How well does the U.S. Government provide Health Insurance?

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Abstract
The debate over universal health insurance (HI) in the U.S., as well as the proper role of the government in the HI market, has been quite heated. Fueling this debate is the uncertainty pertaining to the benefits of HI in general, and the relative benefits of private versus public HI in particular. This uncertainty stems from non-random selection into different types of HI (private, public, or none) in combination with the absence of experimental data. Moreover, the lack of typical exclusion restrictions complicates identification of the causal effects of different HI types. Here, the aim is to assess the causal impact of private HI, relative to public HI, on the insured infant's health. To that end, this study employs the methodology proposed in Altonji et al. (2005) which trades off what can be learned in exchange for not requiring an exclusion restriction. Nonetheless, the method remains quite informative in the present context. Specifically, using data from the Early Childhood Longitudinal Survey, Birth Cohort (ECLS-B), along with several measures of infant health, the results suggest that while private HI is *associated* with improved infant health, this association disappears once selection on observables and unobservables is considered. In fact, the estimated effects of private HI are predominantly *negative* once both types of selection are admitted. Further analysis reveals that the likely beneficial effects of public HI are due to greater coverage for infants at a much lower cost.

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1 Introduction

A large literature documents the importance of early health outcomes, even as early as in utero, in influencing future adult outcomes (see Almond, 2006). That infant health, measured by birth weight, affects future outcomes is reported in Breslau et al. (1994), Brooks-Gunn et al. (1996), and Currie and Hyson (1999) who link low birth weight to lower average scores on several different tests of intellectual and social development. Other studies that exploit sibling comparisons to determine the relationship between low birth weight and future outcomes include Conley and Bennett (2000), Johnson and Schoeni (2007), Lawlor et al. (2006), Black et al. (2007), Royer (2005), and Currie and Moretti (2007). Goldenberg and Cullhane (2007) find that low birth weight is also a strong predictor of later adult chronic medical conditions like diabetes, hypertension, and heart disease. Oreopoulos et al. (2008) conclude that siblings of lower birth weight have worse outcomes. That the U.S. has the highest infant mortality rate of 6.14 per 1, 000 live births in the developed world is also a consequence of the higher incidence of low birth weight (see, e.g. Henderson, 2009 and Kramer et al., 2005).[2]

Among the many factors that potentially affect infant health, health insurance (HI) is one of the most important since its eligibility and coverage denote the timely access and availability of quality care. Specifically, the relationship between HI and health outcomes of individuals may differ along two distinct margins. Along the extensive margin, an individual may be insured or not. Along the intensive margin, an individual must choose between competing insurance plans, including private versus public options. Considering the extensive margin, Davis et al. (2010) compare health care systems across several countries and report that the U.S. has the best preventive care and the shortest waiting times for specialist care and nonemergency surgical care for those with insurance. However, it lags behind in access to essential services, primary care, patient safety, and efficiency for the uninsured. The U.S. is also the only industrialized nation in the world that lacks universal HI of some form.

At the intensive margin, two interesting trends have emerged of late. The national averages for children less than three years old – drawn from the Current Population Survey, Annual Social and Economic Supplements from 1999 to 2009 – highlight the simultaneous trends of a decline in the uninsured population and an apparent shift towards public HI among the insured. While the proportion of uninsured infants under three has declined from 12.7% to 9%, the proportion with private HI has fallen from 64.3% in 1999

[2] Low birth weight is defined as birth weight less than 2,500 grams (5 lb., 8 oz.)

See:http://cia.gov/library/publications/the-world-factbook/rankorder/2091rank.html

See:http://www.census.gov/compendia/statab/cats/births_deaths_marriages_divorces.html

See:http://childstats.gov/americaschildren/glance.asp to 53.8% in 2009, along with an increase in public HI coverage from 26.4% to 40.9% between 1999 and 2009.[3]

This lingering dual problem of poor infant health and inadequate access to quality care has been greatly responsible for a multitude of prior and on-going expansions of public HI. This link has been studied at length; Levy and Meltzer (2008) provide an excellent review. Unsurprisingly, health care reform has been a top priority for public policy as is evident in both media reports and economic research in recent years. The heated policy debate, since the 2008 elections, over the urgent need to address a still substantial uninsured population, unsatisfactory health care access and health outcomes, and increasing health care costs culminated in the comprehensive health reform, the Patient Protection and Affordable Care Act, which President Obama signed into law on March 23, 2010.

Kolstad and Kowalski (2010) point out that the new legislation is often believed to be modeled after the health care reform law passed in Massachusetts in April 2006 that aimed at achieving near-universal HI coverage. Echoing some of the requirements adopted in Massachusetts in 2006, the comprehensive health reform law will require most individuals to have HI beginning in 2014, the availability of HI exchanges for individuals without access to affordable employer coverage, and the expansion of Medicaid to 133% of the federal poverty level (FPL) for all individuals under age 65, to name a few.

Since this study focuses on the sub-population of infants, the most relevant aspects of the new law pertain to the proposed changes in Medicaid, the Children's Health Insurance Program (CHIP), and private HI. Eligibility thresholds for Medicaid and CHIP for children will continue at their current levels until 2019. The federal government will provide for the costs of the new Medicaid eligibles starting with 100% federal funding for the years 2014 through 2016, 95% federal funding for 2017, and 90% federal funding for 2020 and beyond.[4] The provision for states to create the American Health Benefit Exchanges (AHBE) will help consumers shop for the most suitable HI, along with premium and cost-sharing subsidies for greater affordability. Even without any specified public plan option in these exchanges, the Office of Personnel Management will be authorized to contract with private insurers to offer at least two multi-state plans in each Exchange, including at least one option from a non-profit provider.

The rules governing private HI will be stricter to ensure that people are not denied coverage due to pre-existing conditions, as well as to reduce discrimination based on health status and gender. As a start, all new health plans will be required to offer comprehensive coverage including a minimum set of services, capped annual out-of-pocket expenditure, no cost-sharing for preventive services, and no annual or lifetime limits on coverage. Rescissions of coverage will be prohibited by law for both new and existing private

[3] See:http://www.census.gov/hhes/www/hlthins/data/historical/index.html

[4] See: http://www.kff.org/healthreform/upload/8023-R.pdf

HI plans. Additionally, increments in health plan premiums will be subject to review. However, there will be no changes in existing private HI plans, except that they will be required to continue coverage for dependent children up to age 26, eliminate annual and lifetime limits on coverage, and eradicate waiting periods for coverage exceeding 90 days.

The two most contentious aspects of the initial health care reform proposal were the individual mandate leading to universal HI and the availability of a public option in the AHBE. The former is unattainable without the latter. The role of public HI in the provision of HI figures prominently in the ongoing debate over the repeal or reform of the current health care reform law. Hacker (2008) points out that private HI and public HI have different strengths and different weaknesses, and Americans can only gain from a public-private hybrid providing a "broadened range of good, meaningful choices." (Hacker, 2008, p. 20).

The proponents of the public plan option point out that a public option is essential for protecting consumers and reining costs, while expanding coverage and improving the delivery of health care.[5] They further contend that a competing public option is an essential benchmark of "checks and balances" to ensure that both the private plans and the public option remain committed to their high standards. McDonough et al. (2008) also point out that over time, the premiums and copayments have been rising within the Connector, the Massachusetts equivalent of the AHBE, despite the groundbreaking reforms, due to the absence of a public option. The opponents fear that such a public option may "crowd-out" private HI with employers opting out of providing HI to their employees since the latter will have a public option in the HI exchanges. However, amid criticism, a public option ultimately was not included in the Obama legislation, as mentioned above. Some modest reforms were introduced to expand eligibility for public HI among low income households.

In light of this background, this study seeks to answer two questions. First, is there a robust causal relationship between infant health and private HI, as opposed to public HI, among the general insured population? Second, is there a robust causal relationship between infant health and private HI, as opposed to public HI, among the insured poor? The first question addresses the expected effects on infant health of including a public option in a universal HI scheme. The second question addresses the expected effects on infant health within the subpopulation targeted by the relatively minor expansion of public HI under the Obama legislation.

Based on the detailed summary of the literature in Levy and Meltzer (2008), there is sufficient reason to believe that insured infants undoubtedly fare better than their uninsured counterparts. However, among the insured, there seems to be a more favorable impression of private HI in terms of its efficacy and efficiency in improving health relative to public HI. The causal interpretation is clouded, however, by the

[5] See:http://www.nytimes.com/2009/08/18/health/policy/18talkshows.html?_r=1

fact that those with public HI are a non-random sample of the population; specifically, those on public HI may be fundamentally less healthy than those with private HI, independent of the type of HI. Moreover, the existing evidence on the beneficial causal impact of HI is specific to population subgroups like infants, the disabled or the elderly, and the poor.[6]

There is surprisingly very limited work that, even indirectly, estimates the effect of the type of HI coverage (private or public) on health outcomes of the insured. To the best of the author's knowledge, this study is the first attempt to fill this gap by directly addressing the selection issue while comparing private HI and public HI in terms of their causal impact on an insured infant's health.

Using data on over 7,500 nine-month old infants born in 2001 from the Early Childhood Longitudinal Study - Birth Cohort (ECLS-B), this study expands the rich literature on the beneficial causal impact of HI on infant health by accomplishing three objectives. First, assess the relationship between having private HI - as opposed to public HI - and several contemporaneous measures of infant health like five minute Apgar score, number of gestation weeks, an indicator for having a normal birth weight, an indicator for being born prematurely, an indicator for having a gestation age between 38 and 42 weeks, height (more correctly, the length), and weight of the infant. Second, investigate the direction of selection into private HI. Finally, utilize the methodology in Altonji et al. (2005) to assess the sensitivity of the estimated relationship between private HI and infant health to non-random selection, while circumventing the need for valid exclusion restrictions.[7]

The results reveal some fascinating dynamics between private HI, public HI, and infant health. First, private HI is associated with better health outcomes. Second, the results confirm a strong positive selection (on observables and unobservables) into private HI; infants from socioeconomically advantaged families are more likely to have private HI. Finally, for most of the cases, the positive associations between private HI and the health outcomes demonstrate strong sensitivity to non-random selection; even a modest amount of positive selection into private HI is sufficient to eliminate, and even reverse, the initially favorable results for private HI.

Specifically, in most cases, if the amount of (normalized) selection on unobservables is even two percent of the amount of (normalized) selection on observables, this is sufficient to explain the positive association between private HI and infant health. Moreover, for binary measures of child health, if the correlation

[6] Since this study focuses on infant health, the reader should not extrapolate the results to draw inferences about the causal effect of private HI versus public HI on other population segments.

[7] Altonji et al. (2005) developed and applied this technique to study the impact of Catholic high school on educational outcomes. Millimet et al. (2010) used the same technique, among others, to evaluate the impact of School Nutrition Programs on child weight with the 1998 - 1999 ECLS - K cohort data. Hinrichs (2010) also employ this methodology to estimate the impact of racial diversity in college on satisfaction with the college attended, post-college earnings, and civic behavior.

between unobservables in the private HI and outcome equations is to the tune of 0.10 or 0.20, the effect of private HI often becomes negative and statistically meaningful.

