hypothesis and the buffer-shock model (Nam et al., 2008), household assets are accumulated for consumption smoothing during income fluctuations, and extra income is saved when households have income more than needed for consumption. From this view, it is perhaps better to have a direct measure of income fluctuation.

For example, suppose two households have the same level of permanent income. One experiences a short-term negative income shock and the other does not. The one with negative income shock maintains the same level of consumption by spending down household savings. If household permanent income is controlled for, the effects of household assets on consumption smoothing are less likely to be detected because the analysis would compare the level of consumption for households with the same level of permanent income. A better approach is to create an income fluctuation indicator using both household permanent income and annual income.

Finally, beyond the technical issues about household income discussed above, it is also important to clearly distinguish stocks (assets) and flows (income) conceptually. The theoretical relationship between assets and income is complicated and assets and income cannot be independent of each other by definitions. Assets are the difference between income and consumption, and asset stocks can generate income flows as well. This perspective suggests that it may not be sufficient to control for income in regression analysis.

7.2 Limitations and Research Implications

There are several limitations in this exploratory study of asset effects for children with disabilities. These limitations should be addressed in the future. First, the theory of asset effects for children has not been adequately specified. The empirical examination in the study is "reduced-form" tests and is exploratory in nature.

As summarized in Chapter 2, possible effects of household assets on child development and child well-being are discussed in several studies (e.g., Lerman & McKernan, 2008; Nam & Huang, 2009; Shanks et al., 2009), which examine the direction (positive vs. negative) and mechanism of asset effects. It is believed that household assets affect child development through improving home environment, parenting behaviors, and family functioning. Some studies also discuss potential heterogeneity of asset effects across different populations. Valuable as they are, these studies do not provide specific guidelines to examine asset effects. For example, it would be less meaningful to predict the direction of asset effects (i.e., positive or negative) if asset effects are in fact nonlinear. The findings on the mediation mechanism are mixed. Some studies (e.g., Kim, 2010), including this one, do not find strong empirical support for it.

Built on previous theoretical discussions, the study defines asset effects from the life course perspective and considers asset effects cumulative during childhood. There are several key questions from this view: (1) What is the pattern of asset effects by child's age or by stages of child development? The answer to this question helps determine the best timing when asset-based intervention is applied to facilitate child development. It also helps identify the average asset effects over childhood or asset effects at a specific stage. The current study has some preliminary evidence that household assets in early childhood are more important for children's health outcomes than those in a later stage. (2) What is the distribution of asset effects in the population? This question helps theorize the nonlinear nature of asset effects. Practically, it is an effort to establish the asset threshold value at which household assets can generate positive impact on child development. (3) How to model heterogeneity of asset effects? Heterogeneity refers to varying asset effects by outcome measures, asset measures, and sub-populations. Two types of research—descriptive (exploratory) or confirmative—can be conducted on these key questions. Exploratory investigation is used to summarize descriptive findings from the existing data and build specific and theoretical hypotheses. Then confirmative studies can be developed to test these hypotheses.

Second, the study is focused on children with disabilities, and, as a key variable, disability indicated by disability types, and the transition from non-disability to disability is closely examined. But interactions between disability characteristics and household assets are not closely looked at. Such interactions can be defined from two dimensions—asset effects for children with and without disabilities and for children with different types of disabilities. Children with different disability types have different development trajectories; multilevel analyses may be used in the research to address the heterogeneity of asset effects across disability types. This topic is left for future research.

Third, asset effects for children with disabilities, if any, occur in a complex social and policy context. Asset effects for children with disabilities should be evaluated in a policy context. For example, the public education system may have a role in the association of household assets and child educational outcomes. Educational policy and school system may produce “noises” in the evaluation of asset effects for children with disabilities. For example, the No Child Left Behind policy may significantly change educational practices on special education in schools. School districts with fiscal pressures may tighten their special education eligibility. Different types of schools—typical public schools, Charter schools, and private schools—may reflect selection bias. In addition, children with disabilities may access more services if parents were able to communicate and negotiate with school.

Health service delivery can also moderate asset effects on child health outcomes. For low-income households, public assistance, asset accumulation, and child development are all intertwined. For instance, low-income children receiving public health programs (e.g., Medicaid and State Children’s Health Insurance Program) may have better health or health services than those with income slightly higher than the poverty line and not eligible for public programs. The means-tested eligibility of these programs is likely to change parents’ saving behavior. High levels of public services may reduce the need for private financial resources. For instance, states have different asset limit eligibility rules for State Children Health Insurance Program; it is important to examine different asset effects on health outcomes among states with various asset limits. Future research should examine the social and policy context of asset effects for children with disabilities.

Fourth, household asset measures likely have measurement errors, although the PSID provides high quality data. There are some puzzling results in the study, especially on those with negative net worth or zero liquid assets. These results may be related to the measurement errors of household assets. This limitation is not uncommon in self-reported survey data. Future research can address it by collecting accurate data or modeling measurement errors. For example, household asset information collected by the IRS or banking institutions is reliable and may be considered for this type of study. Another thought is to build a theoretical model of measurement errors (measurement model) and apply appropriate statistical analyses (such as confirmatory factor analysis or item response model) for model testing.

Fifth, the hypothesis of asset effects assumes causality between household assets and child development. Even when all limitations above are addressed, it is still difficult, if not impossible, to test causality using observational data because child development is a complex process affected by multiple systems and their interactions (such as disability, school, and health policy discussed above). The reduced-form analyses used in the dissertation are likely to have bias due to not considering these dynamics. It raises a concern regarding the extent to which the analyses accurately estimate asset effects on child outcomes. On one hand, programs with experimental design will be especially useful in this regard. On the other hand, it is important to use a structural approach for clear specification of these dynamics in the conceptual model (Pearl, 2000). If the study claims that asset effects vary by disability types or policy contexts, these hypotheses should be included in the conceptual model appropriately.

Finally, there is still ample room for technical improvement. For instance, it may be better to model children's experiences of repeating a grade and school suspension or expulsion using event-history analysis. Other methods or estimators (i.e., Generalized Method of Moments) can also be considered upon the availability of panel data with more than three waves.

7.3 Policy Implications

The study finds that household assets have positive effects for children with disabilities, especially on health outcomes. In this sample, asset effects generally emerge when household net worth is greater than $40,000 or liquid assets are greater than $10,000. Although the findings suggest that household assets in early childhood are more important for child well-being than those at a later stage, the positive association between household assets and child outcomes exists in both periods, with the mechanism of assets varying at different stages. This indicates the importance of having assets throughout childhood. The study also shows that marginal asset effects are greater in low-income and low-wealth households. These findings not only have implications for asset-based policies for children with disabilities and their families, but also provide an empirical justification for the policy proposals mentioned in Chapter 1. For example, since household assets have effects throughout childhood, Child Development Accounts (CDAs), which encourage households to save for their children from childbirth, appear a good asset-building policy option for all children, including those with disabilities. Other policy options mentioned at the beginning of the dissertation, such as Disability Savings Accounts or Individual Development

Accounts (IDAs) for youth with disabilities, are also useful for specific saving purposes or populations (e.g., children receiving Supplemental Security Income). This study further argues that asset building should be considered a policy strategy for the successful development of children with disabilities.

Current US disability policies and programs are faced with the challenges of financial sustainability and high poverty and unemployment rates among people with disabilities. Disability policy is under radical modification to have a greater focus on health and human capital, successful transition to adulthood, and economic independence for children with disabilities. The findings of the study suggest that asset building should be a necessary component in this new vision. Although household assets have been included in the new picture of policy development (see the policy proposals in Chapter 1), their role has not been clearly defined yet. From my view, asset building, education and training, health services, and social engagement and inclusion are the four most important strategies to achieve this new vision for children with disabilities, and these strategies should be adopted throughout the entire disability policy system. For this population, economic resources, including household assets, are the foundation for successful child development and accumulation of health and human capital, as well as a key determinant of future economic independence. Asset building can even be a facilitator of the other three strategies mentioned above. More research in this area is needed to help clarify the role of household assets in this new vision.

The first step to achieve this new vision of asset building for children with disabilities is to summarize existing knowledge and lessons. The current study provides a brief review of the work in this area (see Chapter 2). Admittedly, such research is especially rare when it comes to children with disabilities. A systematic review of existing knowledge and lessons is imperative, especially in the following aspects: (1) theories of disability and development and how to relate them to asset building; (2) the well-being of children with disabilities as indicated by poverty, assets, and educational and health outcomes; (3) an assessment of current disability programs and services for children and their relevance to asset building; and (4) a review of existing asset building strategies for the general population.

Summarized knowledge and lessons should be applied to test asset building for children with disabilities in practice. Policy innovations can include but are not limited to the following ideas: (1) developing new operations in existing programs to accommodate asset building goals; and (2) creating new programs to encourage asset accumulation. Examples of new operations in existing programs are Individual Development Accounts (IDAs) for children with disabilities in the SSI program, the inclusion of financial education and financial services in the Individualized Education Plan for children with disabilities, and more generous tax benefits for flexible spending accounts for disabled children. An example of new programs is Child Savings Accounts (CSAs) discussed in Chapter 1.

Several findings of the study are useful for designing asset-based policy innovations for children with disabilities. First, asset-based programs should start early and last long. The study suggests that household assets before childbirth have a positive impact on children's health outcomes by preventing the occurrence of negative health conditions. It may be appropriate to use asset-based programs to foster parents' savings for all children even at the prenatal stage. The program should be universal and inclusive since the risk of having a disability always exists. The purposes of asset accumulation may be adjusted later if children are diagnosed with a disability. The study also finds positive associations between children's health outcomes and household assets in later childhood. This lends support for asset-based programs that encourage a continuous process of asset accumulation lasting throughout and even beyond childhood.

Second, asset-based programs should mainly target health outcomes for children with disabilities because they have a high level of unmet health needs. The findings of asset effects on health outcomes for children with disabilities are consistent across four different empirical strategies. Current asset-based programs for children, such as Educational Savings Accounts and 529 Plans, generally focus on education. Ideally, asset-based programs for children should have an array of savings' purposes broader than education and match the child's developmental goals. In this regard, Child Savings Accounts (CSAs) seem a better design. For children with disabilities, saving for health should be emphasized in particular.

Third, household assets affect individual well-being through both asset spending (consumption) and asset holding. These two may seem conflicting because holding assets may limit the use of assets. The different findings of asset effects on health service utilization (e.g., doctor visits for physical illness) between the first and fourth set of analyses are a reflection of these two mechanisms. Therefore, asset-based programs should create a structure that allows program participants to benefit from both types of asset effects. For example, such programs may set up a minimum savings amount for long-term goals and any savings beyond this amount can be spent for restricted purposes, such as health and education.

Fourth, the minimum savings amount of asset-based programs for children with disabilities should be set at around $10,000, and these programs should help families achieve this goal as early as possible. As indicated by this study, asset effects are more likely to seen when households have liquid assets greater than $10,000.

Apparently, this goal can be challenging for some families because the median value of household liquid assets in the sample is $2,000. The minimum savings goal could be lower because perhaps liquid assets examined in this study are not entirely intended for children with disabilities. Further research is needed to see how much savings families truly spend on children with disabilities. An alternative is that the government provide a large amount of seed funds (e.g., $5,000), or families can "borrow" without interest for savings in asset-based programs from the government or the market.

Finally, asset-based programs should be progressive toward low-income and low-wealth populations. The study finds that household assets have greater marginal effects for low-income and low-wealth households than for high-income and high-wealth households. Disadvantaged populations benefit more from asset ownership. Progressive asset-based programs are both efficient and equitable. To achieve progressiveness, appropriate financial incentives can be provided for disadvantaged populations. Asset-based programs may provide a higher match savings rate, larger match savings amount, or more seed funds for low-income participants than for typical program participants. To achieve equity, The distribution of government expenditures should be reconsidered and redirected given that the current asset-based policies are administered largely through the tax code and lean toward the wealthy, while low-income households benefit little from these policies because these households have a low marginal tax rate, do not itemize deductions, or do not accrue much tax liability. In addition, new asset-based programs should expand access to financial services and improve the financial capability of disadvantaged populations.

7.4 Conclusion

The study tests the hypothesis of asset effects on educational and health outcomes for children with disabilities using the PSID-CDS longitudinal data. Household assets are found to have consistent and positive effects on major health outcome measures in all empirical strategies, and, in some analyses, positive effects on children's educational achievement. Asset effects generally emerge when household net worth is greater than $40,000 or liquid assets are greater than $10,000. Although household assets in early childhood are more important for child well-being than those at a later stage, positive associations between household assets and child outcomes exist in both periods. This indicates the importance of having assets throughout childhood. The study also shows greater marginal asset effects for low-income and low-wealth households. While confirming the importance of household assets in child development for children with disabilities, the hypothesized mediation mechanism, which argues household assets affect child well-being through changing parent behaviors, is not supported.

The findings of this study have important policy implications and are particularly useful for designing and testing asset-based policy innovations for children with disabilities. It suggests that asset building should be included in the new vision for successful development of children with disabilities. Asset accumulation for children with disabilities should start early and last long with a specific focus on health and health services. The minimum savings goal should be set at around $10,000. Asset-based programs for children with disabilities should be progressive toward those with low income and low wealth.

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Tables

Table 2.1 Effects of Asset Spending and Asset Holding for Children with Disabilities

Areas of Family Function	**Asset Effects Through**	
	Asset Spending	**Asset Holding**
Economic Security	Consumption smoothing in economic crises	Help families better plan for the future and avoid economic hardship
Access to Services and Support	Provide economic resources for services of desired quantity and quality	Availability of high-quality services and support through homeownership
Investment in Child Development	Positive physical environment to stimulate cognitive development and provide opportunities for high-quality education	School and neighborhood environments indicated by homeownership Increase expectations for children as well as willingness to invest in child investment
Psychological Well-being	Help create a sense of control and greater life satisfaction	Help develop future orientation, self-esteem, self-efficacy, and positive self-image

Table 3.1 Waves of the PSID and PSID-CDS Major Variables

Year	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**99**	**01**	**02**	**03**	**05**	**07**
Child disability in the CDS files																				
														×			×			×
Asset variables in the PSID family files																				
	×					×					×				×	×		×	×	×
Outcome variables (health and education) in the CDS files																				
														×			×			×

Table 3.2 Variables and Measures Used in the Study[23]

Variables	Measurement	Range
Disability Variables		
Ten health condition indicators	Dichotomous	0-1
Dependent Variables		
WJ-R broad reading score	Continuous	0-200
WJ-R applied problems test	Continuous	0-200
Grade repeated (Yes/No)	Dichotomous	1 or 0
School suspension/expulsion (Yes/No)	Dichotomous	1 or 0
Global health status (Excellent/Otherwise)	Dichotomous	1 or 0
School days missed due to physical illness	Count	0 - +∞
Number of hospitalizations	Count	0 - +∞
Number of doctor visits for illness	Count	0 - +∞
Doctor visits for emotional problems (Yes/No)	Dichotomous	1 or 0
Independent Variables: Asset Variables		
Amount of net worth	Continuous	-∞ - +∞
Four-level net worth	Ordinal	1, 2, 3, and 4
Amount of liquid assets	Continuous	0 - +∞
Four-level liquid assets	Ordinal	1, 2, 3, and 4
Control Variables 1: Child Characteristics		
Age	Continuous	0-13
Gender (Male)	Dichotomous	1 or 0
Race (Black and White)	Dichotomous	1 or 0
Special education status (Yes/No)	Dichotomous	1 or 0
Health insurance coverage	Nominal	1,2, and 3
Disability types (10 indicators) (Yes/No)	Dichotomous	1-0
Control Variables 2: Parents' Characteristics		
Household header's gender (Male)	Dichotomous	1 or 0
Household header's employment (Employed)	Dichotomous	1 or 0
Mother's age	Continuous	0-+∞
Mother's education	Ordinal	1, 2, 3, and 4
Mother's marital status (Married)	Dichotomous	1 or 0
Control Variables 3: Household Characteristics		

23 The data sources listed in this table are particularly for childhood sample 1. For childhood sample 2, data sources are slightly different. For example, disability indicators and child outcome measures are from all three waves of the CDS. Asset measures are from family files in 1994, 1999, and 2003.

Variables	**Measurement**	**Range**
Household size	Continuous	1-+∞
Number of children	Continuous	1-+∞
Household income	Continuous	-∞ - +∞
Public program participation (Yes/No)	Dichotomous	1 or 0
Region	Nominal	1, 2, 3, and 4
Control Variables 4: Parenting Behaviors (Measured in the CDS)		
Parental involvement	Continuous	7-27
Educational Expectations	Ordinal	1, 2, and 3
Parental warmth scale	Continuous	1-5
Parenting stress	Continuous	1-5

Table 4.1 Timing of Measures in Fixed-Effects Models

	Observation 1 (t=1)	Observation 2 (t=2)	Observation 3 (t=3)
Child outcome measures	1997 (CDS I)	2002 (CDS II)	2007 (CDS III)
Child characteristics	1997 (CDS I)	2002 (CDS II)	2007 (CDS III)
Parenting behaviors	1997 (CDS I)	2002 (CDS II)	2007 (CDS III)
Asset measures	1994	1999	2003
Household characteristics	1994	1999	2003
Household head's characteristics	1994	1999	2003

Table 5.1 Result Comparison of the First and Second Sets of Analyses [a]

Asset Variables	**Educational Outcomes**				**Health Outcomes**				
	Applied Problems Score	Broad Reading Score	Repeated Grade	School Suspension/ Expulsion	Global Health	School Days Missed	Hospitalization	Doctor Visits for Illness	Doctor Visits for Emotional Problems
Panel I. The First Set of Analyses									
Net Worth									
Continuous				-		-	-	-	
Categorical	+	+		-	+	-	-	-	
Liquid Assets									
Continuous					+	-	-	-	
Categorical	-	-	-	-	+	-	-	-	
Panel II. The Second Set of Analyses									
Net Worth									
Continuous									
Categorical					+	-	-		
Liquid Assets									
Continuous					+	-	-		
Categorical					+	-	-		

a. Only significant results are marked in the table: "+" and "-" are used to indicate positive and negative associations, respectively.