In the current context, both of these measures of the extent of selection on unobservables required to eliminate or reverse the positive association between private HI and child health are entirely plausible since the empirical specifications used in this study do not include important factors like parents' awareness about appropriate medical care, the child's innate healthiness, among others.

With this is mind, admitting even a modest amount of non-random selection into private HI implies that public HI may actually be a more valuable tool in improving infant health than is usually believed. While the mechanism underlying this perhaps surprising result is unclear, additional analysis reveals that public HI for infants - Medicaid and/CHIP - tends to provide more comprehensive benefits while private plans vary widely (see, e.g. Ku, 2007; Hadley and Holahan, 2003/2004, Currie and Thomas, 1995). However, for public HI to be optimal in improving infant health it should cost less as well. Data from the Medical Expenditure Panel Survey (MEPS) indeed reveal that on a per beneficiary basis, public HI for children less than four years old, is cheaper on average compared to private HI plans. As a result, public HI, for infants, appears to be more efficient than private HI and may actually provide better care at a lower cost.

The remainder of the paper is organized as follows. Section 2 provides background information, both on Medicaid and CHIP, as well as the existing literature. Section 3 describes the empirical methodology. Section 4 presents the data in more detail. Section 5 discusses the results, while Section 6 concludes.

2 Background

This study aims to analyze the causal effect of private HI as opposed to public HI on infant health. So, among the different categories of public HI that are available, Medicaid and CHIP are the most relevant to this study.

2.1 Institutional Details

Medicaid was established on July 30, 1965 by the Social Security Act as a medical care supplement to federally funded cash income assistance programs for the poor, especially for dependent children and their mothers, the disabled, and the elderly. The association between cash assistance programs and Medicaid was phased out by the late 1980s. Medicaid operates as a joint federal-state program. While states are responsible for administering their own Medicaid programs, the federal Centers for Medicare and Medicaid Services (CMS) monitors these state-run programs and sets requirements for funding, quality, eligibility standards, and service delivery. Each state has complete independence over setting the eligibility standards, the type, size, duration, and scope of services, and the rate of payment for services, within broad federal guidelines. Consequently, Medicaid policies are intricate and vary widely across states. So, it is always possible for a person to be Medicaid-eligible in one state and not in another, and the menu of services provided differ significantly from state to state as well. However, to receive federal matching funds, every state Medicaid program has to provide at least the following services: inpatient and outpatient hospital services, pregnancy-related services including prenatal care, vaccines for children, physician and rural health clinic services, laboratory and x-ray services, pediatric, family nurse practitioner, and nurse-midwife services, among others.[8]

Although established to assist eligible low-asset individuals "pay for some or all of their medical bills"[9], Medicaid does not extend medical assistance to all poor persons. The main criterion for Medicaid eligibility is limited income and financial resources, subject to state specified threshold levels within federal guidelines. States differ in their Medicaid coverage of the poor population and financial eligibility criteria but some "categorically needy" mandatory groups have to be covered to receive federal matching funds. These groups include, among others, children less than six years old from families with income at or below 133 percent of the FPL, pregnant women from families with income below 133 percent of the FPL, infants, although only for the first year of their lives under certain conditions, whose mothers are Medicaid-eligible, and all children less than 19 from families with incomes at or below the FPL.[10] Additionally, there are optional groups which, if covered by the states, qualify for federal matching funds such as infants less than one year old, and pregnant women not included in the mandatory "categorically needy" group whose family income does not exceed 185 percent of the FPL, among others.

Again, within federal specifications and upper limits, each state has discretionary power to adopt either of two methods of paying for Medicaid services: pay a fee-for-service directly to health care providers, or pay through various prepayment mechanisms like health maintenance organizations (HMOs). Payment rates should be such that an adequate number of providers will enlist to ensure sufficient covered services compared to the care and services available to the general population. Participating providers must accept Medicaid payment rates as payment in full. Medicaid eligible pregnant women, children less than 18 years old, and hospital or nursing home patients who are expected to spend most of their income on institutional care, are exempt from any nominal deductibles, coinsurance or copayments that states may impose on some Medicaid beneficiaries for some services. Moreover, no Medicaid beneficiary has to make copayments for emergency services and family planning services. The federal government contributes a

[8] See: http://www.cms.gov/MedicareProgramRatesStats/downloads/MedicareMedicaidSummaries2009.pdf

[9] See: http://www.cms.gov/MedicaidEligibility/

[10] As of January 2009, the FPL has been set at $22,050 for a family of four in the continental U.S.

share, the Federal Medical Assistance Percentage (FMAP), to each state's Medicaid program. The FMAP is calculated annually by a formula based on the state's average per capita income level and the national income average. In FY 2009, the average FMAP was 59.08 percent.[11]

SCHIP, the State Children's Health Insurance Program, known as CHIP since March 2009, was established on August 5, 1997 by the Social Security Act. CHIP was designed to extend coverage to the uninsured children from families with modest incomes beyond eligibility requirements for Medicaid. CHIP is also a joint federal-state government program like Medicaid. Each state has the independence of designing its own CHIP program within broad federal guidelines set by the CMS. Given the reason for CHIP's establishment, states may design their CHIP programs in either of the following three ways: as separate child health programs independent of Medicaid, or utilize CHIP funds to expand their Medicaid program known as CHIP Medicaid expansion programs or marry these approaches to have CHIP combination programs.

The broad eligibility criteria for coverage by CHIP as mandated by the federal government include uninsured children who are ineligible for Medicaid, uninsured children less than 19 years old, and uninsured children whose family income is at or below 200% of the FPL.

In terms of benefits provided by CHIP, if a state chooses to implement CHIP as a Medicaid expansion, it is to offer the new CHIP enrollees the same Medicaid benefits package. Instead, if a state chooses to implement an independent state children's health insurance program, its benefit package can be one of a specified list of options. States can charge premiums, deductibles, or fees for some of the services provided under CHIP for some groups, but no CHIP beneficiary has to make copayments for pediatric preventive care and immunizations at any level of income.[12]

Unlike Medicaid, the annual federal funding for CHIP is fixed (for example, it was $5 billion for 2007), and each state receives an allotment based on the number of children in low-income families, the number of such children who are uninsured, and health care costs.[13] Moreover, the federal government pays states an "enhanced" FMAP, which was 71.36 percent in FY 2009. Expenditures under the CHIP program in FY 2008 were $10 billion.[14]

2.2 Literature Review

The vast literature on the relative benefits of being insured versus being uninsured is testament to the concern over the lack of affordable health care to a substantial proportion of Americans with the twin adverse effects of poor health and ballooning health care costs. Most of this literature has focused on

[11] See: http://www.cms.gov/MedicareProgramRatesStats/downloads/MedicareMedicaidSummaries2009.pdf

[12] See: http://www.aap.org/advocacy/schipsum.htm

[13] See: http://www.cbo.gov/ftpdocs/80xx/doc8092/05-10-SCHIP.pdf

[14] See: http://www.cms.gov/MedicareProgramRatesStats/downloads/MedicareMedicaidSummaries2009.pdf

the effect of Medicaid (eligibility and enrollment) on the health of children as well as low-income adults, compared to being uninsured, thus providing indirect evidence on the role of public HI in affecting health. For the sake of brevity and specificity to the subpopulation of interest, the following review presents the available evidence on the causal effect of HI (public - Medicaid in the U.S. and national HI in Canada, private, and none) on children's health outcomes and health care utilization.

2.2.1 Direct comparison between private HI and public HI

The literature directly comparing private and public HI is quite small. Currie and Thomas (1995) use both the 1986 and 1988 National Longitudinal Survey of Children and Mothers (NLSCM) modules associated with the 1979 NLSY to study the causal effect of the type of HI - private HI, Medicaid, or none - partially addressing the selection issue by including child-specific fixed effects. They report heterogeneous effects of Medicaid and private HI on the utilization of care based on the race of the child. On the whole, Medicaid coverage, compared to private HI, leads to an unambiguous increase in checkups across race and income levels, possibly indicating enhanced access to health care. In terms of the selection problem, the authors opine that instead of attributing selection in to Medicaid in explaining the unambiguous increase in routine checkups, it is possible that these results simply reflect the differences between Medicaid and private HI plans in covering routine pediatric preventive care. This explanation is of crucial importance to the current study as well. However, the causal interpretation is plagued by the inadequacy of the fixed effects method to control for unobservable changes that potentially affect health status, which in turn may influence enrollment, as conceded by the authors themselves.

Davidoff et al. (2000) compare children's health and health care utilization based on whether they have Medicaid versus being uninsured, and also whether they are Medicaid-enrolled versus being Medicaid-eligible but with private HI. In comparing children in the latter groups, they conclude that the privately insured are more likely to report a delay in care due to cost and have a slightly greater likelihood of reporting unmet dental need, although being less likely to lack a regular source of care, after accounting for the observable differences between these two groups. Although a causal interpretation is difficult, it highlights the misconception of private HI being necessarily better for infant health.

Finally, Ku (2007) is the only study that defines public HI to include both Medicaid and CHIP in the descriptive comparison between private HI and public HI. In terms of access to health care, publicly-insured children are comparable to their privately insured counterparts. Infact, those on public HI have better access to services such as preventive health visits or dental care, as is hypothesized by Currie and Thomas (1995), compared to similar low-income children on private HI. Moreover, while all children on Medicaid and CHIP receive relatively comprehensive health benefits, including preventive and primary medical care, inpatient and outpatient care, CDC recommended pediatric vaccines, laboratory and x-ray services, prescription drugs, and immunizations, as well as dental, vision and mental health care coverage, benefits to children on private HI vary widely and are generally less exhaustive. Many private plans do not even include crucial services for children like vision or dental care, and low-cost private plans often do not cover prescription drugs or preventive care.

Ku (2007) also points out that public HI is not better for children only because it is "more" comprehensive, but also because it involves considerably low costs. This proves that public HI is at least as efficient as private HI for low-income children. This point is also emphasized by Hadley and Holahan (2003/2004) who compare the annual per capita medical spending for lower-income children with full coverage for a year by either Medicaid or private HI. They use data from the Medical Expenditure Panel Survey (MEPS) for 1996 - 1999 and conclude that although the type of HI does not influence the utilization of services, after controlling for demographics and health outcomes, there exist substantial spending differences between the two. Specifically, those on Medicaid would spend significantly more if they had private HI, and the opposite would hold for those currently on private HI.

The present study contributes to this literature in four important ways. First, this is a direct comparison between private HI and public HI among insured infants using several different infant health metrics. Second, this analysis proves the existence of positive selection into private HI in terms of both observable attributes and unobservable factors. Third, accounting for non-random selection into private HI, this work reveals striking beneficial effects of public HI on infant health, thus strengthening the aforementioned direct and indirect hypotheses about the same. Finally, the definition of public HI includes both Medicaid and CHIP.