Table 5.2 Descriptive Statistics (weighted, N=732 in each imputed dataset)

Variables	Mean or %	SD	Median
Dependent Variables (in 2002)			
Applied problems score	102.15	17.82	101.01
Broad reading score	102.29	19.71	100.64
Repeated grade (yes)	17%		
School suspension or expulsion (yes)	17%		
Global health (excellent)	50%		
Number of school days missed	3.37	4.55	2
Number of hospitalization	.28	1.12	0
Number of doctor visit for illness	2.42	4.20	1
Doctor visit for emotional problem (yes)	39%		
Asset Measures			
Net worth	$64,110	$201,183	$12,400
Percentage of negative net worth	18%		
Percentage of zero net worth	5%		
Log-transformed net worth	7.69	4.50	9.42
Categorical measure of net worth (%)			
<$0	18%		
$0-$10,000	28%		
$10,001-$40,000	24%		
>$40,000	30%		
Liquid assets	$21,243	$97,813	$1,600
Log-transformed liquid assets	6.43	3.90	7.38
Categorical measure of liquid assets (%)			
=$0	21%		
$1-$1,000	25%		
$1,001-$10,000	27%		
>$10,000	27%		
Assets measured in:			
1984	35%		
1989	43%		
1994	22%		
Control Variables [a]			
Child's characteristics (measured in 1997)			
Age in 2002	11.69	3.40	12
Gender (male)	60%		Male
Race (Black)	18%		White
Birth order to mother	1.97	.95	2
Special education (yes)	28%		No
Medical insurance in 2001			1
No insurance	6%		
Employer-provided or private insurance	71%		
Government-provided insurance	24%		
Disability in 1997	57%		

Variables	Mean or %	SD	Median
Disability in 2002	78%		
Disability Types			Learning disability
Epileptic convulsion	5%		
Speech impairment	15%		
Hearing difficulty	7%		
Seeing difficulty or blindness	11%		
Emotional disturbance	4%		
Orthopedic impairment	13%		
Learning disability	16%		
Autism	2%		
ADD/ADHD	29%		
<u>Household background</u>			
Head's gender (male)	81%		Male
Head's employment (employed)	78%		Employed
Household size	3.40	1.51	3
Number of children	1.31	1.22	1
Food stamps (yes)	21%		No
AFDC (yes)	37%		No
SSI (yes)	31%		No
Average income in previous five years	$29,139	$25,686	$23,734
Log-transformed income	9.91	.93	10.07
Mother's marital status in 2001 (married)	67%		Married
Mother's age in 2001	33.24	6.84	34
Mother's education in 2001			Some College
Less than high school	10%		
High school	35%		
Some college	31%		
Four-year college and above	24%		
Mother's reading score in 1997	30.98	5.32	32
Region in 1999			3
Northeast	19%		
North central	26%		
South	39%		
West	17%		
Mediators (measured in 1997)			
Parental involvement	19.97	3.52	20.7
Parental warmth	4.53	.53	4.67
Parenting stress	2.15	.71	2.11
Educational expectations (%)			Four-year college
High school and below	23%		
Some college	13%		
Four-year college and above	64%		

[a] Unless specified in table, control variables are measured at the time when asset information is collected.

Table 5.3 Net Worth and Educational Outcomes: Results of the First Strategy

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel A: Applied Problems Scores (OLS)					*Panel B: Broad Reading Scores (OLS)*				
Family Economic Resources										
Log-transformed income	3.75**	3.83**	3.31**	3.44**	2.95*	1.80	1.80	1.24	1.25	.69
Log-transformed net worth		-.03		-.05			-.0003		-.03	
Categorical measure of net worth (Reference group: $0-$10,000)										
<$0			3.11		3.30			2.54		3.02
$10,001-$40,000			.03		-.56			1.42		1.25
>$40,000			5.40*		5.17*			5.17**		5.06**
Parenting Behaviors										
Parental involvement				.72**	.73**				.65**	.65**
Parenting warmth				-1.85	-1.95				-3.86**	-4.04**
Parenting stress				1.29	1.49				-.87	-.79
Educational expectations (Reference group: High school or below)										
Some college				.03	.48				1.02	1.53
Four-year college and above				5.38***	5.59***				7.34***	7.49***

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	Panel C: Repeated Grade (Probit)					*Panel D: School Suspension or Expulsion (Probit)*				
Family Economic Resources	-.14	-.15	-.12	-.12	-.09	.19	.28	.24	.28*	.24
Log-transformed income										
Log-transformed net worth		.002		.003			-.03**		-.03**	
Categorical measure of net worth (Ref. group: $0-$10,000)										
<$0			-.25		-.28			.48**		.49**
$10,001-$40,000			.02		.03			.10		.15
>$40,000			-.46		-.47			-.05		.03
Parenting Behaviors										
Parental involvement				-.03	-.03				-.10**	-.10**
Parenting warmth				.04	.06				-.15	-.17
Parenting stress				.19	.18				.18	.18
Educational expectations (Ref. group: High school or below)										
Some college				.02	.0009				-.27	-.26
Four-year college and above				-.27	-.31				.14	.14

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Table 5.4 Liquid Assets and Educational Outcomes: Results of the First Strategy

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel A: Applied Problems Scores (OLS)					*Panel B: Broad Reading Scores (OLS)*				
Family Economic Resources										
Log-transformed income	3.75**	4.27**	4.01**	3.84**	3.64**	1.80	2.32	1.85	1.63	1.27
Homeownership (yes)		2.40	2.19	1.95	1.78		1.80	1.62	1.58	1.25
Log-transformed liquid assets		-.38		-.37			-.35		-.31	
Categorical measure of liquid assets (Ref. group: =0)										
$1-$1,000			-5.94**		-5.53**			-7.48**		-6.65**
$1,001-$10,000			-6.15		-6.37			-5.56		-5.72
>$10,000			-4.03		-3.84			-3.40		-2.98
Parenting Behaviors										
Parental involvement				.68**	.66**				.61*	.83**
Parenting warmth				-1.68	-1.78				-3.72**	-3.97**
Parenting stress				1.24	1.41				-.90	-.03
Educational expectations (Ref. group: High school or below)										
Some college				.15	.33				1.14	3.00
Four-year college and above				5.50***	5.59***				7.43***	9.19***

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel C: Repeated Grade (Probit)					*Panel D: School Suspension or Expulsion (Probit)*				
Family Economic Resources										
Log-transformed income	-.14	-.16	-.09	-.12	-.06	.19	.17	.20	.16	.19
Homeownership		-.005	.04	-.005	.04		-.26	-.23	-.24	-.21
Log-transformed liquid assets		.007		.005			.03		.03	
Categorical measure of liquid assets (Ref. group: =$0)										
$1-$1,000			.55**		.53**			.48*		.42*
$1,001-$10,000			.05		.06			.04		.06
>$10,000			-.16		-.20			.39		.42
Parenting Behaviors										
Parental involvement				-.03	-.02				-.10**	-.09*
Parenting warmth				.04	.02				-.14	-.15
Parenting stress				.20	.17				.19	.18
Educational expectations (Ref. group: High school or below)										
Some college				.03	.08				-.34	-.32
Four-year college and above				-.27	-.28				.10	.12

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Table 5.5 Test Score Means by Educational Attainment

Test Score in 2002	Educational Attainment in 2007		
	Below high school	High school and above	College enrollment
Applied problems score	97.2	102.2	106.8
Broad reading score	97.1	102.7	108.0

Table 5.6 Net Worth and Health Outcomes: Results of the First Strategy

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel A: Global Health (Probit)					*Panel B: School Days Missed (Negative Binomial)*				
Family Economic Resources										
Log-transformed income	.19	.17	.13	.17	.12	-.09	-.06	.02	-.04	.02
Log-transformed net worth		.007		.007			-.02**		-.02**	
Categorical measure of net worth (Reference group: $0-$10,000)										
<$0			.08		.09			.02		.004
$10,001-$40,000			.33*		.33*			-.35**		-.36**
>$40,000			.41**		.39**			-.56***		-.55***
Parenting Behaviors										
Parental involvement				.02	.02				-.02	-.02
Parenting warmth				.02	.0002				.09	.12
Parenting stress				-.17	-.17				.13	.12
Educational expectations (Reference group: High school or below)										
Some college				.002	.05				-.04	-.10
Four-year college and above				.06	.07				-.09	-.09

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel C: Hospitalization (Negative Binomial)					*Panel D: Doctor Visits for Illness (Negative Binomial)*				
Family Economic Resources										
Log-transformed income	-.24	-.15	-.09	-.25	-.18	-.02	-.02	.04	-.03	.02
Log-transformed net worth		-.04**		-.03*			-.02**		-.02**	
Categorical measure of net worth (Ref. group: $0-$10,000)										
<$0			.24		.09			.10		.05
$10,001-$40,000			-.43		-.47			-.28*		-.28*
>$40,000			-.79*		-.75*			-.51***		-.51***
Parenting Behaviors										
Parental involvement				-.06	-.06				-.04*	-.04
Parenting warmth				.65**	.67**				.03	.05
Parenting stress				.57*	.56*				.05	.04
Educational expectations (Ref. group: High school or below)										
Some college				.21	.18				-.07	-.13
Four-year college and above				.46	.44				.27	.25

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel E: Doctor Visits for Emotional Problems (Probit)									
Family Economic Resources										
Log-transformed income	.04	.05	.02	.07	.06					
Log-transformed net worth		-.001		-.0006						
Categorical measure of net worth (Ref. group: $0-$10,000)										
<$0			.21		.22					
$10,001-$40,000			.03		.03					
>$40,000			.18		.21					
Parenting Behaviors										
Parental involvement				.005	.005					
Parenting warmth				-.04	-.07					
Parenting stress				.25	.25					
Educational expectations (Ref. group: High school or below)										
Some college				-.07	-.04					
Four-year college and above				-.18	-.17					

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Table 5.7 Liquid Assets and Health Outcomes: Results of the First Strategy

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel A: Global Health (Probit)					*Panel B: School Days Missed (Negative Binomial)*				
Family Economic Resources										
Log-transformed income	.19	.05	.09	.04	.07	-.09	.06	.06	.08	.06
Homeownership		.02	.08	.03			-.30**	-.29**	-.30**	-.30**
Log-transformed liquid assets		.06***		.06***			-.05**		-.05**	
Categorical measure of liquid assets (Reference group: $0)										
$1-$1,000			.63***		.69***			-.02		-.06
$1,001-$10,000			.39*		.40*			-.25		-.25
>$10,000			.69***		.70***			-.42**		-.43*
Parenting Behaviors										
Parental involvement				.02	.02				-.02	-.01
Parenting warmth				.003	-.01				.10	.09
Parenting stress				-.18	-.21				.15	.14
Educational expectations (Reference group: High school or below)										
Some college				-.007	-.009				-.05	-.05
Four-year college and above				.06	.06				-.06	-.06

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel C: Hospitalization (Negative Binomial)					*Panel D: Doctor Visits for Illness (Negative Binomial)*				
Family Economic Resources										
Log-transformed income	-.24	-.28	.24	-.18	.11	-.02	.14	.11	.13	.09
Homeownership		.09	.07	.16	.15		-.31**	-.32**	-.29**	-.32**
Log-transformed liquid assets		-.19***		-.19***			-.06***		-.06***	
Categorical measure of liquid assets (Reference group: $0)										
$1-$1,000			-.83**		-.76**			-.15		-.20*
$1,001-$10,000			-2.38***		-2.30***			-.37*		-.38*
>$10,000			-1.80***		-1.68***			-.44**		-.47**
Parenting Behaviors										
Parental involvement				-.04	-.03				-.04	-.04
Parenting warmth				.68**	.66**				.07	.04
Parenting stress				.62**	.60**				.08	.07
Educational expectations (Ref. group: High school or below)										
Some college				.21	.34				-.08	-.08
Four-year college and above				.44	.54				.28	.27

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Panel E: Doctor Visits for Emotional Problems (Probit)									
Family Economic Resources										
Log-transformed income	.05	-.02	-.06	.005	-.03					
Homeownership		-.009	-.04	-.03	-.07					
Log-transformed liquid assets		.03		.03						
Categorical measure of liquid assets (Reference group: $0)										
$1-$10,000			-.13		-.17					
$10,001-$40,000			.16		.15					
>$40,000			.42		.40					
Parenting Behaviors										
Parental involvement				.005	.001					
Parenting warmth				-.06	-.05					
Parenting stress				.24**	.26**					
Educational expectations (Ref. group: High school or below										
Some college				-.08	-.08					
Four-year college and above				-.19	-.18					

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1.

Table 5.8 Average Asset Effects on Educational Outcomes
After Propensity Score Classification

Asset Variables	Educational Outcomes							
	Applied Problems Score		Broad Reading Score		Repeated Grade		School Suspension/ Expulsion	
	M 2	M 3	M 2	M 3	M 2	M 3	M 2	M 3
Panel I: Net Worth								
Log-transformed	.02		.10		-.03		-.01	
Categorical (ref: $0-$10,000)								
<$0		2.73		-2.15		.17		.86
$10,001-$40,000		1.35		-.26		-.06		.54
Above $40,000		1.86		.43		-.17		.25
Panel II: Liquid Assets								
Log-transformed	-.25		-.004		-.04		.01	
Categorical (ref: $0)								
$1-$10,000		-4.61		-2.11		.45		.48
$10,001-$40,000		-4.17		-1.57		-.46		.40
Above $40,000		-3.54		-.68		-.32		-.11

***p<.01 **p<.05 *p<.1

Table 5.9 Average Asset Effects on Health Outcomes After Propensity Score Classification

Asset Variables	**Health Outcomes**									
	Global Health		School Days Missed		Hospitalization		Doctor Visits for Illness		Doctor Visits for Emotional Problems	
	M 2	M 3	M 2	M 3	M 2	M 3	M 2	M 3	M 2	M 3
Panel I: Net Worth										
Log-transformed	.007		-.02		-.02		-.02		-.005	
Categorical (ref: $0-$10,000)										
<$0		.11		-.23		.06		.08		.08
$10,001-$40,000		.36		-.40		-.29		-.21		-.36
Above $40,000		.57*		-.99***		-.97***		-.33		.50
Panel II: Liquid Assets										
Log-transformed	.08***		-.07***		-.13***		-.03		.03	
Categorical (ref: $0)										
$1-$10,000		.90***		-.17		-.59		.26		-.55
$10,001-$40,000		.64***		-.57**		-1.49***		-.11		-.36
Above $40,000		1.18***		-.65*		-1.24***		-.22		.32

***p<.01 **p<.05 *p<.1

Table 5.10 Average Asset Effects for Sub-groups by Expected Assets

Asset Variables	**Health Outcomes**					
	Global Health		School Days Missed		Hospitalization	
	M 2	M 3	M 2	M 3	M 2	M 3
	PANEL I: High Expected Assets Group					
Liquid Assets						
Log-transformed	.07		-.10		-.03	
Categorical (ref: $0)						
Above $10,000		.69		-.60		-.31
	PANEL II: Low Expected Assets Group					
Liquid Assets						
Log-transformed	.12***		-.08		-.15***	
Categorical (ref: $0)						
Above $10,000		2.31***		-1.19		-1.77

M2=Model 2 with the continuous liquid asset measure; M3=Model 3 with the categorical liquid asset measure. For categorical liquid asset measure, only the regression coefficients for the highest liquid asset group (>$40,000) are reported.
***p<.01 **p<.05 *p<.1

Table 6.1 Results Comparison of Fixed-Effects Models and SEM Analyses [a]

Asset Variables	**Educational Outcomes**				**Health Outcomes**				
	Applied Problems Score	Broad Reading Score	Repeated Grade	School Suspension/ Expulsion	Global Health	School Days Missed	Hospitalization	Doctor Visits for Illness	Doctor Visits for Emotional Problems
Panel I. The Third Set of Analyses: Fixed-Effects Analyses									
Net Worth									
Continuous			-		+	-	-		+
Categorical			-	-	+	+	+	+	+
Liquid Assets									
Continuous			-		+	+			
Categorical			-	-	+	+		+/-	-
Panel II. The Fourth Set of Analyses: SEM Models									
Net Worth									
Continuous	+			-			-		+
Categorical	+	+	-		+	+			+
Liquid Assets									
Continuous	+	+			+	+	-	+	
Categorical	+	+		-	+		-	+	+

a. Only significant results are marked in the table: “+” and “-” are used to indicate positive and negative associations.