2.2.2 Comparison between public HI and being uninsured

Although not directly relevant to the research question addressed in this study, it is nonetheless useful to provide a brief summary of the existing literature comparing public HI to no insurance at all. This literature comparing public HI to being uninsured is quite substantial and provides evidence on the effectiveness of public HI by itself. To begin with, ruing the lack of objective measures of infant health in their data from the Vital Statistics (1979 - 1992), Currie et al. (1995) illustrate that a fee hike to obstetrician/gynecologists by the Medicaid program is related to declines in infant mortality. Their identification strategy involves exploiting the variations in Medicaid fee ratios within states and over time.

Currie and Gruber (1996a, 1996b, and 1997) use varied data sources to report beneficial causal effects of Medicaid coverage compared to being uninsured. The first study documents how increased eligibility under Medicaid expansions translates into greater coverage for 15-44 year old women in the event of pregnancy, and decreases both the incidence of low birth weight and infant mortality, especially for the low-income "targeted" population. The second analysis shows how increased Medicaid eligibility reduces the likelihood that a child does not visit a doctor, while increasing the probability of a child's visit to the physician in the last couple of weeks, and improves infant mortality. The last study concludes that insurance coverage in the form of expanded Medicaid eligibility results in greater utilization of both low tech and high tech child birth interventions, and the latter (like the proximity to hospitals with neonatal intensive care unit, NICU) results in real health benefits for the child. Currie and Grogger (2000) examine national samples to reiterate that only the income eligibility expansions in Medicaid significantly increase prenatal care utilization and decrease the incidence of low birth weight. Other enrollment enhancement measures such as states' attempts to simplify the enrollment process have had no impact on either health care utilization or the incidence of low birth weight.

Hanratty (1996) uses a panel of Canadian counties from 1960 to 1975 to identify the beneficial effect of the introduction of national HI on infant health outcomes by exploiting the variation in dates of implementation across provinces. Specifically, the results show that such an implementation is associated with a four percent decline in the infant mortality rate, and an average decline of 1.3 (8.9) percent in the likelihood of low birth weight for the entire population (single parents).

Focusing on the incidence of avoidable hospitalizations, using National Hospital Discharge Survey data, Dafny and Gruber (2000) provide further evidence that the Medicaid expansions lead to more appropriate care for low-income children. Their results show that the expanded public insurance eligibility decreases avoidable hospitalization by 22%, and increases access for newly eligible children resulting in an overall rise of 10% in child hospitalizations. Kaestner et al. (1999) use the Nationwide Inpatient Sample of hospital discharges to show that children more likely to be eligible for Medicaid have a lower incidence of ambulatory care sensitive discharges than ineligible children. However, they find no consistent impact of Medicaid on maternal reports of child health status and bed days. On the other hand, Kaestner et al. (2000) conclude, using a difference-in-difference technique, that Medicaid expansions in some years failed to reduce the discretionary hospitalization rate (that is, the ratio of the number of hospitalizations that are potentially avoidable with appropriate primary care) or hospital length of stay for infants from low-income areas.

Shore-Sheppard (2003) paints an overall beneficial role of expanded public HI for infants and children, although the modest size of the impact has not been able to meet the expectations of policy makers. Her literature review highlights one of the reasons why Medicaid may be beneficial, especially for low income families, since it reduces both the financial and psychological stress by doing away with large premium payments or physician fees, or eliminating the need to spend long hours in emergency rooms awaiting care.

However, it is also important to note that many disadvantaged, potentially Medicaid-eligible families do not enroll for Medicaid to avoid, among others, the onerous application process, language barriers, and the social stigma of being on a publicly-sponsored program.

3 Empirical Methodology

3.1 Baseline Approach

The following empirical model of health determination assesses the impact of private HI on contemporaneous health:

$$y_i = X_i\beta + \tau D_i + \varepsilon_i \tag{1}$$

where y_i represents the health outcome of the i^{th} child; D_i is a dummy variable that takes a value of one if the child has only private HI, and zero if the child has public HI.[15] X_i is a vector of observable attributes of the child (including an intercept), and τ is the constant treatment effect. ε_i captures all remaining unobservable factors that affect the i^{th} child's health. (1) is estimated by OLS for continuous health measures and using a probit model for binary outcomes.

Clearly, the OLS estimator τ will be biased in the presence of other unobservable (to the econometrician) factors that may influence both the treatment, that is having private HI, and the health outcome of the child. In light of Levy and Meltzer's (2008) critique of and caveats for the few worthy instruments for HI to address the endogeneity problem, this study uses the methodology proposed in Altonji et al. (2005) to assess the sensitivity of the causal impact of private HI on child health. The essence of this methodology is to estimate τ in (1) assuming no selection on unobservables (SOU), assess how much SOU is needed to explain this estimate of τ, and finally to use the extent of selection on observables (SOO) as a guide to the actual extent of SOU.

3.2 Sensitivity to Selection on Unobservables

3.2.1 Extent of Selection on Unobservables

Altonji et al. (2005) propound a method of assessing the extent of SOU using the degree of SOO as a guide. This methodology is applicable to both continuous and discrete outcome models. The primary data criteria that need to be met in order to employ this method are that the set of covariates X_i should be conceived of as a random draw from the full set of factors that affect child health and that no single factor

[15] Only 3.58% of the sample is uninsured and are dropped from the analysis.

should dominate the distribution of either the outcomes or the treatment variable.[16] Altonji et al. (2005, p. 170) contend that this assumption probably approximates reality better than those of OLS, given the "manner in which most large-scale data sets are designed and collected." Under these assumptions, the degree of SOU equals the amount of SOO in expectation. Accordingly, a comparison of the amount of SOU relative to the amount of SOO needed to explain the estimated effect obtained under exogeneity can be used to ascertain the robustness of the causal effect. In essence, a large value (i.e., greater than one) of the implied ratio of SOU to SOO will validate a robust causal effect since such a large fraction is unlikely given the assumptions about the data. On the other hand, a small value (i.e., less than one) of the ratio will disprove such a conclusion, implying that the apparent causal effect is likely to be entirely driven by selection bias.

To proceed, the (normalized) amount of SOU is formalized by

$$\frac{E\left[\varepsilon|D=1\right]-E\left[\varepsilon|D=0\right]}{Var\left(\varepsilon\right)} \tag{2}$$

where D depicts the treatment of interest and ε represents the unobservables in the outcome equation (1). The corresponding amount of SOO, adjusted for variance, is represented as

$$\frac{E\left[X\beta|D=1\right]-E\left[X\beta|D=0\right]}{Var\left(X\beta\right)} \tag{3}$$

where $X\beta$ refers to the set of non-treatment covariates in the outcome equation (1). The assumption of equal amounts of selection on unobservables and on observables implies that the ratios in (2) and (3) are equal in magnitude.

Now, to establish the robustness of the beneficial causal effect of private HI obtained under exogeneity, the crux is to quantify the amount of SOU vis-a-vis the amount of SOO, that is necessary to explain away the entire effect of private HI. In order to calculate this implied ratio, define the treatment participation as

$$D_i = X_i\lambda + \nu_i. \tag{4}$$

Substituting (4) in (1) yields

$$y_i = \left(\beta+\tau\lambda\right)X_i + \left(\tau\nu_i+\varepsilon_i\right). \tag{5}$$

The decomposition of the probability limit of the OLS estimate of τ into the true treatment effect and bias

[16] Another requirement is weaker than the standard assumption of $Cov\left(X,\varepsilon\right)=0$.

is given by

$$\begin{aligned} \text{plim } \widehat{\tau} &= \tau + \frac{Cov(\nu, \varepsilon)}{Var(\nu)} \\ &= \tau + \frac{Var(D)}{Var(\nu)} \{E[\varepsilon|D=1] - E[\varepsilon|D=0]\}. \end{aligned} \tag{6}$$

Exploiting the assumption of the equality of the ratios in (2) and (3) above, the bias term in (6) can be expressed as

$$\frac{Cov(\nu, \varepsilon)}{Var(\nu)} = \frac{Var(D)}{Var(\nu)} \left\{ \frac{E[X\beta|D=1] - E[X\beta|D=0]}{Var(X\beta)} Var(\varepsilon) \right\}. \tag{7}$$

So, to compute the value of the bias term in (7) all that is required is the identification of β and $Var(\varepsilon)$. However, under the null of no treatment effect, each can be consistently estimated by applying OLS to equation (5). The sample values of Var(D) and Var(ν) will complete the calculation of the bias. Finally, the implied ratio is attained by dividing the estimate of τ, obtained under exogeneity, by the bias quantified in (7).

3.2.2 Bivariate Probit Model

To assess the apparent causal impact of private HI on discrete measures of child health, Altonji et al. (2005) further suggest using the bivariate probit model. The model is represented as

$$y_i = I(X_i\beta + \tau D_i + \varepsilon_i > 0) \tag{8}$$

$$D_i = I(X_i\lambda + \nu_i > 0) \tag{9}$$

$$\varepsilon, \nu \sim N_2(0, 0, 1, 1, \rho) \tag{10}$$

where y_i is a binary indicator of child health, $I(.)$ is an indicator function, and D_i continues to depict the treatment under consideration. The correlation between the unobservables affecting child health (ε_i) and unobservables that determine the probability of a child being insured privately (ν_i) is given by ρ. This implies positive SOU if $\rho > 0$, while $\rho < 0$ indicates negative selection. The set of covariates X_i is the same as in (1) and (4) above. In the absence of valid exclusion restrictions, the model is treated as being underidentified and ρ is fixed at different values to see how sensitive the causal effect is to the value of ρ. Effectively, the idea is to get estimates of private HI effects corresponding to different values of ρ in order to deduce the sensitivity of the treatment effect to increasing amounts of SOU.

4 Data

The data are obtained from the ECLS-B. It follows a nationally representative cohort of children born in 2001 through first grade. Assembled by the U.S. Department of Education, the ECLS-B focuses on children's early environmental characteristics like health care and in- and out-of-home experiences that play a crucial role in the overall development of children and the first brush with the demands of formal school. The survey has collected information directly from the children's fathers along with the mothers, video-taped parent-child interaction, and assessed child care settings for the sampled children. Actual data collection occurred between Fall 2001 and Fall 2002. The parents of 10,700 children born in 2001 participated in the first wave of the study when the children were approximately nine months old.