Table 6.2 Descriptive Statistics of Three-Wave PSID-CDS Data

Variables	**Mean or %**	**SD**	**Median**
Dependent Variables			
Applied problems score	102.23	18.14	102.00
Broad reading score	99.72	20.11	99.00
Repeated grade (yes)	14%		0
children without repeating a grade in all 3 waves	62%		
children with repeating a grade in all 3 waves	3%		
School suspension or expulsion (yes)	14%		0
children without school suspension in all 3 waves	54%		
children with school suspension in all 3 waves	.08%		
Global health (=excellent)	47%		0
children with excellent health in all 3 waves	19%		
children without excellent health in all 3 waves	28%		
Number of school days missed	2.08	3.76	0
children without school days missed in all 3 waves	17%		
Number of hospitalizations	.45	1.55	0
children without hospitalization in all 3 waves	50%		
Number of doctor visits for illness	2.57	4.03	2
children without visits in all 3 waves	6%		
Doctor visits for emotional problem (yes)	30%		
children without visits in all 3 waves	48%		
children with visits in all 3 waves	7%		
Asset Measures			
Net worth	$175,932	$1058,108	$30,500
Categorical measure of net worth			
<$0	13%		
$0-$10,000	22%		
$10,001-$40,000	20%		
>$40,000	45%		
Liquid assets	$88,891	$942,056	$2,000
Categorical measure of liquid assets			
=$0	22%		
$1-$1,000	21%		
$1,001-$10,000	24%		
>$10,000	32%		
Control Variables [a]			
Child's characteristics			
Age	11.25	5.50	11
Special education (yes)	26%		0
Disability status (yes)	49%		0
Household background			
Head's employment (employed)	82%		1

Variables	Mean or %	SD	Median
Household size	4.02	1.11	4
Number of children	2.09	.98	2
Food stamps (yes)	17%		0
AFDC (yes)	7%		0
SSI (yes)	6%		0
Average income	$61.696	$72,200	$46,486
Mother’s marital status (married)	68%		1
Mother’s age	34.97	7.73	35
Mother’s education			Some college
Less than high school	13%		
High school	35%		
Some college	29%		
Four-year college and above	24%		
Mediators			
Parental involvement	5.17	3.06	5
Parental warmth	4.03	.81	4.14
Parenting stress	2.35	.83	2.29
Educational expectations			4-year college
High school and below	26%		
Some college	18%		
Four-year college and above	55%		

Table 6.3 Results of Fixed-Effects Models: Net Worth and Educational Outcomes

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Applied Problems Score						**Broad Reading Score**					
Log-NW	.30**	-.03	-.02				.28**	.08	.07			
Categorical (Ref.: $0-$10,000)												
<$0				2.21	.04	.33				2.41	-.03	-.14
$10,001-$40,000				.03	.42	.62				1.34	1.01	-.98
>$40,000				4.44***	1.55	1.85				4.61***	1.52	1.20
Parental involvement			.32			.34			-.12			-.10
Parenting warmth			-.13			-.10			-.87			-.84
Parenting stress			-1.60***			-1.63**			.22			.24
Educational expectations (Ref. group: High school or below)												
Some college			.27			.24			1.08			1.09
4-year college and above			1.19			1.07			3.13***			3.13**
	Repeated Grades						**School Suspension/Expulsion**					
Log-NW	-.05**	-.09***	-.11***				-.03	-.006	-.003			
Categorical (Ref.: $0-$10,000)												
<$0				.18	1.48***	1.43***				-.27	-.20	-.26
$10,001-$40,000				.18	.21*	-.10				-.67**	-.52***	-.60***
>$40,000				-.79**	-.49**	-.69***				-.37	.20	.19
Parental involvement			-.25***			-.25***			-.08**			-.07**
Parenting warmth			-.34***			-.29**			-.06			-.09
Parenting stress			.07			.05			.12			.12
Educational expectations (Ref.: High school or below)												
Some college			-.34*			-.58***			-.21			-.08
4-year college and above			-.36*			-.39*			-.32*			-.42**

Regression coefficients are reported in the Table. ***p<.01 **p<.05 *p<.1

Table 6.4 Results of Fixed-Effects Models: Liquid Assets and Educational Outcomes

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Applied Problems Score						**Broad Reading Score**					
Log-LA	.53***	.04	.04				.78***	.13	.10			
Categorical (Ref.: $0)												
$1-$1,000				-.02	-1.13	-1.30				3.12**	.14	-.17
$1,001-$10,000				1.21	-.71	-.62				2.96**	.25	-.03
>$10,000				5.28***	.68	.58				7.40***	1.72	1.47
Homeownership	2.68**	1.32	1.49	2.76**	1.27	1.44	2.01	.26	.32	2.43	.23	.29
Parental involvement			.33			.32			-.14			-.14
Parenting warmth			-.13			-.25			-.78			-.87
Parenting stress			-1.51**			-1.52**			.12			.13
Educational expectations (Ref.: High school or below)												
Some college			.95			1.07			1.61			1.66
4-year college and above			1.95			2.02			3.64**			3.68**
	Repeated Grades						**School Suspension/Expulsion**					
Log-LA	-.05**	-.05***	-.04*				-.09***	-.009	-.009			
Categorical (Ref.: $0)												
<$1-$1,000				.01	-.56***	-.54**				.-.62**	-.27	-.32*
$1,001-$10,000				-.20	-.61***	-.61***				-.63**	.07	-.02
>$10,000				-.55	.20	.31				-1.32***	-.78***	-.75***
Homeownership	-.31	-.44***	-.88***	-.32	-.56***	-1.03***	-.07	-.30*	-.41**	-.08	-.27	-.38**
Parental involvement			-.27***			-.27***			-.09***			-.09***
Parenting warmth			-.40***			-.47***			-.08			-.08
Parenting stress			.07			.06			.11			.07
Educational expectations (Ref.: High school or below)												
Some college			-.16			-.03			-.22			-.26
4-year college and above			-.23			-.22			-.34*			-.30*

Regression coefficients are reported in the Table. ***p<.01 **p<.05 *p<.1

Table 6.5 Results of Fixed-Effects Models: Net Worth and Health Outcomes

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Global Health Status						**School Days Missed**					
Log-NW	.03*	.03**	.03**				-.01	-.02***	-.03***			
Categorical (Ref: $0-$10,000)												
<$0				.70***	.28**	.30**				.06	.51***	.51***
$10,001-$40,000				.82***	.73***	.67***				.15	.29***	.20***
>$40,000				.91***	.95***	.90***				.03	.40***	.32***
Parental involvement			.02**			.03**			-.06**			-.05***
Parenting warmth			-.27***			-.26***			-.28**			-.27***
Parenting stress			-.60***			-.60***			.09			.08
Educational expectations												
(Ref. : High school or below)												
Some college			-.36**			-.37**			-.19***			-.19***
4-year college and above			.16			.12			-.01			-.02
	Hospitalization						**Doctor Visits for Illness**					
Log-NW	-.05**	-.04***	-.04***				-.02	-.001	.000			
Categorical (Ref: $0-$10,000)												
<$0				.53**	.53***	.59***				.22*	-.001	-.04
$10,001-$40,000				.21	.73***	.77***				.08	.10*	.09***
>$40,000				-.15	.22**	.28				-.08	.-.05	-.06*
Parental involvement			-.03*			-.02			-.002			.002
Parenting warmth			.32***			.29***			.06			.05
Parenting stress			.06			.04			.19*			.19***
Educational expectations												
(Ref. : High school or below)												
Some college			-.60***			-.67***			-.11***			-.11***
4-year college and above			-.26***			-.24***			-.28*			-.27**

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Doctor Visits for Emotional Problems											
Log-NW	.01	.06***	.07***									
Categorical (Ref: $0-$10,000)												
<$0				.33	.07	.01						
$10,001-$40,000				.32	.31***	.34***						
>$40,000				.26	.83***	1.13***						
Parental involvement			-.13***			-.13***						
Parenting warmth			.23*			.28**						
Parenting stress			.54***			.60***						
Educational expectations (Ref: High school or below)												
Some college			-.37**			-.30**						
4-year college/above			-.68***			-.75***						

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

Table 6.6 Results of Fixed-Effects Models: Liquid Assets and Health Outcomes

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Global Health Status						**School Days Missed**					
Log-LA	.05*	.06***	.05***				.01	.03***	.03***			
Categorical (Ref: $0)												
<$1-$1,000				.19	.28***	.19*				.28**	.32***	.31***
$1,001-$10,000				.36*	.56***	.45***				.29**	.44***	.36***
>$10,000				.57***	.70***	.55***				.15	.10**	.06
Homeownership	.03	.16	.31**	.04	.14	.28**	-.08	-.19**	-.17*	-.07	-.17**	-.15*
Parental involvement			.03**			.03**			-.07***			-.07***
Parenting warmth			-.27***			-.28***			-.29***			-.27***
Parenting stress			-.61***			-.61***			.04			.04
Educational expectations												
(Ref: High school or below)												
Some college			-.39**			-.40**			-.21***			-.24***
4-year college and above			.14			.12			-.11			-.12*
	Hospitalization						**Doctor Visits for Illness**					
Log-LA	-.02	-.004	-.007				.006	.005	.005			
Categorical (Ref: $0)												
<$1-$1,000				.09	-.08	-.13				.16	.06	.10***
$1,001-$10,000				-.41*	-.08	.-.08				.29**	.18*	.17***
>$10,000				-.02	.19*	.18				-.01	-.19***	-.15**
Homeownership	-.11	-.27**	-.20**	-.10	-.26***	-.20**	.11	.12**	.08*	.11	.15***	.12**
Parental involvement			-.03**			-.03**			-.002			-.003
Parenting warmth			.31***			.33***			.06			.08**
Parenting stress			.06			.07			.19***			.17***
Educational expectations												
(Ref. : High school or below)												
Some college			-.61***			-.58***			-.11***			-.12***
4-year college and above			-.30***			-.31***			-.27***			-.26***

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3	LM1	LM2	LM3
	Doctor Visits for Emotional Problems											
Log-LA	-.005	-.007	-.004									
Categorical (Ref: $0)												
<$1-$1,000				.09	-.28**	-.25						
$1,001-$10,000				-.005	.05	.18						
>$10,000				-.11	-.48**	-.40						
Homeownership	.06	.09	-.05	.08	.11	-.04						
Parental involvement			-.13***			-.14***						
Parenting warmth			.24**			.24*						
Parenting stress			.50***			.53***						
Educational expectations												
(Ref: High school or below)												
Some college			-.45*			-.35*						
4-year college and above			-.68**			-.60***						

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

Table 6.7 Net Worth and Child Outcomes in SEM Models

Net Worth	SEM1			SEM2		
	WI	WII	WIII	WI	WII	WIII
	Applied Problems Score					
Log-NW	.04	-.13	-.23	.25*	.18	.11
Categorical						
<$0	.41	1.82	1.56	1.94	2.07	1.70
$10,001-$40,000	.97	.18	1.20	.72	.07	1.47
>$40,000	.76	.69	.88	3.42*	3.50**	2.98**
	Broad Reading Score					
Log-NW	-.02	.001	.11			
Categorical						
<$0	.09	2.50*	2.52	2.12	2.70	2.26
$10,001-$40,000	.60	-.37	2.30	1.75	-.50	1.89
>$40,000	.83	1.44	5.07*	3.19	3.07*	3.10**
	Repeated Grades					
Log-NW	.01	.03	-.01	.01	.008	-.02
Categorical						
<$0	.04	-.15	.15	.01	-.17	.15
$10,001-$40,000	.19	.34*	.17	.13	.27	.17
>$40,000	.06	-.99**	-.51	.03	-.21	.03
	School Suspension/Expulsion					
Log-NW	-.008	-.02	.02	-.007	-.03**	.002
Categorical						
<$0	-.12	.09	-.07	-.05	.10	-.10
$10,001-$40,000	-.17	-.01	.09	-.12	-.05	.13
>$40,000	-.06	-.06	.02	-.009	-.05	.08

Net Worth	SEM1			SEM2		
	WI	WII	WIII	WI	WII	WIII
	Global Health					
Log-NW	.02	.02	.02	.02	-.02	.003
Categorical						
<$0	.07	.26	.03	.17	.18	.03
$10,001-$40,000	.37**	.11	.02	.29**	.03	.02
>$40,000	.40**	.34	.13	.38***	.12	-.02
	School Days Missed due to Physical Illness					
Log-NW	.002	.003	.02	-.002	-.004	-.009
Categorical						
<$0	.09	.23	.13	.12	.22	.13
$10,001-$40,000	.16	.08	-.24	.13	.08	-.23
>$40,000	.03	.27	.04	.02	.27*	.04
	Hospitalization					
Log-NW	-.02	.01	-.03	-.02	.003	-.03*
Categorical						
<$0	.06	.15	.28	.06	.17	.27
$10,001-$40,000	-.06	.15	.04	-.06	.12	.03
>$40,000	-.19	.05	-.10	-.16	.26	-.12
	Doctor Visits for Physical Illness					
Log-NW	.02	.02	-.006	.01	.004	-.01
Categorical						
<$0	-.03	.007	.20	-.07	.02	.19
$10,001-$40,000	-.08	-.03	.17	-.13	.01	.15
>$40,000	.17	.09	.13	.13	.04	.09

Net Worth	SEM1			SEM2		
	WI	**WII**	**WIII**	**WI**	**WII**	**WIII**
	Doctor Visits for Emotional Problems					
Log-NW	.04	.03	.05	.03*	.01	-.001
Categorical						
<$0	-.07	-.08	-.04	-.03	.08	-.03
$10,001-$40,000	.13	.31	-.15	.08	.27	-.13
>$40,000	.34	-.17	-.06	.37*	.25	-.03

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

Table 6.8 Liquid Assets and Child Outcomes in SEM Models

Liquid Assets	**SEM1**			**SEM2**		
	WI	**WII**	**WIII**	**WI**	**WII**	**WIII**
				Applied Problems Score		
Log-LA	.14	-.06	-.27	.73***	.37**	.20
Categorical						
$1-$1,000	1.48	1.64	1.06	3.79**	1.59	1.75
$1,001-$10,000	2.53	.16	1.56	5.37***	.18	2.34
>$10,000	3.55*	2.02	1.28	7.41***	3.77**	2.58*
				Broad Reading Score		
Log-LA	.06	.16	.06	.49***	.53***	.12
Categorical						
$1-$1,000	-.23	1.87	.07	2.77	3.19**	.75
$1,001-$10,000	1.12	.26	1.67	2.97	1.04	1.51
>$10,000	2.10	2.89*	3.77	5.67***	4.74***	2.53*
				Repeated Grades		
Log-LA	.009	-.04	-.02	.001	-.03	-.02
Categorical						
$1-$1,000	.32	-.05	.16	.17	-.06	.15
$1,001-$10,000	-.003	.006	-.09	-.04	-.007	-.09
>$10,000	.26	-.27	-.04	.08	-.22	-.19
				School Suspension/Expulsion		
Log-LA	-.009	-.002	.023	-.002	-.03	-.01
Categorical						
$1-$1,000	-.04	-.04	-.04	.13	-.02	-.07
$1,001-$10,000	-.04	.08	.01	.06	.07	.02
>$10,000	-.10	-.27	.07	-.09	-.35*	-.24

Liquid Assets	SEM1 WI	SEM1 WII	SEM1 WIII	SEM2 WI	SEM2 WII	SEM2 WIII
			Global Health			
Log-LA	.02	.04	.02	.03**	-.008	.02
Categorical						
$1-$1,000	-.12	-.08	-.04	.02	-.08	-.03
$1,001-$10,000	.11	.00	.13	.18	-.11	.11
>$10,000	.14	.37	.20	.25*	.03	.13
			School Days Missed due to Physical Illness			
Log-LA	.01	.04*	-.001	.01	.02*	-.002
Categorical						
$1-$1,000	.19	-.01	.06	.20	-.01	.06
$1,001-$10,000	.18	.11	.07	.19	.11	.06
>$10,000	-.07	.32	-.25	-.04	.25	-.07
			Hospitalization			
Log-LA	-.03*	.01	.01	-.03*	.01	.008
Categorical						
$1-$1,000	.02	.10	.11	.005	-.09	.10
$1,001-$10,000	-.39**	-.09	-.07	-.37**	-.06	-.07
>$10,000	-.08	.16	.09	-.09	.02	.03
			Doctor Visits for Physical Illness			
Log-LA	.03*	-.002	.008	.03**	.005	.01
Categorical						
$1-$1,000	.45***	.27**	.11	.42***	.24*	.10
$1,001-$10,000	.17	.04	-.01	.17	.05	-.009
>$10,000	.35*	-.05	-.04	.33	.05	.12

Liquid Assets	SEM1 WI	SEM1 WII	SEM1 WIII	SEM2 WI	SEM2 WII	SEM2 WIII
	Doctor Visits for Emotional Problems					
Log-LA	.03	.001	.02	.03	.02	-.01
Categorical						
$1-$1,000	.38	.25	.16	.21	.19	.14
$1,001-$10,000	.16	.35*	.03	.08	.26	.03
>$10,000	.39	-.03	.16	.37	.16	-.05

Regression coefficients are reported in the table. ***p<.01 **p<.05 *p<.1

Table 7.1 Results Summary of Four Sets of Analyses [a]

Asset Types	**Asset Measures**	**Educational Outcomes**				**Health Outcomes**				
		Applied Problems Score	Broad Reading Score	Repeated Grade	School Suspension/ Expulsion	Global Health	School Days Missed	Hospitalization	Doctor Visits for Illness	Doctor Visits for Emotional Problems
I. The First Set of Analyses: Assets Measured before the Birth (Chapter 5)										
Net	Continuous				-		-	-	-	
Worth	Categorical	+	+		-	+	-	-	-	
Liquid	Continuous					+	-	-	-	
Assets	Categorical	-	-	-	-	+	-	-	-	
II. The Second Set of Analyses: Propensity Score Classification (Chapter 5)										
Net	Continuous									
Worth	Categorical					+	-	-		
Liquid	Continuous					+	-	-		
Assets	Categorical					+	-	-		
III. The Second Set of Analyses: Fixed-Effects Analyses (Chapter 6)										
Net	Continuous			-		+	-	-		+
Worth	Categorical			-	-	+	+	+	+	+
Liquid	Continuous			-		+	+			
Assets	Categorical			-	-	+	+		+/-	-
IV. The Fourth Set of Analyses: SEM Analyses (Chapter 6)										
Net	Continuous	+			-			-		+
Worth	Categorical	+	+	-		+	+			+
Liquid	Continuous	+	+			+	+	-	+	
Assets	Categorical	+	+		-	+		-	+	+

a. Only significant results are marked in the table: “+” and “-” are used to indicate positive and negative associations.