For this study, only the first wave of nine-month old infants is used. Since BMI - a more popular health outcome measure - is not meaningful for children less than two years old, seven more apt measures of infant health used are: length, weight, five minute Apgar score, number of gestation weeks, an indicator for each of normal pregnancy, whether a child is born prematurely, and whether the child's five minute Apgar score falls within the normal range. The normal pregnancy indicator takes a value of one if the gestation weeks were between 38 and 42, and zero otherwise. The premature birth indicator is one if the child's gestation age was 33 weeks or less and zero, otherwise. The normal Apgar score indicator takes a value of one if the Apgar score lies between seven and ten and zero, otherwise.[17]

In order to control for child-specific, parental and environmental factors the following covariates are included in the analysis: child's age, race (white, black, Hispanic, Asian, and other), a gender dummy, household socioeconomic status (SES), household size, mother's age, mother's weight, father's age, dummy variables for whether the mother has a high school degree, some college degree, a BA degree, or an advanced degree, corresponding indicators for father's education, a marital status indicator for whether the parents are married, region type (Northeast, Midwest, South, and West), and city type (urban cluster, urban area, and rural).[18] Additionally, higher order and interaction terms involving the continuous variables have been incorporated in the estimations.

The ECLS-B is one of the few national U.S. studies that involves fathers through self-reporting driven by the importance of the father's presence in the child's life.[19] The survey includes separate questionnaires for only resident, only non-resident biological, and both resident and non-resident biological fathers. Thus, in defining father's education and age, special care is taken to identify the type of father, and then define

[17] Length and weight of the child are measured by the survey collectors, and the birth weight and gestation age information come from the infant's birth certificate.

[18] Urban Cluster is defined as less densely populated than an Urbanized Area.

[19] See: The ECLS-B 9-month User's Manual, Chapters 1- 5, pg 64.

the corresponding age and education levels.

Since the focus of the study is to analyze the effect of private HI on early birth outcomes, only the first wave of the survey with 10,700 children is exploited.

Moreover, the focus is on only insured children who are singletons. Additionally, children with missing data for age, race, and gender are dropped from the sample. The treatment variable of interest, whether the child has only private HI, is binary in nature and takes a value of one if the mother reported that the child has private HI.[20] Although it is possible for a child to have both private HI and Medicaid/CHIP, the very few observations with such an overlap possibly indicate measurement error, and are thus omitted from the sample.[21] The control group comprises children with only public HI defined as being covered by either Medicaid, or CHIP, or both.

The final sample has 7,850 nine-month old insured children. Subsequently, the sample is restricted to low-income households for a better comparison between Medicaid/CHIP eligible households but on private HI and households on public HI. As noted by Kolstad and Kowalski (2010), the Massachusetts reform not only provides analysts with a unique opportunity to evaluate the impact of a policy geared to attain near-universal HI coverage for the general population (instead of specific sub-groups like the poor, children, or the elderly), the increase in expansion of coverage is comparable to the predicted scale of the coverage expansion in the national reform. So, the principal sample in this study includes all insured children, regardless of their poverty status. Moreover, the empirical methodology employed in this study is designed to admit both observable and unobservable differences between the treated and control groups, so that the homogeneity of observably low-income families is not a requirement. Additionally, almost 49% of the sample in this study are from households with income less than 185% of the FPL.

Table 1 provides the summary statistics for the full sample of 7,850 infants. All analyses are performed using survey weights. The last two columns report the differences in means between the treated (privately insured) and the untreated (publicly insured) along with the p-values. Of these insured children, 54% have private HI. Even a cursory glance at the summary statistics is indicative of a strong positive selection (on observables) into private HI. Privately insured children are more likely to be white and Asian, not reside

[20] The question for private HI is: “Does child have coverage through a private HI plan (from employer, workplace, or purchased directly, or through a state/local govt.)?”

The question for being covered by Medicaid is: “Does child have coverage through Medicaid or state program?”

The question for being covered by CHIP is: “Does child have coverage through CHIP or state program?”

[21] Less than 7% of children have both private HI and public HI (Medicaid and/CHIP) in the sample. Adressing the problem of measurement error is beyond the scope of the current study. However, it is unclear how measurement error would affect the current analysis since measurement error would most likely bias the estimated effects of private HI toward zero as well as attenuate the apparent selection on observables and unobservables.

in the south, and are from medium to high income households with married, older, and well educated parents. Their mothers also weigh less than their counterparts on public HI. Also, these children, on an average, have a higher five minute Apgar score and longer gestation weeks compared to their publicly insured counterparts. The former are also more likely to have a normal birth weight, a normal Apgar score range, their gestation weeks are more likely to be between 38 and 42 weeks, and they are less likely to be born prematurely. The summary statistics in Table 1 thus illustrate that the children on private HI have significantly and substantially higher means of favorable family background measures and individual health outcomes, thus providing additional motivation to examine the selection issue, especially given the lack of reliable exclusion restrictions as rued by Levy and Meltzer (2008).

5 Results

First, the full sample of 7,850 insured infants is considered. Then, two low-income samples are analyzed. The poorest income sample in the data constitutes households with income $\leq$ 130% of FPL, and the next category includes households with income $\leq$ 185% of FPL.

5.1 Full Sample

5.1.1 Baseline Results

For all seven health outcome variables, three versions of (1) are estimated, each of which varies only by the vector of covariates, X_i. The raw correlations between being privately insured and the different health outcomes are also reported. Specification (1) includes X_i as is. Specification (2) includes squared age of child, squared age of mother, squared household size, squared weight of mother, an interaction term between the mother's age and whether she has a BA degree or more, an interaction term between whether the child is black and the household size, an interaction term between whether the child is black and the mother's weight, an interaction term between whether the child is black and whether the mother has at least a BA degree, and an indicator of whether the child is black with married parents. Specification (3) augments Specification (2) with the cubed continuous variables like child's age, household size, mother's age, and mother's weight, an interaction term between squared mother's age and whether the mother has at least a BA degree, and an interaction term between whether the child is black and squared household size

Table 2 presents the baseline results. The raw correlation between private HI and the outcomes are reported in the first column. They indicate a positive (negative) association between private HI and the five minute Apgar score and the number of gestation weeks (height and weight) of the child. The estimate for gestation weeks is statistically significant at the 1% level. The probit results show that private HI is associated with a higher probability of the child being of normal birth weight, of having 38-42 gestation weeks, and of having an Apgar score of at least 7. A child on private HI is less likely to have a premature birth.

The first set of covariates in Specification 1 is sufficient to reduce the coefficient on private HI for the five minute Apgar score and the number of gestation weeks, although only the latter is statistically significant. For the binary outcomes, the estimated marginal effects decline in absolute value for all the outcomes reflecting positive selection on observables into private HI. Since the probability of premature birth is a negative health outcome, a negative marginal effect or point estimate of private HI reflects that private HI is beneficial for the child.

It is important to note, though, that the above estimations are obtained under the assumption of exogeneity, ruling out a causal interpretation. The inclusion of the first set of covariates substantially reduces the point estimates for almost all the outcomes in Table 2, indicating a strong SOO into private HI. Given this evidence of a strong SOO into private HI, it is possible that a small amount of SOU, can explain the remaining private HI effect.

5.1.2 Sensitivity to Selection on Unobservables

Extent of SOU relative to SOO Table 3 presents the results for the methodology that accounts for both continuous and binary health outcome variables. For each of the specifications, the first column reports the estimate of the bias term from equation (7), the second column shows the private HI estimate under exogeneity, while the third column reports the implied ratio attained from dividing the second column by the first. This section summarizes the results for the outcomes with statistically significant private HI estimates under exogeneity, τ, since this method is not meaningful otherwise.

For the number of gestation weeks as the health outcome variable, the estimated bias term is positive implying positive selection across all specifications. For the binary outcomes of probability of normal birth weight and normal pregnancy, the estimated bias terms are positive across all specifications intimating positive selection. The probability of a premature birth reports a negative bias term suggesting positive selection as well. This is because private HI is associated with a lower probability of premature birth (a negative raw correlation) and better observable attributes (marginal effects in absolute value decline), and the latter play a role in reducing the probability of premature birth. That is, the children with a lower probability of being born prematurely are more likely to have private HI to begin with. These results simply echo the popular belief of a beneficial role of private HI vis-a-vis public HI. The summary statistics in Table 1 further support this line of thought.

Now, the implied ratio is at the most 0.017 for the number of gestation weeks. This means that if the (normalized) amount of SOU is only 0.017 (1.7%) of the (normalized) amount of SOO, it is sufficient to attribute the entire beneficial private HI effect to positive selection into private HI. Similarly, the implied ratios of 0.004 and 0.007 for the likelihoods of normal birth weight and normal pregnancy respectively, suggest that even if the SOU is a meager 0.4% (0.7%) of the SOO, it is adequate to explain the positive effect of private HI on the probability of normal birth weight (normal pregnancy). The opposite is true for the probability of being born prematurely for which it is adequate for the SOU to be at the most only 0.2% of the SOO to completely write off the negative impact of private HI. The foregoing evidence is suggestive of a strong positive selection into private HI which rules out interpreting the beneficial effect of the same as causal. The estimate of private HI, τ, under the assumption of only SOO, is statistically insignificant for height, weight and the five minute Apgar score among the continuous outcomes, and for the probability of a normal Apgar score. Nevertheless, this methodology indicates that a small amount of SOU can explain the observed association between private HI and child health.

Bivariate Probit The binary outcomes are further assessed by the biprobit model following Altonji et al. (2005). The results are displayed in Table 4. The coefficient estimates of the treatment variable are obtained by constraining the degree of SOU (ρ) from zero to positive amounts for all but the probability of being born prematurely. For the premature birth indicator, the value of ρ varies from zero to negative amounts, to maintain consistency with the notion that children with private HI have better unobservable attributes. If the estimated effect of the treatment is statistically significant under exogeneity (when ρ is constrained to zero), but is rendered statistically insignificant as soon as ρ deviates from zero, then the causal effect should not be viewed as robust. In this study, ρ is restricted to take values in the interval [0, 0.25] in increments of 0.05.

While it is not possible to know the true value of ρ without a valid exclusion restriction or reliance on the bivariate normality assumption, a value around 0.10-0.20 seems plausible since the set of observables does not include important factors such as mother-specific factors like mother's awareness about applicable medical care that might motivate the demand for health care, and the child's genetic endowments like innate healthiness and his or her accident proclivity (Currie and Thomas, 1995).[22]

[22] Access to WIC has not been included in the analysis due to its potential endogeneity. Given the literature documenting beneficial effects of WIC on infant outcomes and the fact that WIC is only available to low income households (e.g., Bitler and Currie, 2005), this omission constitutes a favorable unobservable for those on public HI. As a result, one might suspect negative selection on unobservables into private HI in direct contrast to the favorable observables, based on the summary statistics and baseline regressions, enjoyed by those on private HI. However, as detailed below, the unconstrained estimates of ρ are positive. Thus, despite the omission of WIC from the set of covariates, the net SOO and SOU seem to move in the same

For the probability of normal birth weight, the estimated effect, under exogeneity, is positive and statistically significant at 1%. As soon as ρ increases to 0.05 (denoting a higher level of positive SOU) the estimate falls in magnitude, continuing to be positive and significant (although only at 10%). As the value of ρ is further increased, the positive effect completely disappears. By the time ρ is 0.15, the estimate is not only statistically insignificant, but is also negative in sign. Further increases in ρ only make the negative effect larger and more significant. This implies that not only is the beneficial effect of private HI (under exogeneity) not robust, but a modest amount of positive SOU, even to the tune of only 0.10, is sufficient to render the effect insignificant, and greater amounts of SOU completely reverse the effect.

This same pattern is repeated for the probability of normal pregnancy when the positive and statistically significant estimated effect (when ρ is zero) is rendered negative and statistically significant for $\rho \geq 0.15$. Even though the estimate for the probability of a normal Apgar score starts off being positive but statistically insignificant (when ρ is zero), it changes sign and becomes statistically significant for $\rho \geq 0.25$. This points to the deleterious effect of private HI on yet another infant health metric, after allowing for modest to substantial positive selection into private HI.

In Panel IV, for the probability of premature birth, ρ is restricted to take values in the interval [-0.25, 0] in decrements of 0.05. The results show that the negative and statistically significant effect (under exogeneity) quickly becomes statistically insignificant, changes sign, and finally becomes larger, positive, and statistically significant for $\rho \geq$ -0.20.

Intuitively, this means that even a modest amount of positive SOU into private HI is adequate in eliminating or even reversing the beneficial causal effect of private HI. Since the sample includes only insured children, the control group consists of those that have public HI (Medicaid and/or CHIP). So, in this analysis along the intensive margin, the results point towards a striking revelation: allowing for a modest to significant amount of selection (on unobservables) into private HI, is suggestive of public HI causing a beneficial effect on child health.

Prior to continuing, a few comments are warranted about the methodology adopted in this study. First, this methodology does not provide point estimates of the effects of being privately insured. It simply indicates the amount of SOU that is needed to fully explain the apparent causal effect, and provides a guide for testing the robustness of the estimated effect, after allowing for different levels of selection based on the assumption of bivariate normality. While Currie and Thomas (1995) find point estimates of the heterogeneous, but, beneficial causal effects of Medicaid based on the race of the child along the extensive margin, their child-level fixed effects cannot account for the role of time-variant unobservables in driving

direction. This is plausibly explained by the potential existence of a large number of unfavorable unobservables for those on public HI which swamp the benefits of being an WIC recipient.

the selection problem. While obtaining point estimates of the causal effect should be the goal of future research, the above analysis offers a fresh insight into the private HI versus public HI debate: modest positive selection into private HI suggests an adverse impact of private HI, and within the insured sample of children, indicates a beneficial causal effect of public HI.

Second, although it is impossible to know the true value of ρ sans valid exclusion restrictions, the bivariate probit models are estimated without constraining ρ - relying solely on the parametric assumption for identification - and the estimates suggest that these crucial levels of selection are entirely reasonable. In Table 4, the estimates of $\widehat{\rho}$ from the unconstrained models are consistent with infants covered by private HI possessing better unobservables when the outcomes are normal birth weight, normal pregnancy, and premature birth. $\widehat{\rho}$ = 0.254, 0.269, and 0.236 for normal birth weight in specifications (1), (2), and (3), respectively; for normal pregnancy, $\widehat{\rho}$ = 0.197, 0.162, and 0.142 (although imprecisely estimated); for premature birth, the estimated values of $\widehat{\rho}$ = -0.147, -0.181, and -0.170 (although imprecise) for the three specifications, respectively.[23]

The fact that children on public HI appear to fare no worse, and possibly even better than their counterparts on private HI, is possibly explained by two hypotheses. First, public HI may simply provide "more" health care coverage. Second, public HI may actually be more efficient in the sense of providing "better" coverage. If the findings in this study are driven by the first explanation, then this suggests that such a comparison between public HI and private HI is not one of apples-to-apples and that private HI may outperform public HI if the level of coverage is comparable. However, if the second explanation is correct, this suggests that government-provided HI is outperforming the private sector.

The existing research (e.g. Hadley and Holahan, 2003/2004 and Ku, 2007), however, lends support to the latter hypothesis, that is, this beneficial causal effect does not appear to be a simple artifact of "more" benefits available through public HI (Medicaid and/or CHIP), but potentially reflect greater efficiency in terms of greater coverage at lower costs provided by public HI compared to most private HI plans. CHIP, too, provides an alternative source of cheaper coverage coupled with a broader range of benefits than private HI. This engenders the "crowding-out" of private HI when parents switch to CHIP instead of enrolling their children in private HI.[24] Table C1 in Appendix C showcases a similar story from the MEPS data for 2001 to 2007 for infants less than four years old. It is evident that the average payments made by Medicaid (and/or CHIP) for medical services per enrollee are smaller than for those by private HI. Since payments constitute the bulk of the costs incurred by the HI provider, this simply corroborates the aforementioned

[23] Only when the normal Apgar score is the outcome, the estimated $\widehat{\rho}$ are not consistent with the expectations based on the summary statistics or the prior results in Table 3.

[24] See:http://www.cbo.gov/ftpdocs/80xx/doc8092/05-10-SCHIP.pdf

evidence of public HI being a cheaper source of more benefits for infants. These results documenting the different effects of private HI and public HI are driven by coverage and cost characteristics of the types of HI that the child has, thus confirming Currie and Thomas' (1995) hypothesis.

Measurement Error There are two other potential sources of measurement error in this context since most of the health outcomes are measured at birth while the measure of HI (private or public) is available only at the time of the survey when the infant is 9 months old. First, it is possible that even among the insured population, there is a lapse in HI coverage at some point between child birth and the time of the survey. Second, it is possible that parents switched between the types of HI, with no lapse of coverage. To partially address both concerns, the sample is restricted to infants who are insured continuously since birth. More than 94% of the sample experience no lapse of coverage. Not surprisingly, the results hardly differ from the full sample results. These are reported in Appendix D. Beyond this, there is no way to determine if individuals changed HI types between birth and 9 months of age without experiencing a lapse in coverage.

5.2 Low Income Samples

The two samples considered are (i) insured infants from households with income ≤130% of FPL and (ii) insured infants from households with income ≤185% of FPL. There are 2,950 infants in the first category and 3,900 infants in the second group. The summary statistics and results - baseline as well as the sensitivity analyses - are reported in Appendix A and B for sub-samples (i) and (ii) respectively. In the lowest income sample (the first category), only 13.2% of the infants have private HI, while 20.2% have private HI in the second category.

Tables A1 and B1 show that in terms of observable differences in family and socioeconomic characteristics, infants on private HI have relatively more favorable attributes even among the indigent. Understandably, the differences are not as substantial, whether statistically or in magnitude, in the poor sub-samples compared to the full sample. For example, the difference in means of being on private HI versus public HI for whites is the largest in the full sample followed by those in category (ii) and then category (i), although they are statistically significant for all the samples. Similarly, the mean difference in SES is 1.053 for the full sample, 0.450 for those in group (ii), and 0.380 for the poorest sub-sample. So, even among the poor and more homogeneous sub-samples, there is ample indication of a positive SOO into private HI.

The baseline results are presented in Table A2 and Table B2, respectively, for the two categories. The set of covariates are identical to the full sample analyses. Focusing on the statistically significant results, the raw correlations suggest, in both tables, a statistically significant beneficial effect of private HI on the probability of premature birth. In the less poor sample (Table B2), private HI is also associated with higher probabilities of normal birth weight and normal pregnancy, like the full sample. However, the inclusion of the first set of controls reduces the magnitude of the private HI effect on the probability of premature birth for the lowest income sample, and additionally renders it insignificant for the less poor sample. The marginal effects in absolute value are reduced for the probabilities of normal birth weight and normal pregnancy and remain almost constant with the inclusion of more covariates. Altogether, there seems to be some SOO, like the full sample results, and it is possible that some accompanying amount of SOU can explain the entire estimated effect, for each outcome, in both the indigent sub-samples.

The results of determining the amount of SOU guided by the amount of SOO à la Altonji et al. (2005) are reported in Tables A3 and B3, respectively for the two poor sub-groups. For the poorest sub-sample, the probability of a premature birth reports a negative bias term suggesting positive selection into private HI as before. The implied ratio is at the most 0.029 which suggests that SOU has to be only 2.9% of SOO to fully explain the estimated beneficial effect of private HI on this measure of infant health.

The next step is to turn to the bivariate probit analysis for the binary outcomes. These results (in Tables A4 and B4) are similar to those of the full sample, i.e., allowing for greater positive SOU (increasing ρ from 0 to 0.25 in the first three panels and decreasing ρ from 0 to -0.25 in Panel IV) paints an increasingly beneficial causal impact of public HI. This holds true for both the samples and for all the specifications. The only point of difference is that the estimated effect of private HI on the probability of normal Apgar score in the less poor sample remains statistically insignificant even under exogeneity.[25] These low-income results further support the hypotheses of Currie and Thomas (1995) and Ku (2007).

These low income samples are further restricted to infants who are continuously insured since birth to address potential measurement error arising from any lapse of coverage since birth until 9 months. The results hardly change since, as mentioned earlier, more than 94% of the samples do not lose coverage since birth. The results are presented in Appendices E and F, respectively for the lowest income sample and less poor sample.

[25] For households with income $\leq$ 130% of FPL: the estimated $\widehat{\rho}$ are consistent with private HI possessing better unobservables when using the normal birth weight. $\widehat{\rho}$=0.136, 0073, and 0.019 (imprecisely estimated) for Specifications (1), (2), and (3) respectively.

For households with income $\leq$ 185% of FPL: the estimated $\widehat{\rho}$ are consistent with private HI possessing better unobservables when using the normal birth weight with $\widehat{\rho}$ = 0.376, 0.327, and 0.310 (imprecisely estimated) for the three specifications. The imprecisely estimated $\widehat{\rho}$ for normal pregnancy are: 0.233, 0.058 for the first two specifications. The estimated $\widehat{\rho}$ for the other outcomes for both sub-samples and all the specifications are inconsistent with expectations based on the summary statistics or the prior results based on Tables A3 and B3.

6 Conclusion

While the benefits of coverage by public HI relative to no coverage at all are rarely disputed, the existing empirical literature on HI is virtually silent on the causal effects of private HI versus public HI among the insured. This study complements the few studies that have examined variations of this question in some salient ways.

Using newly available data from the ECLS-B, this analysis first, proves the much hypothesized positive selection (on both observables and unobservables) in to private HI among the insured. Second, it shows that the positive associations between private HI and the health outcomes demonstrate strong sensitivity to non-random selection; even a *modest* amount of positive selection in to private HI is sufficient to eliminate, and even reverse, the initial beneficial results for private HI. Thus, the results portray public HI in a better light than is usually admitted, after allowing for only a modest amount of non-random selection in to private HI. Intuitively, public HI may be more beneficial past the eligibility, application and enrollment phases - due to the coverage of most or all of the essential health care required for an infant at virtually no cost. These results hold for both the entire insured sample and the low income insured sub-samples for whom Medicaid/CHIP are more relevant as the programs exist today.