Table 7.2 Asset Effects on Global Health

Asset Measures	1st Set	2nd Set	4th Set: SEM2 at WI
Net Worth			
Log-transformed net worth	.007	.007	.02
Categorical measure of net worth (Reference group: $0-$10,000)			
<$0	.08	.11	.17
$10,001-$40,000	.33*	.36	.29**
>$40,000	.41**	.57*	.38***
Liquid Assets			
Log-transformed liquid assets	.06***	.08***	.03**
Categorical measure of liquid assets (Reference group: =$0)			
$1-$1,000	.63***	.90***	.02
$1,001-$10,000	.39*	.64***	.18
>$10,000	.69***	1.18***	.25*

***p<.01 **p<.05 *p<.1

Table 7.3 Asset Effects on School Days Missed due to Physical Illness

Asset Measures	1st Set	2nd Set	4th Set: SEM2 at WII
Net Worth			
Log-transformed net worth	-.02**	-.02	-.004
Categorical measure of net worth (Reference group: $0-$10,000)			
<$0	.02	-.23	.22
$10,001-$40,000	-.35**	-.40	.08
>$40,000	-.56***	-.99***	.27*
Liquid Assets			
Log-transformed liquid assets	-.30**	-.07***	.02*
Categorical measure of liquid assets (Reference group: =$0)			
$1-$1,000	-.02	-.17	-.01
$1,001-$10,000	-.25	-.57**	.11
>$10,000	-.42**	-.65*	.25

***p<.01 **p<.05 *p<.1

Table7.4 Parenting Behavior Variables, Child Disability, and Child Outcomes

Variables	**Educational Outcomes**				**Health Outcomes**				
	Applied Problems Score	Broad Reading Score	Repeated Grade	School Suspension / Expulsion	Global Health	School Days Missed	Hospitalization	Doctor Visits for Illness	Doctor Visits for Emotional Problems
Panel I. The First Set of Analyses: Assets Measured before Childbirth (Chapter 5)									
Parenting Behavior Variables									
Parental Involvement	$+^{**}$	$+^{**}$	-	$-^{**}$	+	-	-	$-^{*}$	+
Parenting warmth	-	$-^{**}$	+	-	+	+	$+^{**}$	+	-
Parenting stress	+	-	+	+	-	+	$+^{*}$	+	+
Educational expectations	$+^{***}$	$+^{***}$	+/-	-/+	+	-	+	-/+	-
Disability Variables									
Having disability in WI	-	$-^{***}$	+	-	-	+	$+^{***}$	+	+
Having disability in WII	-	$-^{***}$	+	-	$-^{*}$	$+^{*}$	$+^{***}$	$+^{***}$	$+^{**}$
Panel II. The Third Set of Analyses: Fixed-effects Models (Chapter 6)									
Parenting Behavior Variables									
Parental Involvement	+	-	$-^{***}$	$-^{**}$	$+^{**}$	$-^{***}$	$-^{*}$	-	$-^{***}$
Parenting warmth	-	-	$-^{***}$	-	$-^{***}$	$-^{***}$	$+^{***}$	+	$+^{*}$
Parenting stress	$-^{***}$	+	+	+	$-^{***}$	+	+	$+^{*}$	$+^{***}$
Educational expectations	+	$+^{***}$	$-^{*}$	$-^{**}$	$-^{**}$	$-^{***}$	$-^{***}$	$-^{***}$	$-^{***}$
Disability Variables									
Whether having a disability in the observed wave	-	+	$+^{***}$	$+^{***}$	$-^{***}$	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$

a. "+" and "-" are used to indicate positive and negative associations. ***p<.01 **p<.05 *p<.1

Figures

Figure 2.1 Asset Effects for Children: Linkages from Assets to Child Well-Being

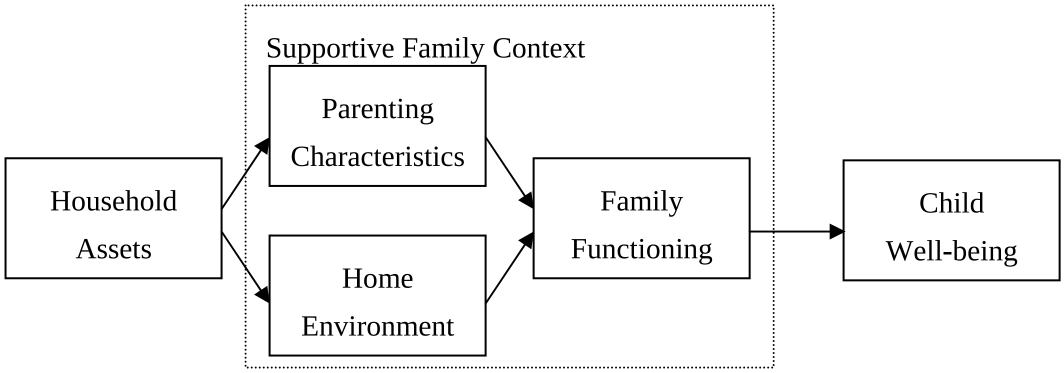


Figure 2.2 Asset Effects for Children with Disabilities: Linkages from Assets to Child Well-Being

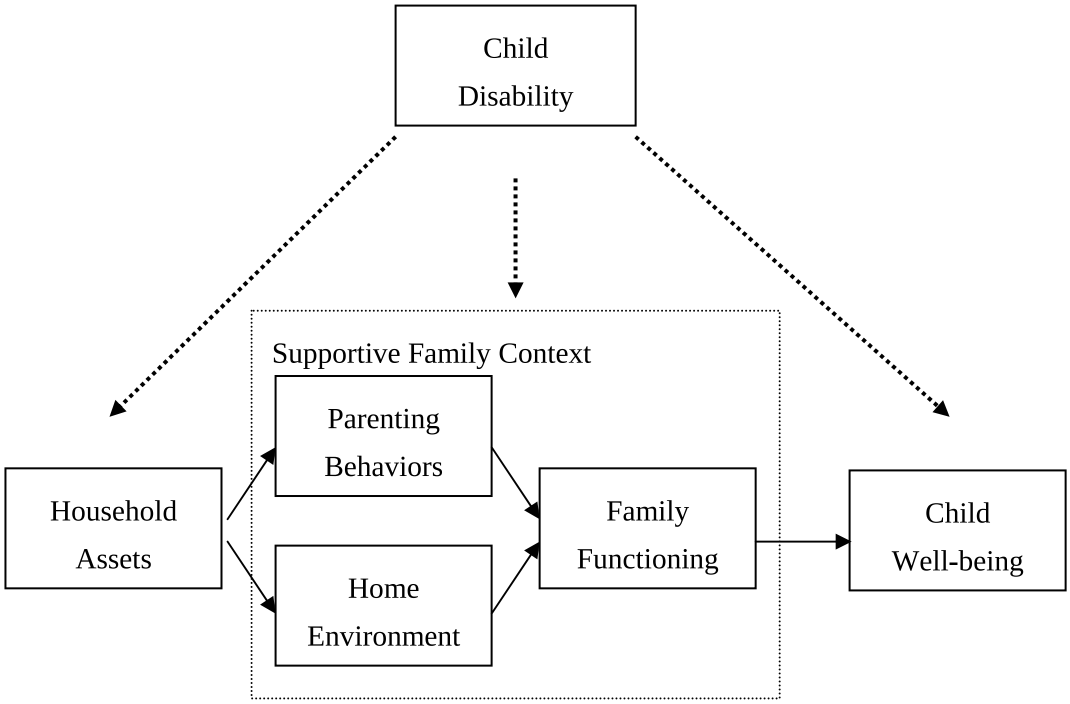


Figure 3.1 Child Development Supplement (CDS) and Transition into Adulthood (TA) in the Panel Study of Income Dynamics (PSID)

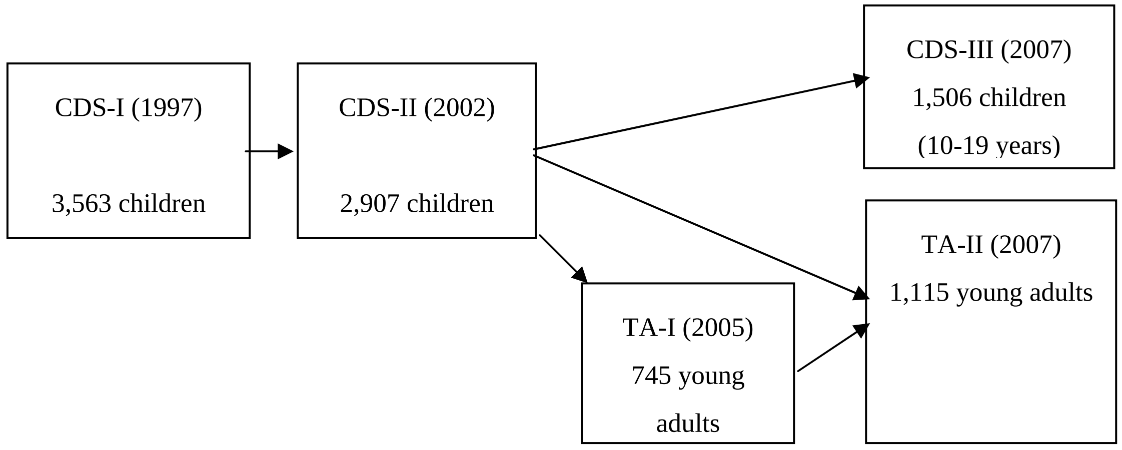


Figure 4.1 Household Assets, Child Outcomes, and Confounding Factors

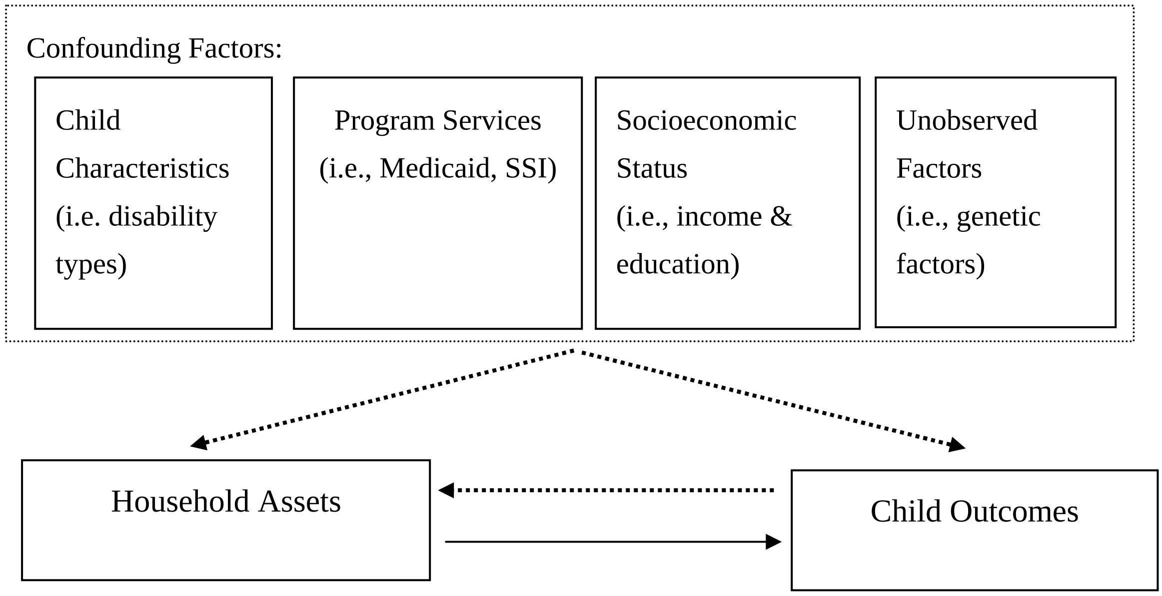


Figure 4.2 The First Empirical Strategy: Assets Measured Before Childbirth

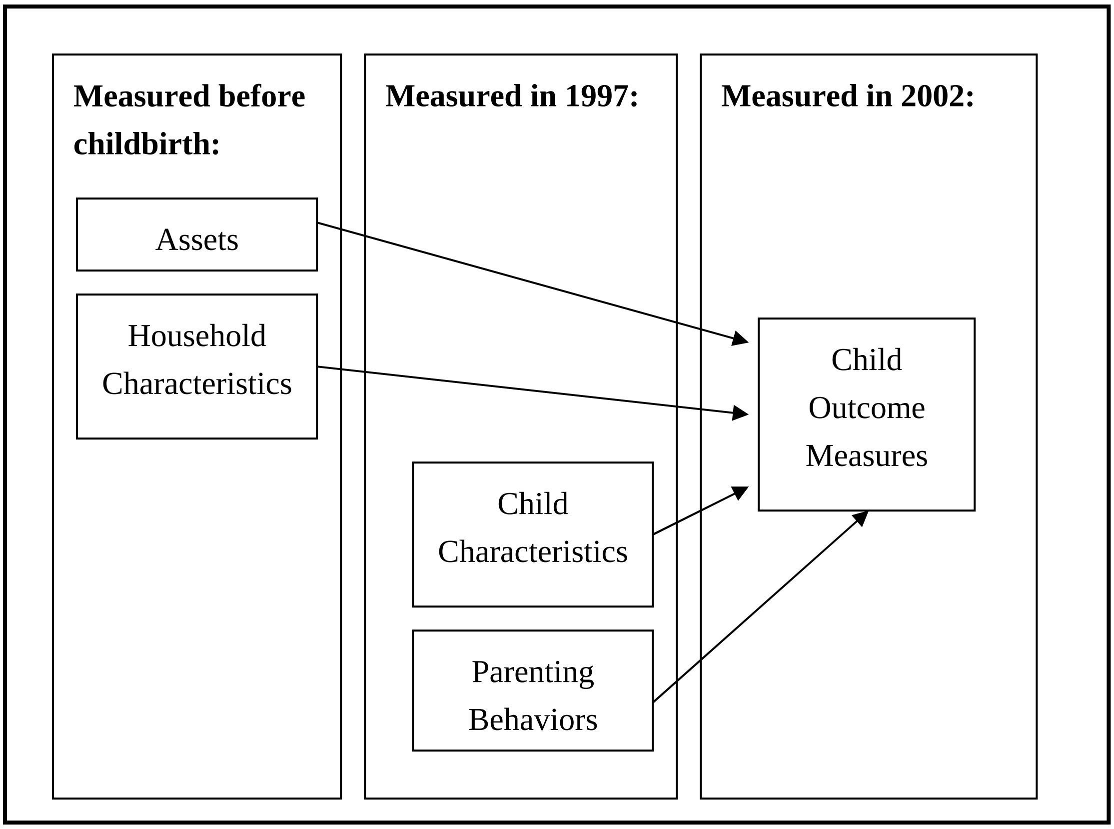


Figure 4.3 Dynamic Model of Asset Effects in Structural Equations Modeling

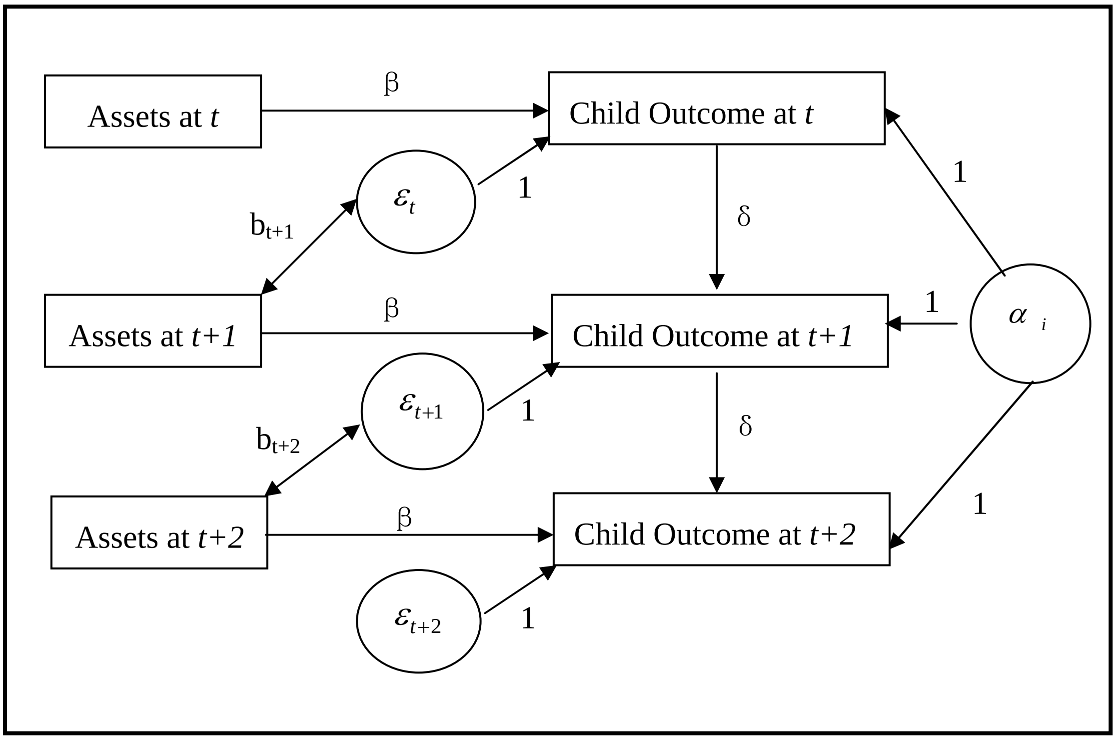


Figure 5.1 Net Worth and Predicted Applied Problems Score

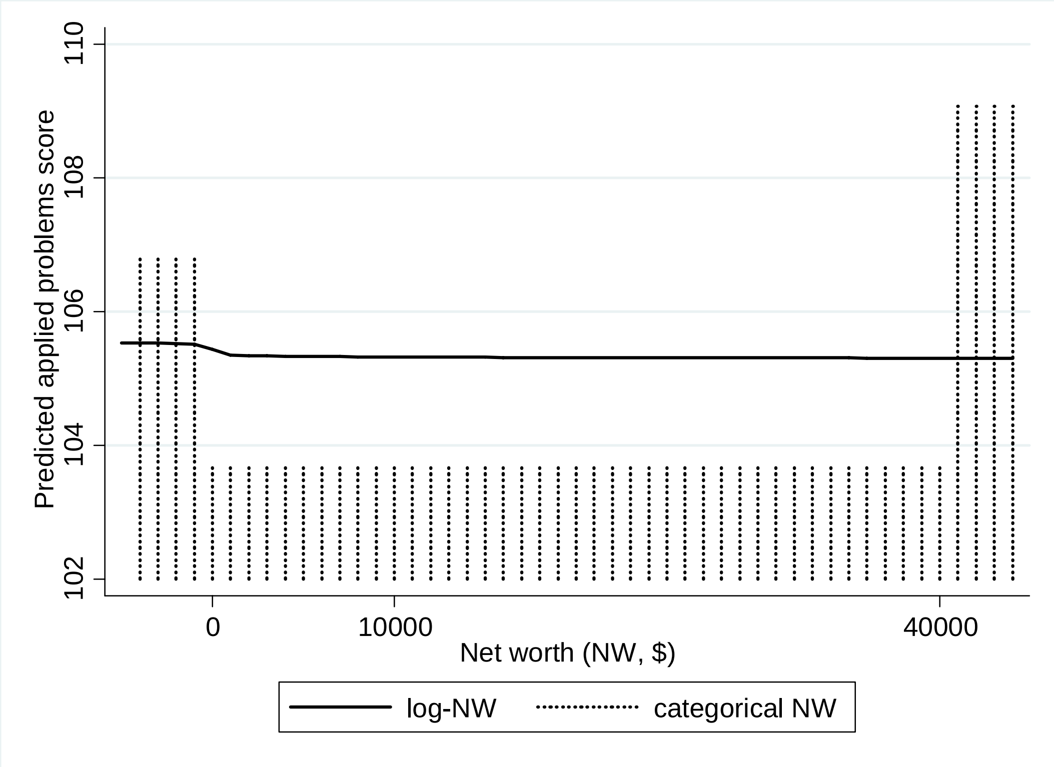


Figure 5.2 Liquid Assets and Predicted Applied Problems Score

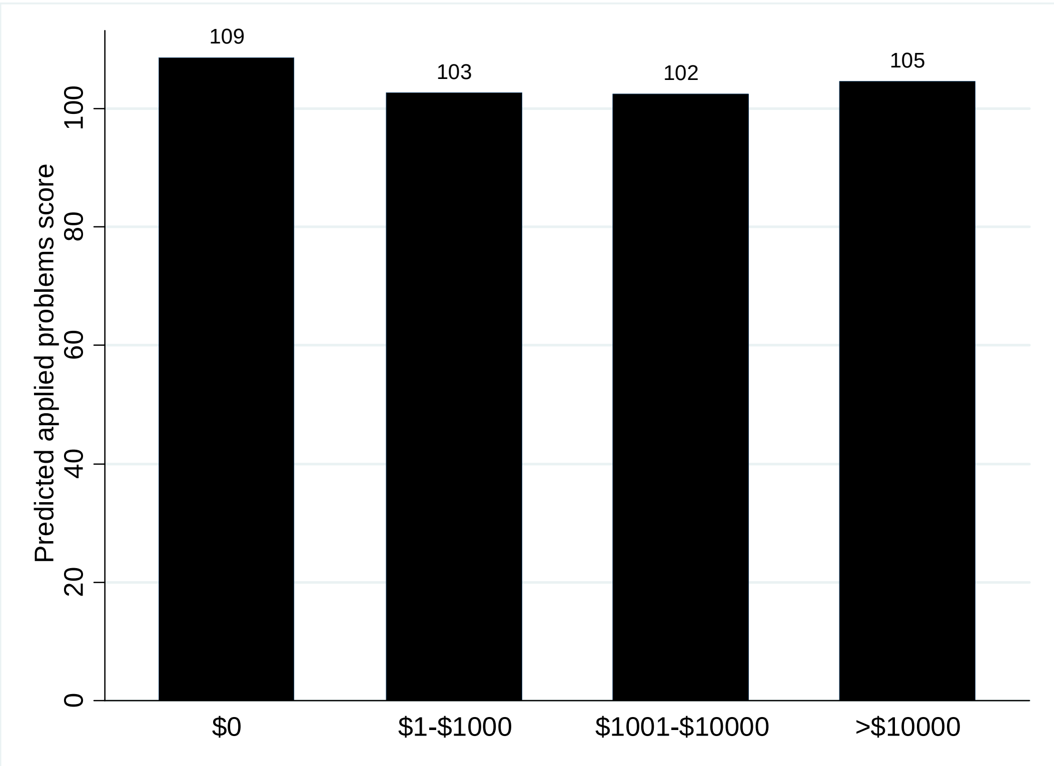


Figure 5.3 Liquid Assets and Predicted Probability of Repeating a Grade

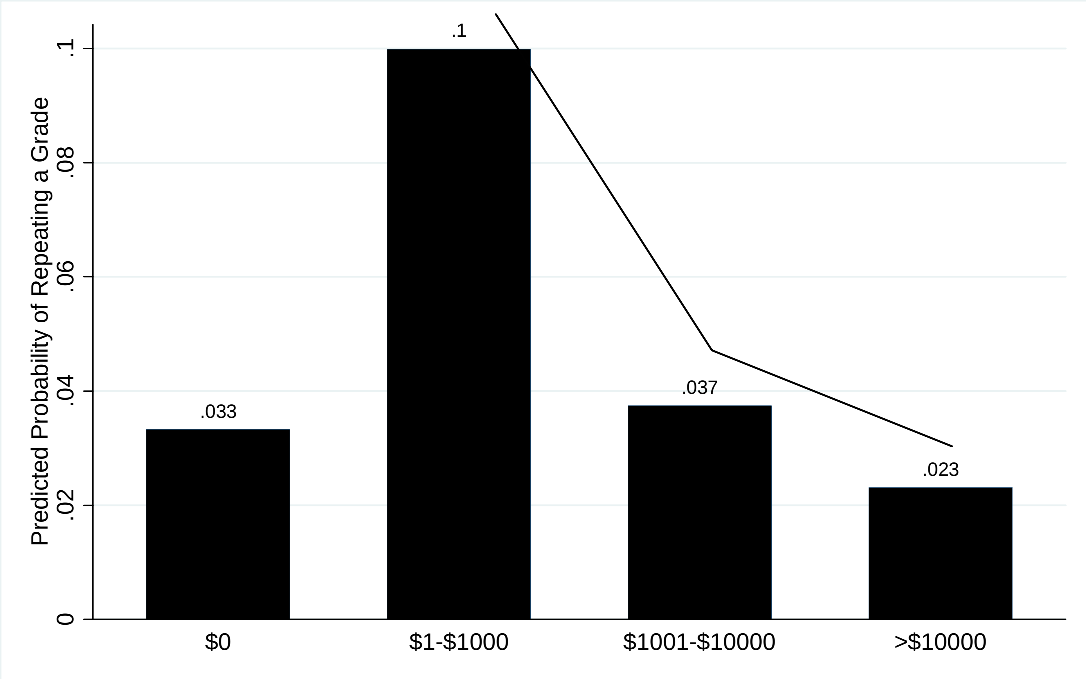


Figure 5.4 Net Worth and Predicted Probability of School Suspension or Expulsion

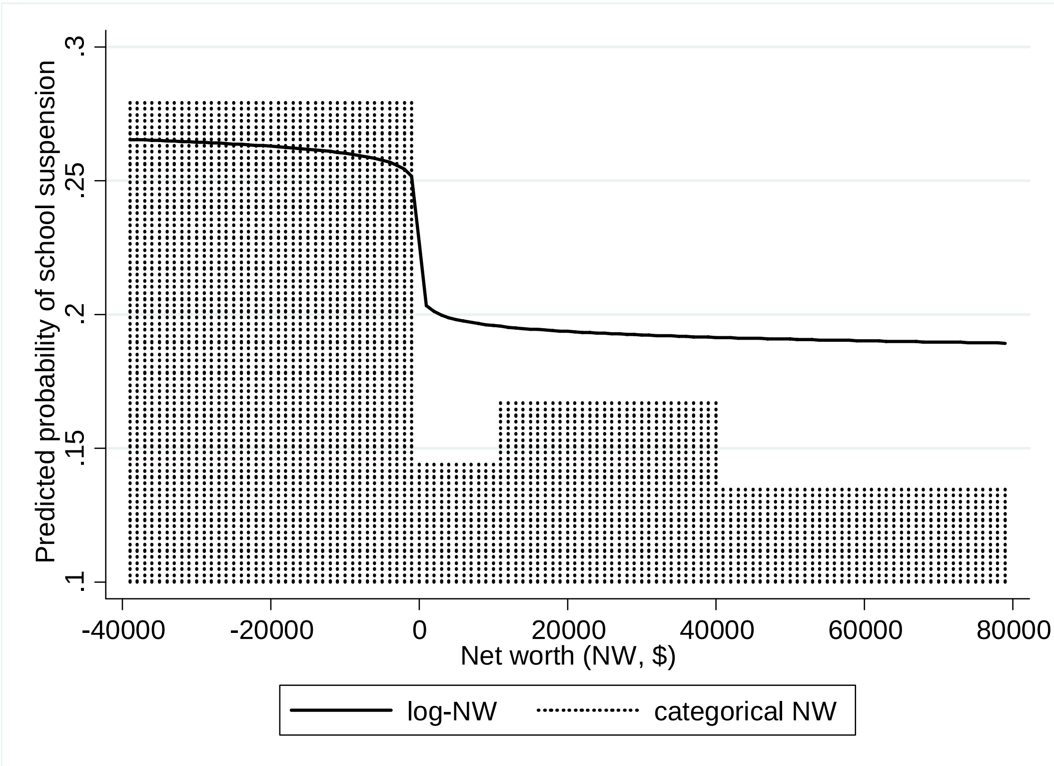


Figure 5.5 Liquid Assets and Predicted Probability

of School Suspension or Expulsion

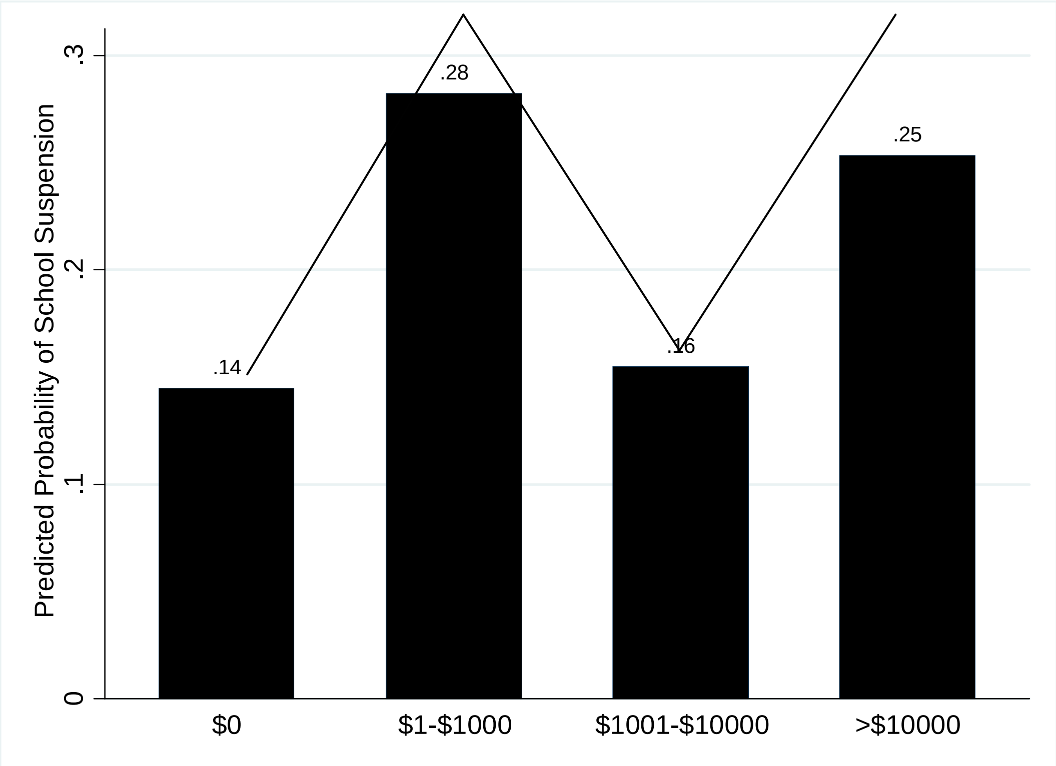


Figure 5.6 Net Worth and Predicted Probability of Excellent Health

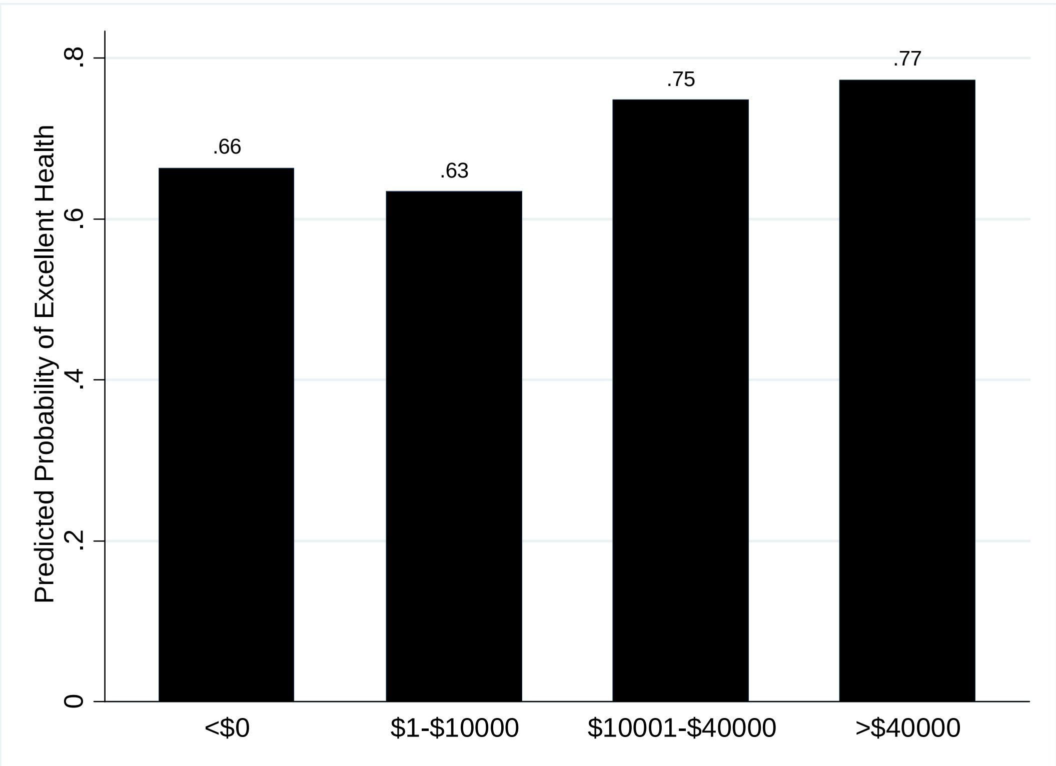


Figure 5.7 Liquid Assets and Predicted Probability of Excellent Health

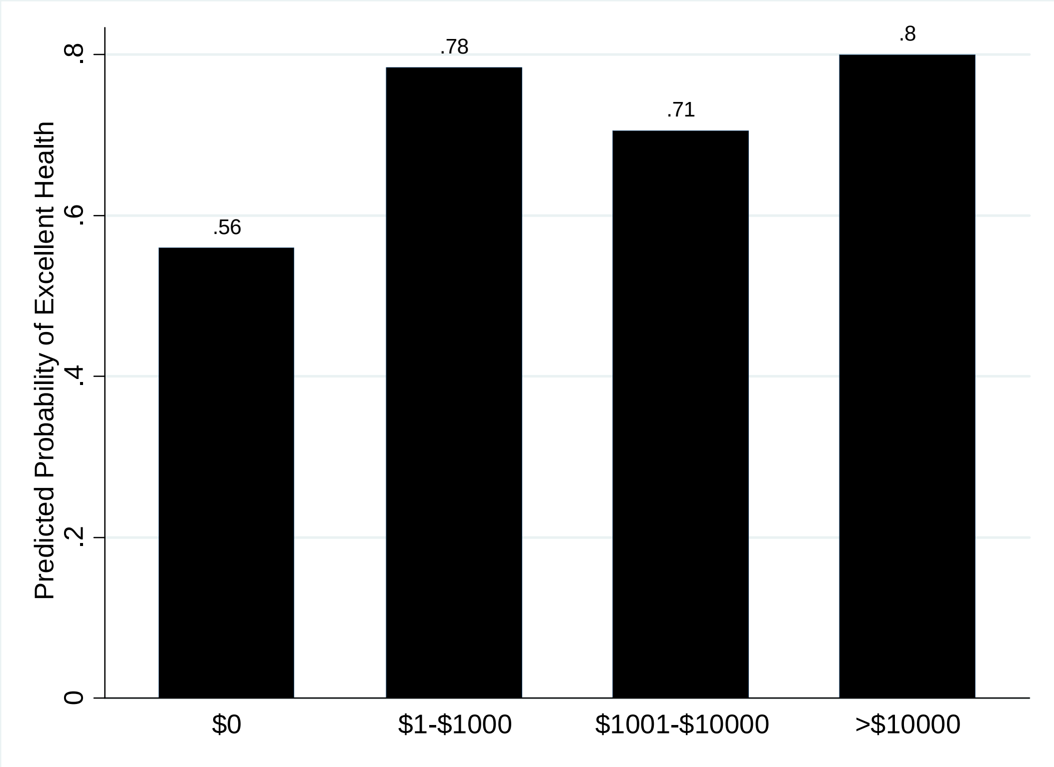


Figure 5.8 Net Worth and Predicted School Days Missed

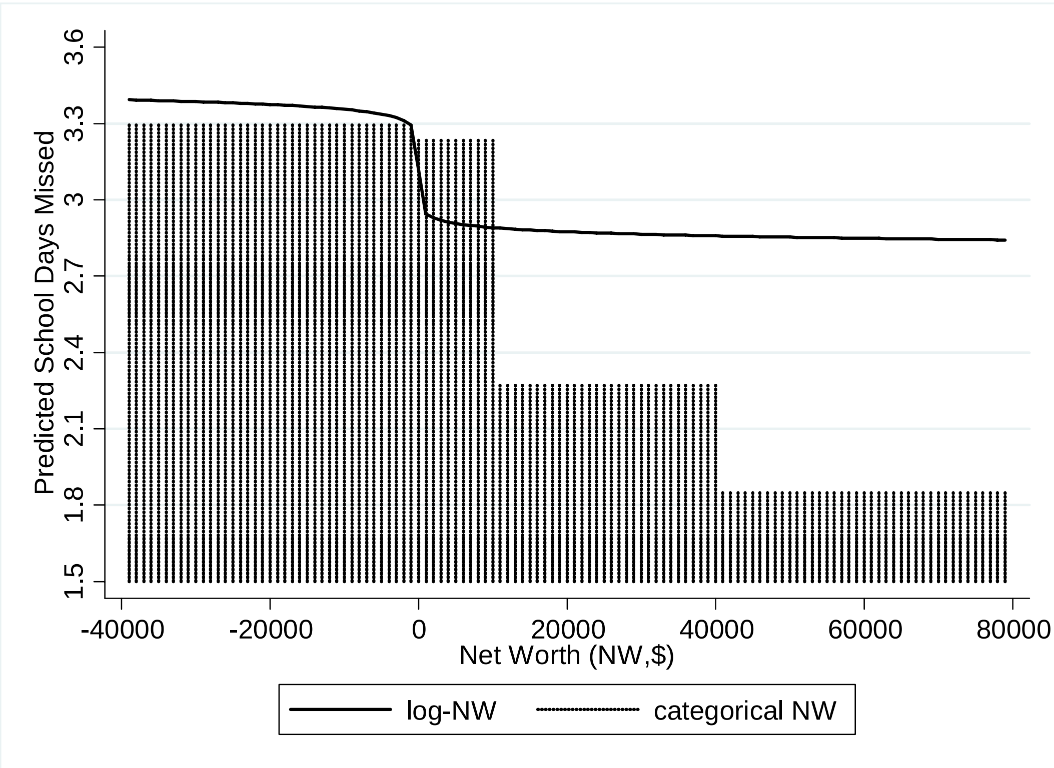


Figure 5.9 Liquid Assets and Predicted School Days Missed

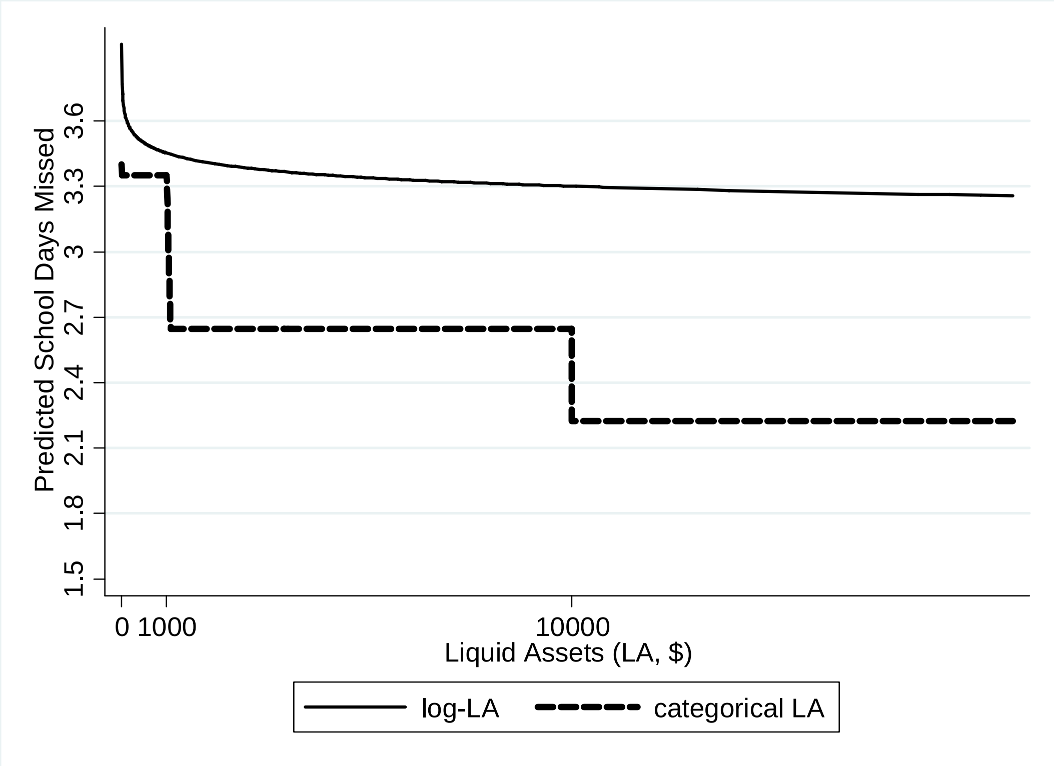


Figure 5.10 Net Worth and Predicted Frequency of Hospitalization

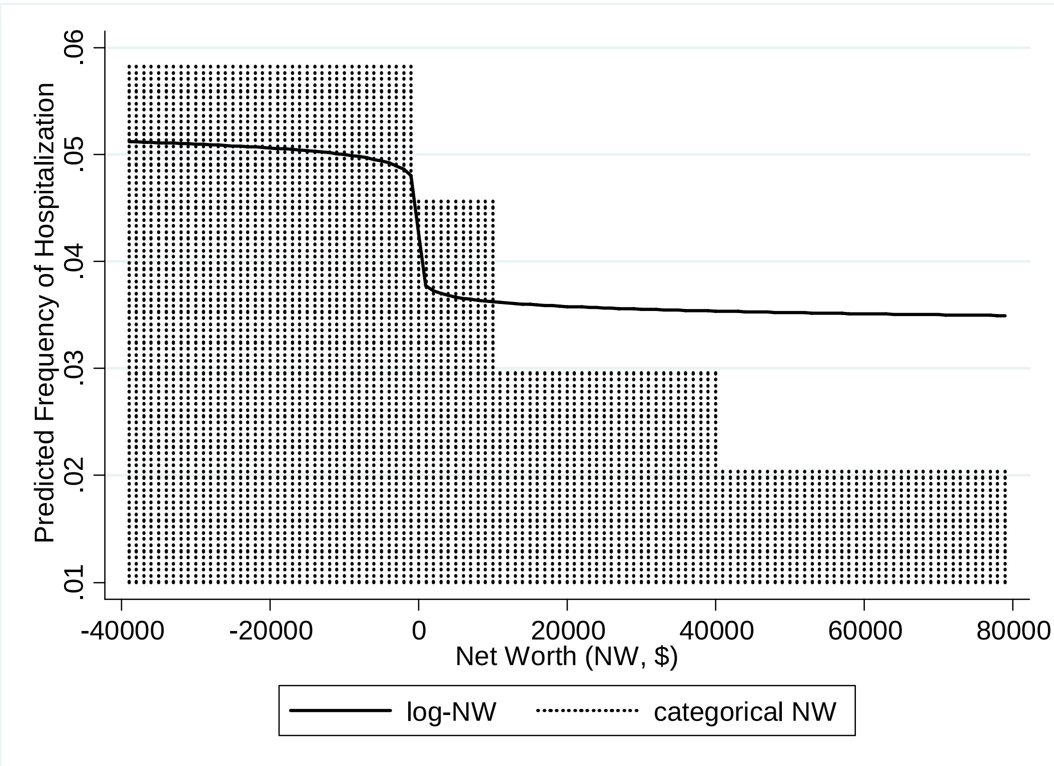


Figure 5.11 Liquid Assets and Predicted Frequency of Hospitalization

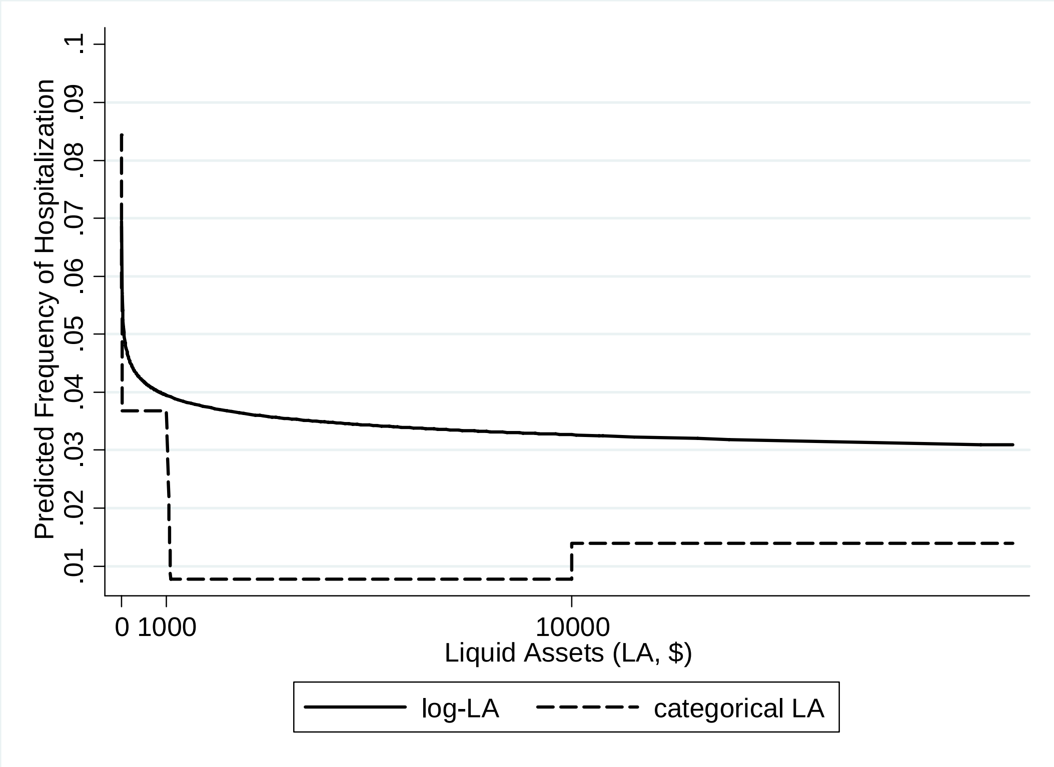


Figure 5.12 Net Worth and Predicted Doctor Visits for Illness

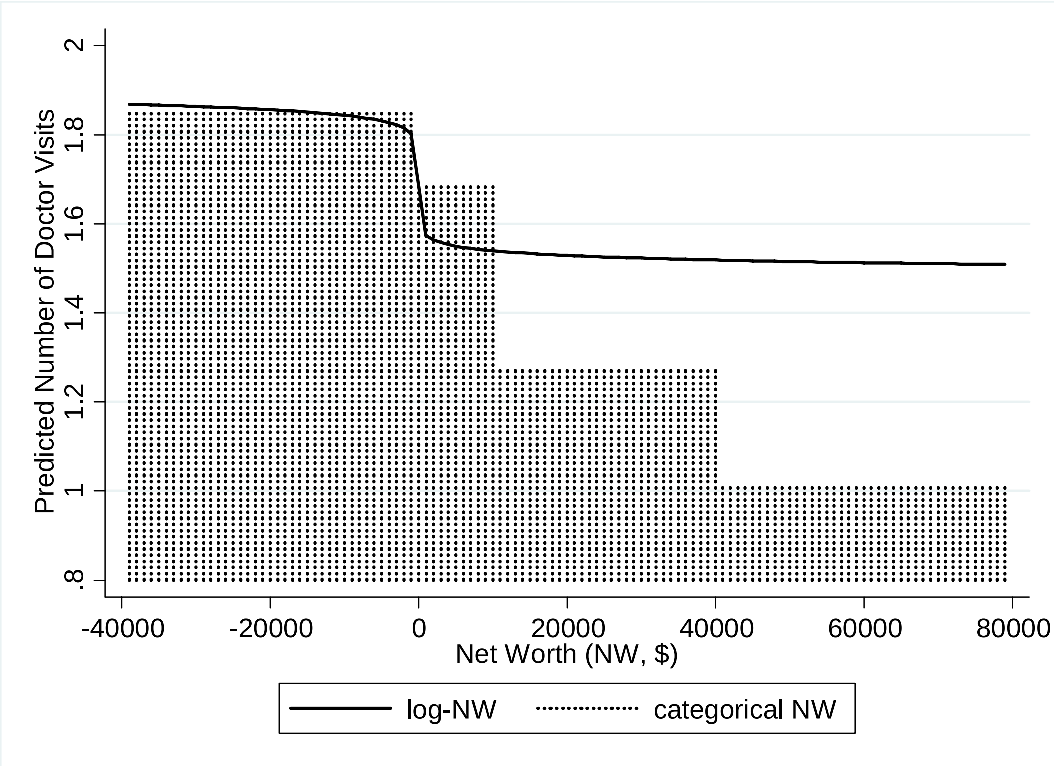


Figure 5.13 Liquid Assets and Predicted Doctor Visits for Illness

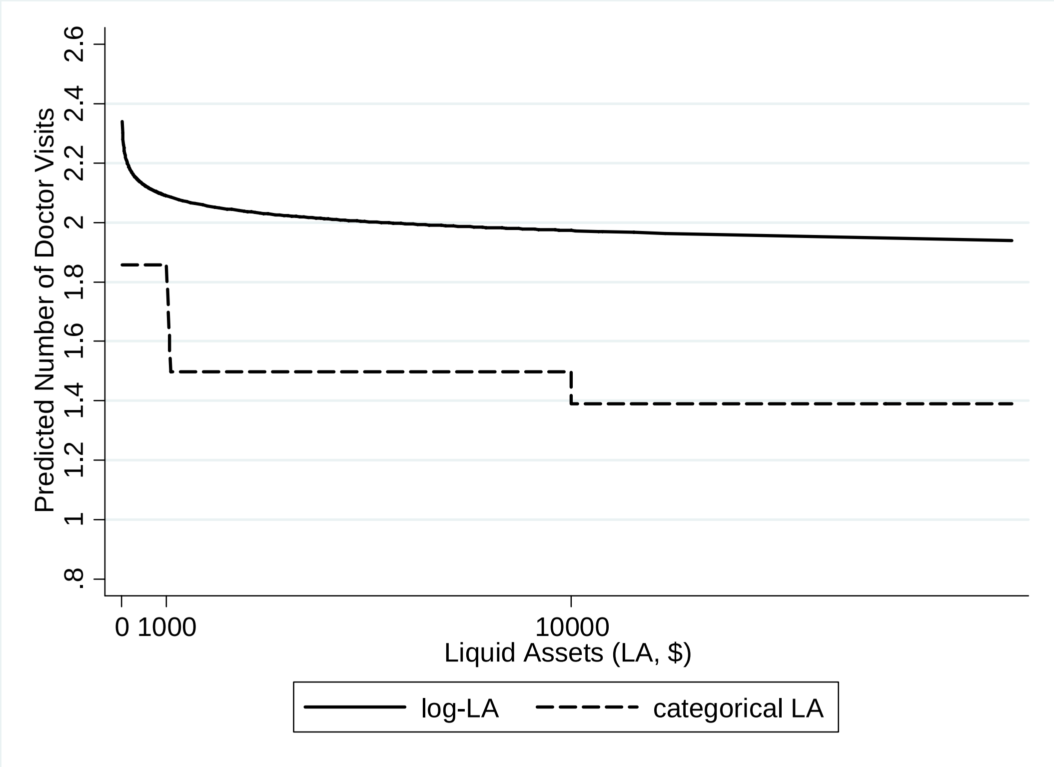


Figure 6.1 Net Worth and Predicted Number of School Days Missed

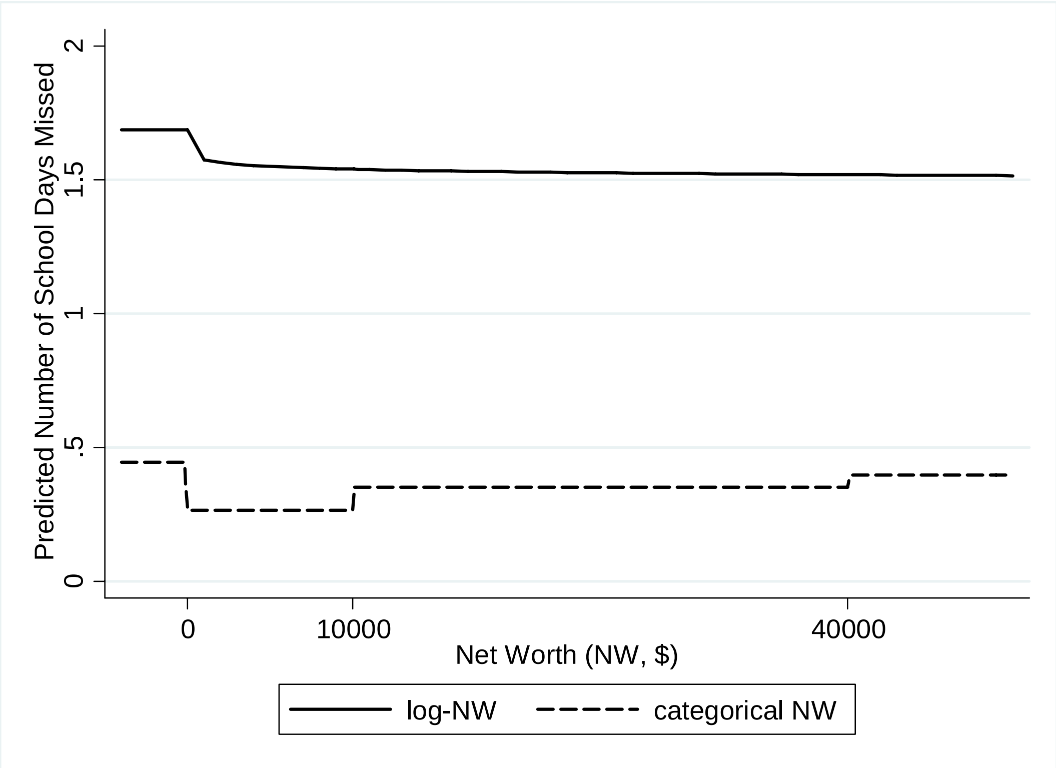


Figure 6.2 Liquid Assets and Predicted Number of School Days Missed

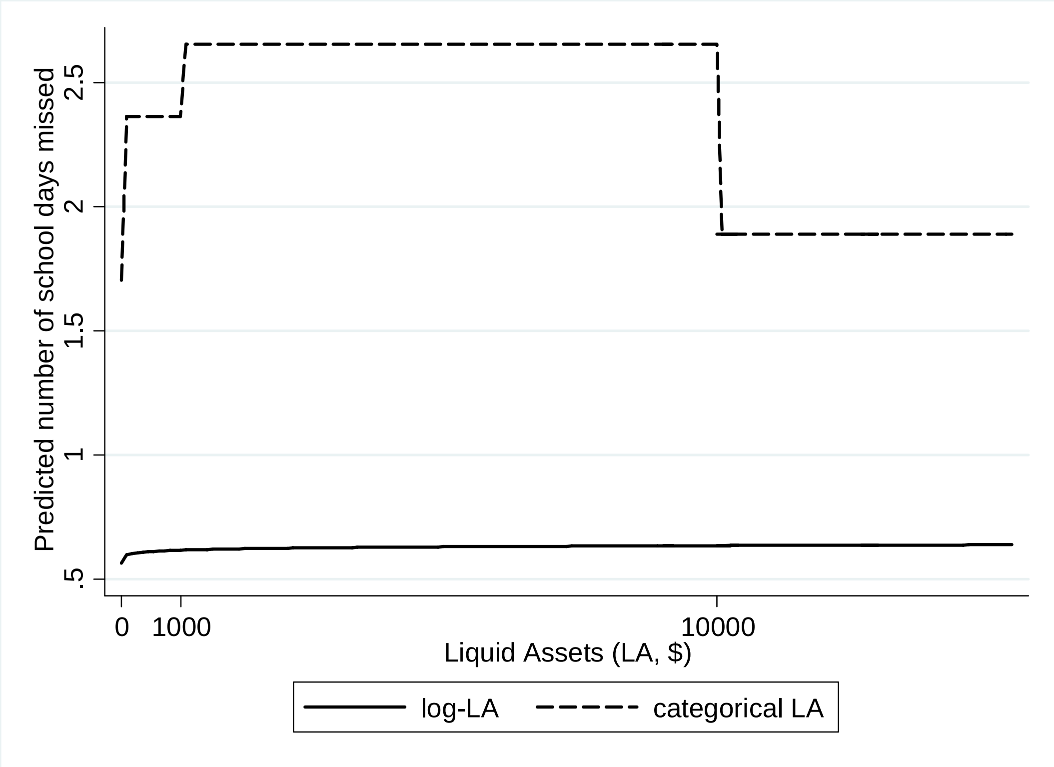


Figure 6.3 Net Worth and Predicted Frequency of Hospitalization

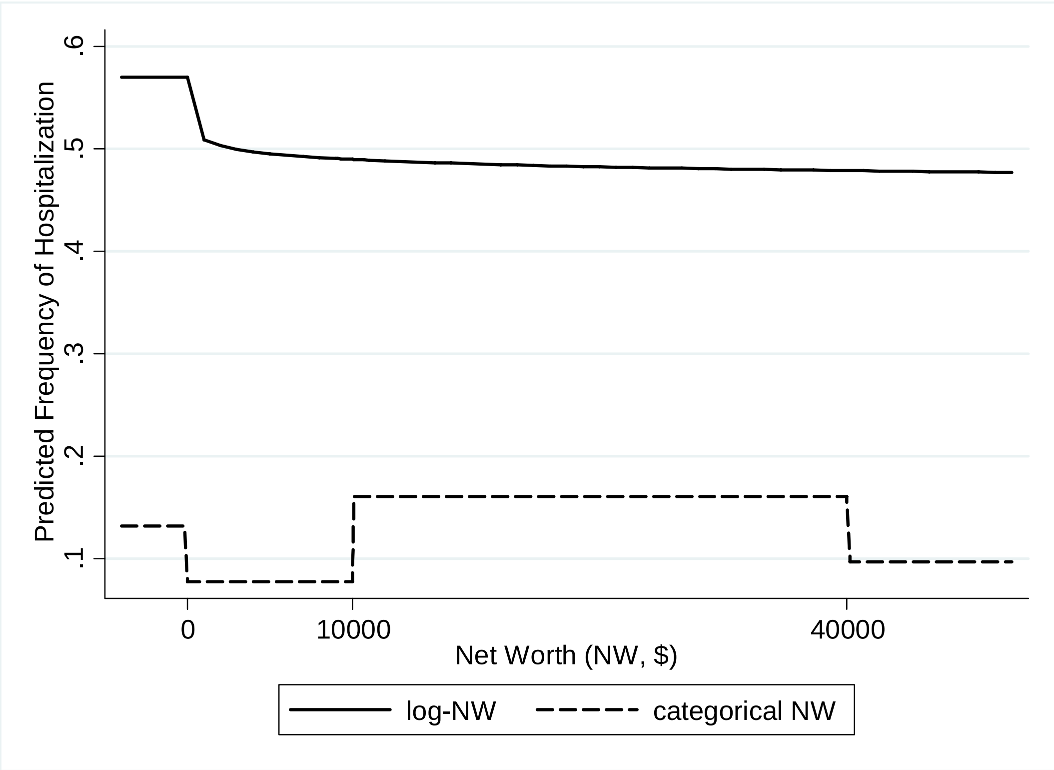


Figure 7.1 Overestimation Risk of the Log-Transformed Asset Measure

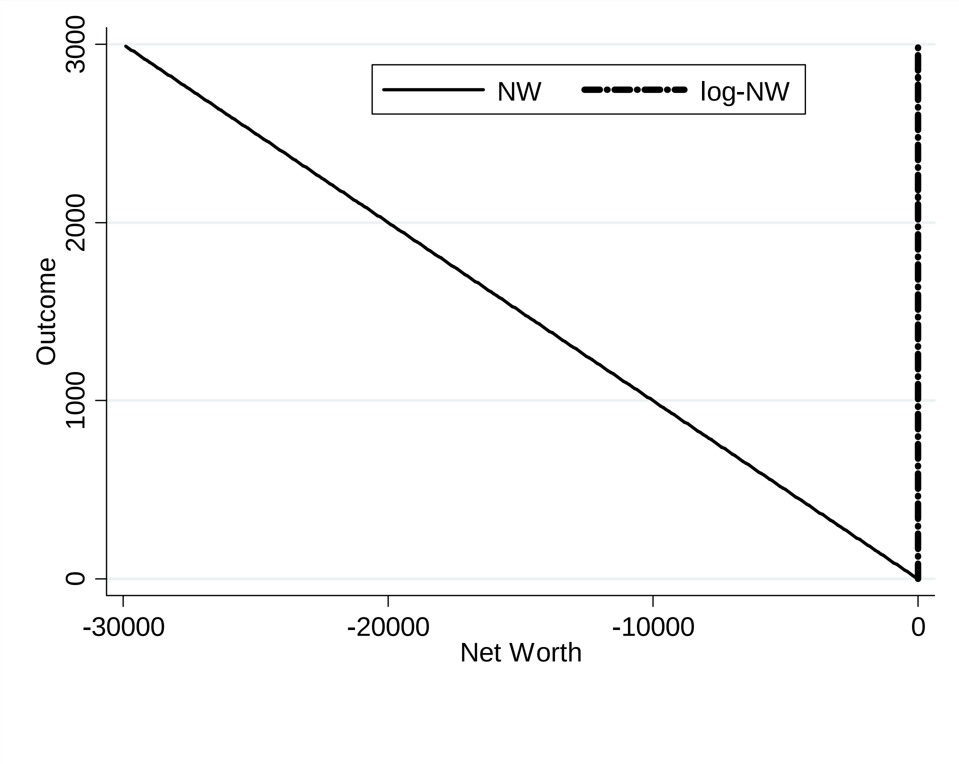


Figure A.1 Procedures of Propensity Score Classification

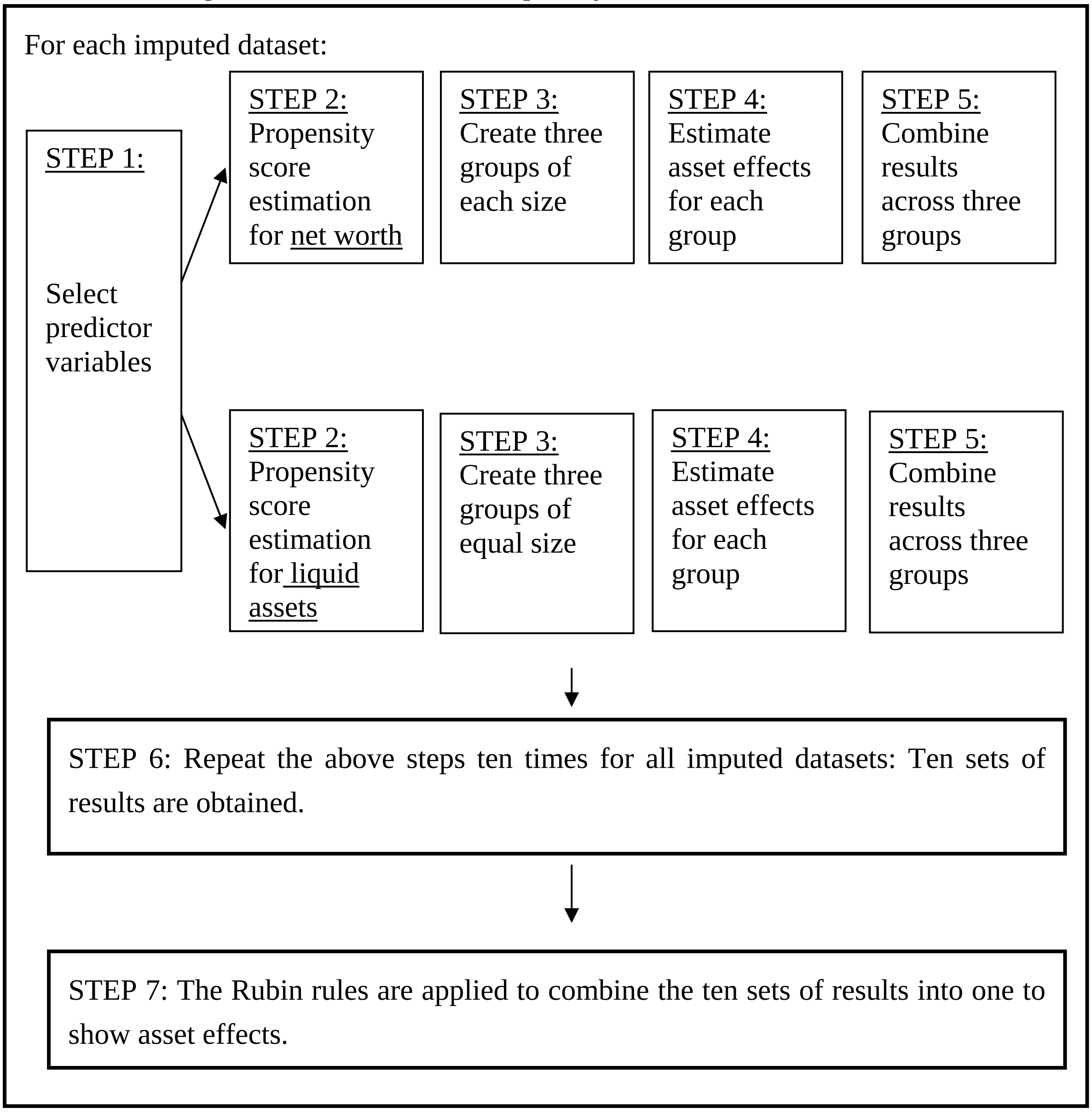


Figure A.2 Balance Check Before and After Propensity Score Classification

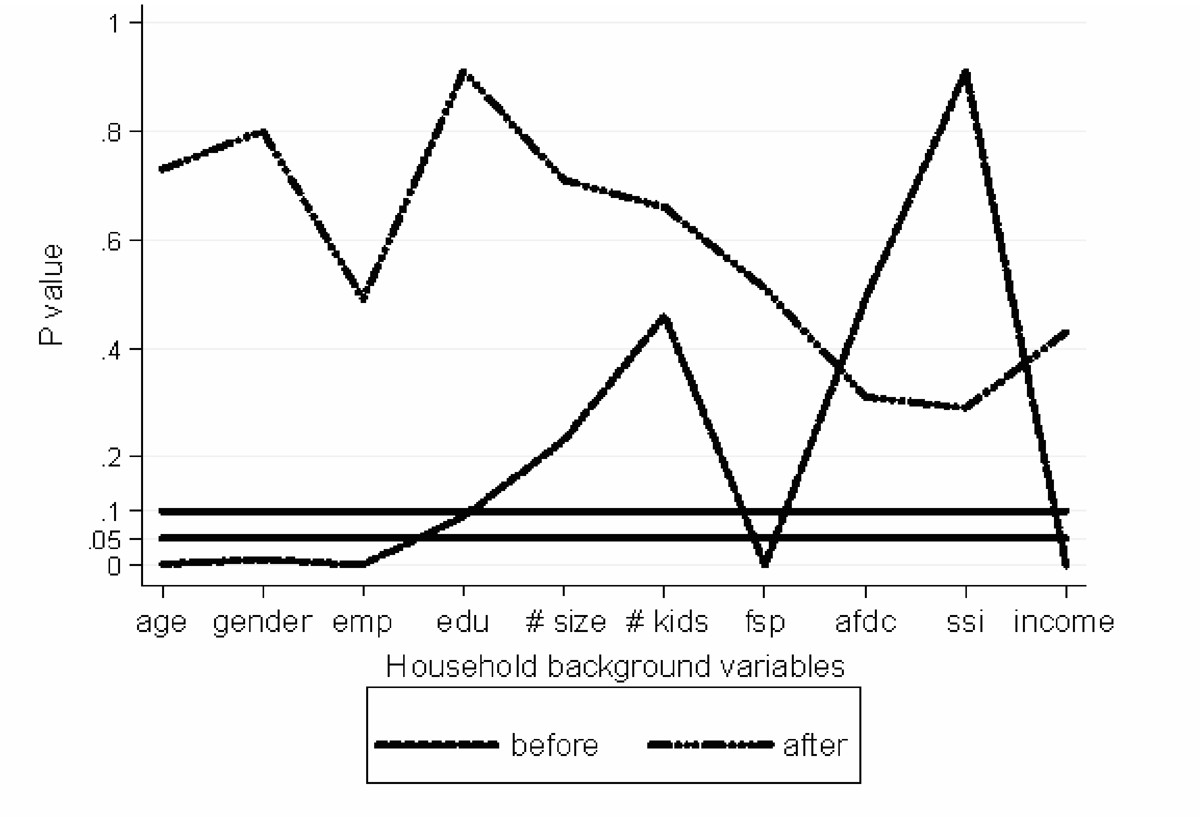


Figure B.1 Fixed-Effects Analysis in the Context of SEM

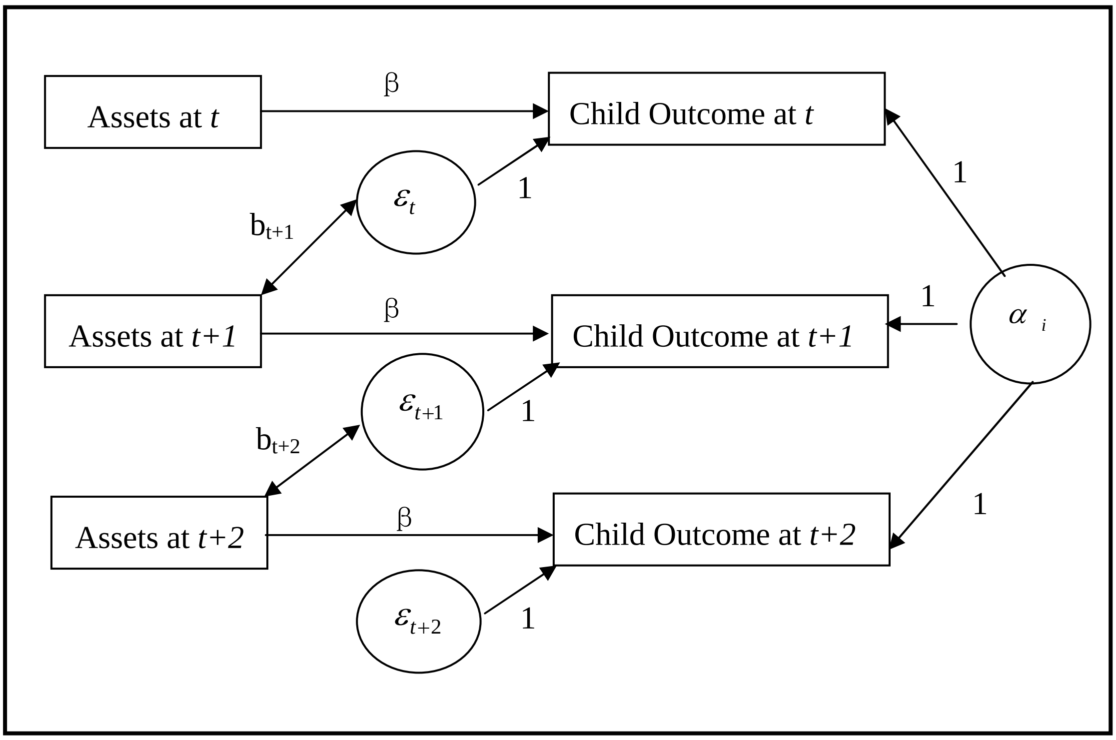
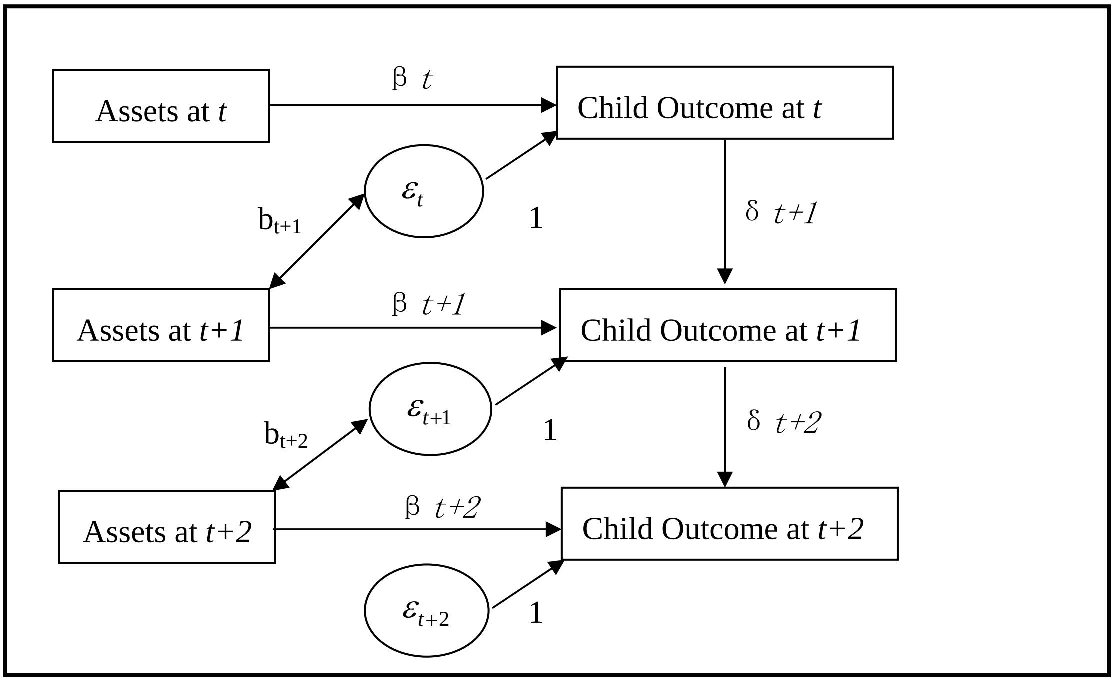


Figure B.2 Dynamic Model of Asset Effects in SEM



Appendix A. Procedure for Propensity Score Classification

To control for the potential confoundedness of assets and household background variables, the second set of analyses uses propensity score classification before regression analyses (Imai & Van Dyk, 2004). First, households' net worth and liquid asset values are predicted from household background predictors, and the predicted values are used as the propensity scores of net worth and liquid assets. Then the study sample is categorized into three equal groups[24] based on the ranking of the estimated propensity score of household assets. Each group is about one-third of the sample. One group includes observations with the predicted asset value (net worth or liquid assets) in the top 33%, one group has the bottom 33%, and the middle 33% forms the third group. Regression models tested in the previous chapter are re-tested for the three groups separately. Finally, results for each group are combined as the average asset effects for the entire sample.