While future work should aim at obtaining point estimates of the effect of private HI relative to public HI, the results do have important implications for the national health reform legislation passed in March 2010. The recently enacted national health reform law does not provide for a public option in the proposed establishment of the state-level AHBE despite a heated debate over such an inclusion. Also, it shares many features of the Massachusetts reform, with its emphasis on attaining near-universal HI coverage regardless of income and age. As such, the full sample results offer insight into the likely impact of the national reform on infant health: substantial improvements in health outcomes for those who are in worse health to begin with. Thus, ignoring possible general equilibrium effects, it seems a public option may have a beneficial causal effect on a random infant from the entire population. Similarly, given the partial equilibrium analysis, it seems public HI has a beneficial effect on a random infant from the low income population.

References

[1] Almond, D. (2006), "Is the 1918 Influenza Pandemic Over? Long-term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population," *Journal of Political Economy*, 114, 672–712.

[2] Almond, D. and B. Mazumder (2005), "The 1918 Influenza Pandemic and Subsequent Health Outcomes: An Analysis of SIPP Data," *American Economic Review: Papers and Proceedings*, 95, 258–62.

[3] Altonji, J.G., T.E. Elder, and C.R. Taber (2005), "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools," *Journal of Political Economy*, 113, 151–184.

[4] Bhattacharya, J. and K. Bundorf (2009), "The Incidence of the Healthcare Costs of Obesity," *Journal of Health Economics,* 28, 649–658

[5] Bhattacharya, J., K. Bundorf, N. Pace, and N. Sood (2009), "Does Health Insurance Make You Fat?" National Bureau of Economic Research Working Paper #15163.

[6] Bitler, M.P. and J. Currie (2005), "Does WIC work? The effects of WIC on pregnancy and birth outcomes," *Journal of Policy Analysis and Management*, 24, 73–91.

[7] Black, S.E., P.J. Devereux, and K.G. Salvanes (2007), "From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes," *The Quarterly Journal of Economics*, MIT Press, 122, 409–439.

[8] Blewett, L.A. and K.T. Call (2007), "Revisiting Crowd-Out," *The Synthesis Program Robert Wood Johnson Foundation* www.policysyntheses.org, September.

[9] Breslau, N., G. Brown, J. Deldotto, S. Kumar, S. Ezhuthachan, P. Andreski, K. Hufnagle, and E. Peterson (1994), "A Gradient Relationship Between Low Birth Weight and IQ at Age Six Years," *Archives of Pédiatrie and Adolescent Medicine,* 148, 377–83.

[10] Brooks-Gunn, J., P. Klebanov, and G. Duncan (1996), "Ethnic Differences in Children's Intelligence Test Scores: Role of Economic Deprivation, Home Environment, and Maternal Characteristics," *Child Development,* 67, 396–408.

[11] Case, A. and C. Paxson (2010), "Causes and Consequences of Early Life Health," National Bureau of Economic Research Working Paper # 15637.

[12] Castelle, K. (1990), "In the Child's Best Interest: A Primer on the UN Convention on the Right of the Child," New York: Defence for Children International.

[13] Conley, D. and N. Bennett. (2000), "Is Biology Destiny? Birth Weight and Life Chances," *American Sociological Review*, 65, 458–67.

[14] Currie, J. and J. Grogger (2002), "Medicaid Expansions and Welfare Contractions: Offsetting Effects on Prenatal Care and Infant Health?" *Journal of Health Economics,* 21, 313–335.

[15] Currie, J. and J. Gruber, (1996a), "Saving Babies: The Efficacy and Cost of Recent Changes in the Medicaid Eligibility of Pregnant Women," *Journal of Political Economy*, 104, 1263–1296.

[16] Currie J and J. Gruber (1996b), "Health Insurance Eligibility, Utilization of Medical Care and Child Health," *The Quarterly Journal of Economics*, CXI:431–66.

[17] Currie J. and J. Gruber (1997), "The Technology of Birth: Health Insurance, Medical Interventions and Infant Health," National Bureau of Economic Research Working Paper # 5985.

[18] Currie, J. and R. Hyson (1999), "Is the Impact of Health Problems Cushioned by Socioeconomic Status? The Case of Low Birth Weight," *American Economic Review*, 89, 245–50.

[19] Currie, J. and E. Moretti (2007), "Biology as Destiny? Short and Long-Run Determinants of Intergenerational Transmission of Birth Weight," *Journal of Labor Economics,* 25, 231–64.

[20] Currie, J. and D. Thomas (1995), "Medical Care for Children: Public Health Insurance, Private Insurance, and Racial Differences in Utilization," *Journal of Human Resources*, XXX, 135–62.

[21] Currie, J., J. Gruber, and M. Fischer (1995), "Physician Payments and Infant Mortality: Evidence from Medicaid Fee Policy," *American Economic Review*, 85, Papers and Proceedings of the Hundredth and Seventh Annual Meeting of the American Economic Association Washington, DC, January 6–8, 1995 (May, 1995), 106–111.

[22] Currie, J., M. Stabile, P. Manivong, and L. L. Roos (2010), "Child Health and Young Adult Outcomes," *Journal of Human Resources*, 45, 517–548, Summer.

[23] Dafny, L. and J. Gruber (2000), "Does Public Insurance Improve the Efficiency of Medical Care? Medicaid Expansions and Child Hospitalizations," National Bureau of Economic Research Working Paper #7555 (February).

[24] Davidoff, A. et al. (2000), "Medicaid-Eligible Children Who Don't Enroll: Health Status, Access to Care, and Implications for Medicaid Enrollment," *Inquiry*, 37, 203–218.

[25] Davis, K., C. Schoen, and K. Stremikis (2010), "How the Performance of the U.S. Health Care System Compares Internationally 2010 Update," The Commonwealth Fund, June.

[26] DeNavas-Walt, C., B.D. Proctor, and J.C. Smith (2009), "Income, Poverty, and Health Insurance Coverage in the United States: 2008," *U. S. Census Bureau, Current Population Reports, P60–236*, U.S. Government Printing Office, Washington D.C.

[27] DeNavas-Walt, C., B.D. Proctor, and J.C. Smith (2010), "Income, Poverty, and Health Insurance Coverage in the United States: 2009," *U. S. Census Bureau, Current Population Reports, P60-238*, U.S. Government Printing Office, Washington D.C.

[28] Duchovny, N. and L. Nelson (2007), "The State Children's Health Insurance Program," Washington, D.C.: Congressional Budget Office.

[29] Goldenberg, R.L. and J.F. Culhane (2007), "Low Birth Weight in the United States," *American Journal of Clinical Nutrition*, 85, 584S–590S, February.

[30] Hacker, J.S. (2008), "The Case for Public Plan Choice in National Health Reform- Key to Cost Control and Quality Coverage," Accessed January 2011, http://institute.ourfuture.org/report/2008125116/case-public-plan-choice-national-health-reform

[31] Hadley, J. and J. Holahan (2003/2004), "Is Health Care Spending Higher under Medicaid or Private Insurance?" *Inquiry*, 40, 323–42, Winter.

[32] Hanratty, M. (1996), "Canadian National Health Insurance and Infant Health," *American Economic Review*, 86, 276–84.

[33] Henderson, J.W. (2009), Confounding Factors, *Health Economics and Policy,* Chapter 11, 313–315.

[34] Hinrichs, P. (2010), "The Effects of Attending a Diverse College," *Economics of Education Review*, forthcoming.

[35] Johnson, R. C. and R. F. Schoeni (2007), "The Influence of Early-Life Events on Human Capital, Health Status, and Labor Market Outcomes Over the Life Course," PSC Research Report No. 07-616, January.

[36] Jung, J. and C. Tran (2010), "Market Inefficiency, Insurance Mandate and Welfare: U.S. Health Care Reform 2010," The University of New South Wales, Australian School of Business, School of Economics Discussion Paper: 2010/31.

[37] Kaestner, R., T. Joyce, and A. Racine (1999), "Does Publicly Provided Health Insurance Improve the Health of Low-Income Children in the United States," National Bureau of Economic Research Working Paper # 6887.

[38] Kaestner, R., T. Joyce, and A. Racine (2000), "Did Recent Expansions in Medicaid Narrow Socioeconomic Differences in Hospitalization Rates of Infants?" *Medical Care*, 38, 195–206, February.

[39] Kramer, M.S., F.C. Barros, K. Demissie, S. Liu, J. Kiely, and K. S. Joseph (2005), "Does Reducing Infant Mortality Depend on Preventing Low Birth Weight? An Analysis of Temporal Trends in the Americas," *Paediatric and Perinatal Epidemiology*, 19, 445–451, November.

[40] Kolstad, J.T. and A.E. Kowalski (2010), "The Impact of Health Care Reform on Hospital and Preventive Care Evidence from Massachusetts," National Bureau of Economic Research Working Paper # 16012.

[41] Ku, L. (2007), "Comparing Public Health Insurance and Private Health Insurance for Children," *Center on Budget and Policy Priorities*, May 11.

[42] Lawlor, D., H. Clark, G. D. Smith, and D. Leon (2006), "Intrauterine Growth and Intelligence Within Sibling Pairs: Findings from the Aberdeen Children of the 1950s Cohort," *Pediatrics,* 117, 894–902.

[43] Levy, H. and D. Meltzer (2008), "The Impact of Health Insurance on Health," *Annual Review of Public Health*, 29, 399–409.

[44] McDonough, J.E. et al. (2008), "Massachusetts Health Reform Implementation: Major Progress And Future Challenges," *Health Affairs*, 27, 285–297

[45] Mitchell, J.and R. Schurman (1984), "Access to Private Obstetrics/Gynecology Services Under Medicaid," *Medical Care,* 22, 1026–37.

[46] Millimet, D.L., M. Husain and R. Tchernis (2010), "School Nutrition Programs and the Incidence of Childhood Obesity," *Journal of Human Resources*, 45, 640–654.

[47] O'Brien, M. J. et al. (2000), "State Experiences with Cost-Sharing Mechanisms in Children's Health Insurance Expansions," *The Commonwealth Fund*, May.

[48] Oreopoulos, P., M. Stabile, L. Roos, and R. Walld (2008), "The Short, Medium, and Long Term Effects of Poor Infant Health," *Journal of Human Resources,* 43, 88–138.

[49] Royer, H. (2005), "Separated at Girth: Estimating the Long-Run and Intergenerational Effects of Birthweight Using Twins," Ford School of Public Policy. Ann Arbor, MI: University of Michigan.

[50] Shore-Sheppard, L. (2003), "Expanding Public Health Insurance for Children: Medicaid and the State Children's Health Insurance Program," *Changing Welfare* by Rachel A. Gordon and Herbert J. Walberg, Chapter 5.

[51] U.S. National Commission on the International Year of the Child, Report to the President (Washington, D.C.: GPO, 1980).