Since observations within each group are relatively homogenous in terms of household backgrounds (as reflected by similar propensity scores within each group) while observations across groups are relatively heterogeneous, this approach can better control for confounding relationships between household assets and other household background variables. This strategy is useful especially when there are multiple confounding relationships that are not linear and additive.

Procedure for Propensity Score Classification

The procedure of propensity score classification includes several steps. Figure A.1 briefly describes the procedure of propensity score analyses. First, indicators of household background are selected to estimate the propensity score of household assets. These indicators are characteristics of household heads (age, gender,

24 I tested four, five, six, and ten groups in sensitivity tests.

employment status, and educational attainment), household size, number of children, participation in public programs (Food Stamp, SSI, or AFDC), and the average household income in the previous five years. All these variables are measured in the same time period as asset measures.[25] As expected, some household background variables, such as income, education, and household heads' age, are highly related to household assets. Ideally, those variables measured later than asset variables should not be used to predict the propensity score of household assets because they might be the consequence of holding assets.

FIGURE A.1 ABOUT HERE

Second, the generalized boosted regression model is used to predict net worth and liquid assets, respectively. As a data mining technique having considerable success in predictive accuracy, the generalized boosted regression model is better to balance household background variables for those with different levels of assets.[26] Third, based on the ranking of the estimated propensity score from the boosted regression, observations are categorized into three groups with equal size. Fourth, Models 2 and 3 in the first set of analyses (with the continuous and categorical asset measures, respectively—see Chapter 5 for details) are conducted in each group for all

[25] Three criteria are used to select variables for predicting household assets: (1) Variables are measured no later than asset measures; (2) Variables are controlled for in the first set of analyses; and (3) Variables are likely to affect household asset accumulation.

[26] In fact, three models are used to estimate the propensity score of net worth and liquid assets. Model 1 (PSM 1) is a multivariate OLS regression simply including all variables mentioned above as independent variables to predict net worth and liquid assets. Since both net worth and liquid assets are highly skewed, Model 2 (PSM 2) applies skew-normal linear regression to predict net worth and liquid assets. Model 3 (PSM 3) conducts the generalized boosted regression to predict propensity scores of net worth and liquid assets. This chapter only reports results from the generalized boosted regression.

outcome measures. Fifth, the estimated asset effects for each group then are combined across the three groups using the method proposed by Imai and Van Dyk (2004). For example, suppose the estimated coefficients of assets for the three groups are β_g, $g = 1, 2,$ and 3 with standard errors s_g. Asset effects estimated within each group (β_g) can be considered asset effects for a sub-sample (high, medium, and low expected assets). The average asset effects for the sample, then, is the mean of $\beta_g s$ with the standard error of $\sqrt{(\sum s_g{}^2)/3^2}$. These steps are repeated for each of the ten imputed datasets. The results are further combined across the ten imputed datasets using the Rubin rule. For example, each imputed dataset *m* (*m=1….10*) has the average asset effects $\overline{\beta_g}_m$. According to the Rubin rule (1987), the mean of these ten $\overline{\beta_g}_m$s is the average asset effects across ten imputed datasets. Taking into account both within- and between-imputation variation, calculation of the standard error is more complex, and the formula can be referred to Rubin (1987).