[52] Zycher, B. (2007), "Comparing Public Health Insurance and Private Health Insurance: Would A Single-Payer System Save Enough to Cover the Uninsured?" *Medical Progress Report Number 5*, Center for Medical Progress at the Manhattan Institute, October.

Table 1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	p-value
Private Health Insurance (1 = Yes)	7850	0.540	0.498		
Child's Health Indicators					
Height (in centimeters)	7800	73.087	3.975	-0.017	0.855
Weight (in kilograms)	7650	9.581	1.667	-0.018	0.630
Five Minute APGAR Score	6250	8.942	0.617	0.016	0.299
Five Minute APGAR Score ≥ 7 (1 = Yes)	6250	0.989	0.102	0.006	0.032
Normal Birth Weight (1 = Yes)	7850	0.940	0.238	0.038	0.000
Number of Gestation Weeks	7750	38.841	2.379	0.226	0.000
Number of Gestation Weeks 38 - 42 (1 = Yes)	7750	0.778	0.416	0.066	0.000
Number of Gestation Weeks ≤ 33 (1 = Yes)	7750	0.027	0.163	-0.018	0.000
Controls					
Age (in months)	7850	10.445	1.909	-0.109	0.012
Gender (1 = boy)	7850	0.517	0.500	0.012	0.286
White (1 = Yes)	7850	0.543	0.498	0.341	0.000
Black (1 = Yes)	7850	0.139	0.346	-0.156	0.000
Hispanic (1 = Yes)	7850	0.244	0.429	-0.197	0.000
Asian (1 = Yes)	7850	0.028	0.165	0.023	0.000
Urbanized Area (1 = Yes)	7850	0.731	0.444	0.104	0.000
Urbanized Cluster (1 = Yes)	7850	0.124	0.330	-0.042	0.000
Northeast (1 = Yes)	7850	0.169	0.375	0.044	0.000
Midwest (1 = Yes)	7850	0.228	0.419	0.051	0.000
South (1 = Yes)	7850	0.367	0.482	-0.103	0.000
West (1 = Yes)	7850	0.237	0.425	0.008	0.419
Household Socioeconomic Status (SES)	7850	-0.067	0.820	1.053	0.000
Household SES Quintile 1 (1 = Yes)	7850	0.193	0.395	-0.365	0.000
Household SES Quintile 2 (1 = Yes)	7850	0.199	0.399	-0.205	0.000
Household SES Quintile 3 (1 = Yes)	7850	0.202	0.402	0.008	0.373
Household SES Quintile 4 (1 = Yes)	7850	0.200	0.400	0.213	0.000
Household SES Quintile 5 (1 = Yes)	7850	0.206	0.404	0.349	0.000
Household Size	7850	4.283	1.438	-0.427	0.000
Parents are Married (1 = Yes)	7850	0.666	0.472	0.474	0.000
Mother's Age	7850	28.266	6.200	5.474	0.000
Mother's Age (1 = Missing)	7850	0.005	0.073	-0.011	0.000
Father's Age	7850	31.799	5.848	3.088	0.000
Father's Age (1 = Missing)	7850	0.124	0.330	-0.216	0.000
Mother's Weight (in kilograms)	7850	71.417	16.719	-1.954	0.000
Mother's Weight (1 = Missing)	7850	0.195	0.396	-0.009	0.297
Mother's Education = High School (1 = Yes)	7850	0.293	0.455	-0.171	0.000
Mother's Education = Some College (1 = Yes)	7850	0.265	0.441	0.097	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	7850	0.154	0.361	0.219	0.000
Mother's Education = Advanced College Degree (1 = Yes)	7850	0.095	0.293	0.163	0.000
Mother's Education (1 = Missing)	7850	0.005	0.068	-0.010	0.000
Father's Education = High School (1 = Yes)	7850	0.283	0.451	-0.148	0.000
Father's Education = Some College (1 = Yes)	7850	0.234	0.423	0.117	0.000
Father's Education = Bachelor's Degree (1 = Yes)	7850	0.144	0.352	0.206	0.000
Father's Education = Advanced College Degree (1 = Yes)	7850	0.105	0.307	0.169	0.000
Father's Education (1 = Missing)	7850	0.025	0.155	-0.044	0.000

NOTES: The sample includes only 9-month old insured children with either private coverage, Medicaid or CHIP. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 7850. Sample sizes are rounded to the nearest 50 by requirement.

Table 2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	-0.000	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
II. Weight of Child				
Private HI	-0.001	0.001	0.001	0.001
	(0.005)	(0.007)	(0.007)	(0.007)
III. Five Minute APGAR Score				
Private HI	0.016	0.006	0.007	0.006
	(0.018)	(0.030)	(0.031)	(0.031)
IV. Number of Gestation Weeks				
Private HI	0.007*	0.006*	0.006*	0.007*
	(0.002)	(0.002)	(0.002)	(0.002)
V. Probability of Normal Birth Weight				
Private HI	0.319*	0.174*	0.180*	0.184*
	(0.034)	(0.048)	(0.049)	(0.049)
	[0.038]	[0.019]	[0.020]	[0.020]
VI. Probability of Normal Pregnancy				
Private HI	0.222*	0.157*	0.170*	0.175*
	(0.039)	(0.055)	(0.055)	(0.055)
	[0.066]	[0.047]	[0.050]	[0.052]
VII. Probability of Premature Birth				
Private HI	-0.285*	-0.160†	-0.175†	-0.182†
	(0.053)	(0.070)	(0.071)	(0.072)
	[-0.018]	[-0.009]	[-0.009]	[-0.010]
VIII. Probability of Normal APGAR Score				
Private HI	0.199†	0.105	0.122	0.127
	(0.099)	(0.155)	(0.151)	(0.151)
	[0.006]	[0.002]	[0.002]	[0.002]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the sample means. Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 3 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates

Table 3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio
I. Continuous Outcome Variables									
Height of Child	-0.001	0.001 (0.002)	-0.864	-0.001	0.001 (0.002)	-0.841	-0.001	0.001 (0.002)	-0.839
Weight of Child	-0.004	0.001 (0.007)	-0.357	-0.002	0.001 (0.007)	-0.367	-0.002	0.001 (0.007)	-0.364
Five Minute APGAR Score	1.380	0.006 (0.030)	0.004	1.162	0.007 (0.031)	0.006	1.100	0.006 (0.031)	0.006
Number of Gestation Weeks	0.519	0.006* (0.002)	0.012	0.431	0.006* (0.002)	0.015	0.392	0.007* (0.002)	0.017
II. Binary Outcome Variables									
Probability of Normal Birth Weight	7.821	0.021* (0.006)	0.003	6.300	0.022* (0.006)	0.003	5.463	0.022* (0.006)	0.004
Probability of Normal APGAR Score	1.519	0.002 (0.005)	0.001	1.496	0.003 (0.005)	0.002	1.084	0.003 (0.005)	0.002
Probability of Normal Pregnancy	9.805	0.046* (0.016)	0.005	8.184	0.050* (0.016)	0.006	7.266	0.051* (0.016)	0.007
Probability of Premature Birth	-7.066	-0.010† (0.004)	0.001	-4.905	-0.010† (0.004)	0.002	-4.251	-0.011† (0.004)	0.002

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table 2.

Table 4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						Specification 2						Specification 3					
	ρ = 0	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**
I. Probability of Normal Birthweight																		
Private HI	0.174*	0.089‡	0.003	-0.082‡	-0.168*	-0.255*	0.180*	0.095‡	0.010	-0.076	-0.161*	-0.247*	0.184*	0.099†	0.014	-0.072	-0.158*	-0.244*
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
	[0.011]	[0.005]	[0.000]	[-0.004]	[-0.008]	[-0.012]	[0.011]	[0.006]	[0.001]	[-0.004]	[-0.008]	[-0.011]	[0.011]	[0.006]	[0.001]	[-0.004]	[-0.007]	[-0.011]
II. Probability of Normal Pregnancy																		
Private HI	0.157*	0.072	-0.013	-0.099‡	-0.184*	-0.270*	0.170*	0.085	-0.001	-0.086	-0.171*	-0.257*	0.175*	0.090	0.005	-0.081	-0.167*	-0.253*
	(0.055)	(0.055)	(0.055)	(0.054)	(0.054)	(0.054)	(0.055)	(0.055)	(0.055)	(0.055)	(0.054)	(0.054)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.054)
	[0.026]	[0.012]	[-0.002]	[-0.015]	[-0.028]	[-0.039]	[0.028]	[0.014]	[-0.000]	[-0.013]	[-0.025]	[-0.037]	[0.029]	[0.015]	[0.001]	[-0.012]	[-0.025]	[-0.036]
III. Probability of Normal APGAR Score																		
Private HI	0.105	0.018	-0.069	-0.156	-0.244	-0.333†	0.122	0.036	-0.051	-0.137	-0.224	-0.312†	0.127	0.040	-0.046	-0.133	-0.221	-0.309†
	(0.155)	(0.156)	(0.156)	(0.156)	(0.157)	(0.158)	(0.151)	(0.152)	(0.152)	(0.153)	(0.153)	(0.154)	(0.151)	(0.151)	(0.152)	(0.152)	(0.153)	(0.153)
	[0.001]	[0.000]	[-0.001]	[-0.001]	[-0.002]	[-0.002]	[0.001]	[0.000]	[-0.000]	[-0.001]	[-0.002]	[-0.002]	[0.001]	[0.000]	[-0.000]	[-0.001]	[-0.002]	[-0.002]
	Specification 1						Specification 2						Specification 3					
	ρ = 0	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**
IV. Probability of Premature Birth																		
Private HI	-0.160†	-0.074	0.011	0.097	0.184*	0.271*	-0.175†	-0.090	-0.005	0.081	0.167†	0.253*	-0.182†	-0.097	-0.012	0.074	0.160†	0.246*
	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.072)	(0.072)	(0.072)	(0.072)	(0.072)	(0.072)
	[-0.005]	[-0.002]	[0.000]	[0.002]	[0.004]	[0.006]	[-0.005]	[-0.003]	[-0.000]	[0.002]	[0.004]	[0.005]	[-0.005]	[-0.003]	[-0.000]	[0.002]	[0.003]	[0.005]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table 2.