Balance Check before and after Propensity Score Classification

To check whether propensity score classification successfully addresses the "observed" selection bias, I examine the relationships between household assets and household background variables before and after propensity score classification. If the significant associations between these variables disappear after classification, then one can say the selection bias is successfully addressed.

Using the net worth measure as an example, this section shows the correlations between net worth and these background variables before and after propensity score classification. To do this, the ten background variables are regressed as dependent variables on net worth before classification. This produces ten single regression models. The background variables are characteristics of household heads (age, gender, education, and employment status), household size, number of children, program participation (in food stamps, SSI, or AFDC), and the average household income in the previous five years. Depending on the measurement level of each variable, one of the following is used: OLS regression, Probit regression, and ordinal logistic regression.

FIGURE A.2 ABOUT HERE

The obtained *p* value of the net worth variable in each of these regression models is plotted in Figure A.2. The dotted line depicts the relationships between net worth and household background variables before propensity score classification, and the two solid lines are drawn at p=.05 and p=.1. Data points falling below these two solid lines show significant associations between net worth and background variables. The *p* value of net worth in five regressions is smaller than .05; the dependent variables of these five regressions are household head's age, gender, employment, household's participation status in the food stamp program, and household income. The *p* value of net worth in the regression of household head's education is smaller than .1. In other words, before propensity score classification, household assets are highly correlated with most of the household background variables, and the estimated asset effects in the first set of analyses are likely confounded with these variables. It is interesting to find that net worth is not strongly associated with participation in AFDC and SSI, the two means tested programs. Three reasons may explain this: First, for about 60% of observations, asset information was collected in 1984 or 1989, when asset limits of AFDC and SSI were not so restricted as they are today; the median liquid assets for the sample is $1,600. Second, net worth includes home equity, which does not count against program eligibility. Third, the original scale of net worth, which is highly skewed, may affect regression estimation.

The dash-dot line in Figure A.2 plots the *p* value of net worth in the same regression after propensity score classification. To obtain these *p* values, the procedure in Figure A.1 is performed with slight modification. Rather than estimates asset effects, Step 4 regresses household background variables on net worth alone. The dash-dot line in Figure A.2 suggests that the smallest *p* value of net worth is nearly .3 greater than the cutoff threshold of .1. None of these household background variables is statistically correlated with household assets. After propensity score classification, the distribution of net worth is balanced across these household background variables. Therefore, it can be said with more confidence that after classification, the estimated asset effects are not likely to be caused by the associations between assets and these background variables.

Appendix B. Model Specification of SEM Analyses

The fourth empirical strategy tests asset effects on educational and health outcomes for children with disabilities using the three-wave longitudinal data in Structural Equations Models (SEMs). A main technical feature of this strategy is that it allows the correlation between household assets and the residual in the previous stages to be specified and estimated. As a possible solution to the endogeneity issue in fixed-effects analyses (discussed in Chapter 4), it may better capture the dynamic relationships between household assets and child outcomes (See Equations 4.13).

FIGURE B.1 ABOUT HERE

The analyses are conducted on the same sample used for fixed-effects analyses, and two models are tested for each outcome measure. The first model (SEM1) adds an individual heterogeneous term (similar to fixed-effects analyses), and correlates household assets with the error term of dependent variables at the previous stage. In other words, SEM1 assigns a structure—current assets associated with the error term of outcome measures at the previous stage—to model the potential endogeneity of assets in fixed-effects analyses. In addition, SEM1 allows varying asset effects at different observation points. Figure B.1 illustrates this specification without including control variables. Latent variable α refers to the individual heterogeneous term, and b_{t+1} and b_{t+2} are estimated correlations between household assets and the error terms of outcome measures at the previous stage. β is estimated asset effects on the outcome measure at different points in time. While intended to resemble the idea of fixed-effects analyses, it uses the maximum likelihood estimator instead of the fixed-effects estimator. Another difference is that, for this strategy, the unit of analysis is the child and the sample size becomes smaller (therefore the power of the analyses is also smaller). Finally, since SEM models are not conditional models, it can include all children in the analysis, including those without person-variation on outcome measures over time. Figure B.1 can also be expressed in the following equations (B.1):

$$
\begin{aligned}
Y_{it} &= \alpha_i + \beta_t A_{it} + \varepsilon_{it} \\
Y_{it+1} &= \alpha_i + \beta_{t+1} A_{it+1} + \varepsilon_{it+1} \\
Y_{it+2} &= \alpha_i + \beta_{t+2} A_{it+2} + \varepsilon_{it+2} \\
b_{t+1} &= Corr(A_{t+1,} \varepsilon_t) \\
b_{t+2} &= Corr(A_{t+2,} \varepsilon_{t+1})
\end{aligned}
$$

The second model specification (SEM2) does not have the individual heterogeneous term in analyses. Instead, SEM2 assumes a dynamic relationship between children's outcomes over time and includes the first-order lag of the dependent variable in analyses. SEM2 still allows household assets to be correlated with the error term of outcome measures from the previous stage. Equations 4.12 suggest that the cumulative assets effects up until this stage can be replaced with the first-order lag of the dependent variable. SEM2 can be considered an empirical strategy reflecting this idea. Equations B.2 and Figure B.2 show the specification of SEM2 without control variables.

FIGURE B.2 ABOUT HERE

SEM1 and SEM2 include the same control variables as fixed-effects analyses. All count dependent variables (i.e., school days missed, hospitalization, and doctor visits for illness) are recoded into dichotomous measures, and Probit instead of Poisson regression is applied to these outcome measures. Given that the error term is the key for this strategy, and that Poisson regression for count variables do not allow the error term to be estimated, it is not appropriate for this strategy. Main findings are briefly discussed because these analyses are a further exploration based on fixed-effects analyses.

$$
\begin{aligned}
Y_{it} &= \beta_t A_{it} + \varepsilon_{it} \\
Y_{it+1} &= \beta_{t+1} A_{it+1} + \delta_{t+1} Y_t + \varepsilon_{it+1} \\
Y_{it+2} &= \beta_{t+1} A_{it+2} + \delta_{t+2} Y_{t+1} + \varepsilon_{it+2} \\
b_{t+1} &= Corr(A_{t+1,} \varepsilon_t) \\
b_{t+2} &= Corr(A_{t+2,} \varepsilon_{t+1})
\end{aligned}
$$