Appendix A

Table A1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	Private HI - Public HI p-value
Private Health Insurance (1 = Yes)	2950	0.132	0.339		
Child's Health Indicators					
Height (in centimeters)	2900	72.931	4.078	0.029	0.895
Weight (in kilograms)	2850	9.521	1.688	0.081	0.385
Five Minute APGAR Score	2350	8.920	0.682	-0.088	0.040
Five Minute APGAR Score ≥ 7 (1 = Yes)	2350	0.986	0.118	-0.001	0.942
Normal Birth Weight (1 = Yes)	2950	0.922	0.269	0.018	0.221
Number of Gestation Weeks	2900	38.720	2.656	0.110	0.451
Number of Gestation Weeks 38 - 42 (1 = Yes)	2900	0.739	0.439	0.033	0.166
Number of Gestation Weeks ≤ 33 (1 = Yes)	2900	0.037	0.189	-0.017	0.104
Controls					
Age (in months)	2950	10.474	2.009	0.132	0.229
Gender (1 = boy)	2950	0.495	0.500	-0.024	0.384
White (1 = Yes)	2950	0.329	0.470	0.125	0.000
Black (1 = Yes)	2950	0.240	0.427	-0.114	0.000
Hispanic (1 = Yes)	2950	0.363	0.481	-0.030	0.244
Asian (1 = Yes)	2950	0.017	0.129	0.022	0.001
Urbanized Area (1 = Yes)	2950	0.678	0.467	0.044	0.081
Urbanized Cluster (1 = Yes)	2950	0.148	0.355	-0.017	0.393
Northeast (1 = Yes)	2950	0.139	0.346	-0.011	0.571
Midwest (1 = Yes)	2950	0.194	0.396	0.002	0.924
South (1 = Yes)	2950	0.401	0.490	-0.058	0.030
West (1 = Yes)	2950	0.266	0.442	0.067	0.006
Household Socioeconomic Status (SES)	2950	-0.791	0.493	0.380	0.000
Household SES Quintile 1 (1 = Yes)	2950	0.509	0.500	-0.338	0.000
Household SES Quintile 2 (1 = Yes)	2950	0.312	0.463	0.121	0.000
Household SES Quintile 3 (1 = Yes)	2950	0.133	0.340	0.118	0.000
Household SES Quintile 4 (1 = Yes)	2950	0.041	0.199	0.082	0.000
Household SES Quintile 5 (1 = Yes)	2950	0.005	0.072	0.017	0.000
Household Size	2950	4.683	1.746	0.207	0.030
Parents are Married (1 = Yes)	2950	0.418	0.493	0.281	0.000
Mother's Age	2950	25.488	5.895	2.486	0.000
Mother's Age (1 = Missing)	2950	0.008	0.088	-0.008	0.103
Father's Age	2950	30.353	5.559	1.224	0.000
Father's Age (1 = Missing)	2950	0.252	0.434	-0.155	0.000
Mother's Weight (in kilograms)	2950	72.680	17.355	-0.806	0.393
Mother's Weight (1 = Missing)	2950	0.202	0.402	-0.020	0.348
Mother's Education = High School (1 = Yes)	2950	0.380	0.485	0.005	0.860
Mother's Education = Some College (1 = Yes)	2950	0.185	0.389	0.108	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	2950	0.025	0.155	0.055	0.000
Mother's Education = Advanced College Degree (1 = Yes)	2950	0.007	0.084	0.005	0.277
Mother's Education (1 = Missing)	2950	0.007	0.081	-0.007	0.141
Father's Education = High School (1 = Yes)	2950	0.366	0.482	0.046	0.078
Father's Education = Some College (1 = Yes)	2950	0.150	0.357	0.077	0.000
Father's Education = Bachelor's Degree (1 = Yes)	2950	0.028	0.164	0.058	0.000
Father's Education = Advanced College Degree (1 = Yes)	2950	0.014	0.117	0.036	0.000
Father's Education (1 = Missing)	2950	0.051	0.220	-0.037	0.002

NOTES: The sample includes only 9-month old insured children from households with income less than 130% of the FPL. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 2950. Sample sizes are rounded to the nearest 50 by requirement.

Table A2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	0.000	-0.001	-0.001	-0.001
	(0.004)	(0.003)	(0.003)	(0.003)
II. Weight of Child				
Private HI	0.008	0.012	0.012	0.011
	(0.012)	(0.012)	(0.012)	(0.012)
III. Five Minute APGAR Score				
Private HI	-0.088	-0.081	-0.082	-0.079
	(0.055)	(0.065)	(0.065)	(0.065)
IV. Number of Gestation Weeks				
Private HI	0.003	0.002	0.003	0.003
	(0.004)	(0.004)	(0.004)	(0.004)
V. Probability of Normal Birth Weight				
Private HI	0.131	0.084	0.096	0.102
	(0.081)	(0.088)	(0.090)	(0.091)
	[0.018]	[0.011]	[0.012]	[0.013]
VI. Probability of Normal Pregnancy				
Private HI	0.105	0.105	0.115	0.118
	(0.093)	(0.099)	(0.099)	(0.100)
	[0.033]	[0.033]	[0.036]	[0.037]
VII. Probability of Premature Birth				
Private HI	-0.247†	-0.227‡	-0.254†	-0.270†
	(0.110)	(0.126)	(0.129)	(0.131)
	[-0.017]	[-0.013]	[-0.013]	[-0.013]
VIII. Probability of Normal APGAR Score				
Private HI	-0.015	-0.060	-0.058	-0.063
	(0.229)	(0.254)	(0.255)	(0.255)
	[-0.001]	[-0.001]	[-0.001]	[-0.001]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Sample includes 9 month old infants from households with income less than 130% of the FPL. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the sample means. Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 3 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates.

Table A3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio
I. Continuous Outcome Variables									
Height of Child	0.003	-0.001 (0.003)	-0.474	0.003	-0.001 (0.003)	-0.483	0.003	-0.001 (0.003)	-0.472
Weight of Child	-0.011	0.012 (0.012)	-1.072	-0.009	0.012 (0.012)	-1.286	-0.007	0.011 (0.012)	-1.516
Five Minute APGAR Score	-0.571	-0.081 (0.065)	0.142	-0.609	-0.082 (0.065)	0.134	-0.647	-0.079 (0.065)	0.121
Number of Gestation Weeks	0.059	0.002 (0.004)	0.040	0.044	0.003 (0.004)	0.058	0.032	0.003 (0.004)	0.090
II. Binary Outcome Variables									
Probability of Normal Birth Weight	1.263	0.010 (0.011)	0.008	0.734	0.013 (0.011)	0.018	0.608	0.014 (0.011)	0.023
Probability of Normal APGAR Score	0.161	-0.003 (0.010)	-0.021	0.062	-0.003 (0.011)	-0.048	0.021	-0.003 (0.011)	-0.153
Probability of Normal Pregnancy	0.725	0.030 (0.030)	0.042	0.511	0.033 (0.030)	0.065	0.455	0.034 (0.030)	0.075
Probability of Premature Birth	-1.154	-0.014‡ (0.008)	0.012	-0.694	-0.016† (0.008)	0.024	-0.572	-0.017† (0.008)	0.029

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table A2.

Table A4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						**Specification 2**						**Specification 3**					
	ρ = 0	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**
I. Probability of Normal Birth Weight																		
Private HI	0.084	-0.008	-0.101	-0.196†	-0.292*	-0.391*	0.096	0.005	-0.088	-0.183†	-0.279*	-0.377*	0.102	0.011	-0.082	-0.176‡	-0.272*	-0.370*
	(0.088)	(0.088)	(0.089)	(0.089)	(0.089)	(0.089)	(0.090)	(0.090)	(0.090)	(0.091)	(0.091)	(0.091)	(0.091)	(0.091)	(0.091)	(0.092)	(0.092)	(0.092)
	[0.001]	[-0.000]	[-0.001]	[-0.002]	[-0.003]	[-0.003]	[0.001]	[0.000]	[-0.001]	[-0.002]	[-0.002]	[-0.003]	[0.001]	[0.000]	[-0.001]	[-0.002]	[-0.002]	[-0.003]
II. Probability of Normal Pregnancy																		
Private HI	0.105	0.014	-0.078	-0.170‡	-0.264*	-0.358*	0.115	0.024	-0.068	-0.16	-0.254†	-0.348*	0.118	0.027	-0.065	-0.157	-0.250†	-0.344*
	(0.099)	(0.099)	(0.099)	(0.098)	(0.098)	(0.097)	(0.099)	(0.099)	(0.099)	(0.099)	(0.099)	(0.098)	(0.100)	(0.100)	(0.100)	(0.100)	(0.099)	(0.099)
	[0.003]	[0.000]	[-0.002]	[-0.005]	[-0.007]	[-0.009]	[0.004]	[0.001]	[-0.002]	[-0.004]	[-0.007]	[-0.009]	[0.004]	[0.001]	[-0.002]	[-0.004]	[-0.006]	[-0.009]
III. Probability of Normal APGAR Score																		
Private HI	-0.060	-0.157	-0.255	-0.356	-0.460‡	-0.567†	-0.058	-0.153	-0.251	-0.352	-0.455‡	-0.560†	-0.063	-0.159	-0.257	-0.357	-0.460‡	-0.566†
	(0.254)	(0.255)	(0.256)	(0.257)	(0.257)	(0.257)	(0.255)	(0.256)	(0.257)	(0.258)	(0.258)	(0.258)	(0.255)	(0.256)	(0.257)	(0.258)	(0.258)	(0.258)
	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]
	Specification 1						**Specification 2**						**Specification 3**					
	ρ = 0	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**
IV. Probability of Premature Birth																		
Private HI	-0.227‡	-0.134	-0.039	0.058	0.157	0.260†	-0.254†	-0.162	-0.068	0.028	0.126	0.227‡	-0.270†	-0.178	-0.085	0.011	0.109	0.209
	(0.126)	(0.126)	(0.127)	(0.127)	(0.128)	(0.128)	(0.129)	(0.130)	(0.131)	(0.131)	(0.132)	(0.132)	(0.131)	(0.132)	(0.133)	(0.133)	(0.133)	(0.134)
	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.001]	[0.001]	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.000]	[0.001]	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.000]	[0.000]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table A2.

Appendix B

Table B1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	p-value
Private Health Insurance (1 = Yes)	3900	0.202	0.402		
Child's Health Indicators					
Height (in centimeters)	3850	72.992	4.089	-0.003	0.986
Weight (in kilograms)	3800	9.567	1.732	0.100	0.153
Five Minute APGAR Score	3150	8.930	0.670	0.001	0.976
Five Minute APGAR Score ≥ 7 (1 = Yes)	3150	0.987	0.113	0.006	0.280
Normal Birth Weight (1 = Yes)	3900	0.923	0.267	0.017	0.109
Number of Gestation Weeks	3850	38.744	2.577	0.103	0.322
Number of Gestation Weeks 38 - 42 (1 = Yes)	3850	0.745	0.436	0.037	0.034
Number of Gestation Weeks ≤ 33 (1 = Yes)	3850	0.034	0.180	-0.012	0.106
Controls					
Age (in months)	3900	10.469	2.005	0.128	0.108
Gender (1 = boy)	3900	0.500	0.500	-0.015	0.458
White (1 = Yes)	3900	0.366	0.482	0.160	0.000
Black (1 = Yes)	3900	0.213	0.410	-0.112	0.000
Hispanic (1 = Yes)	3900	0.348	0.476	-0.065	0.001
Asian (1 = Yes)	3900	0.019	0.135	0.020	0.000
Urbanized Area (1 = Yes)	3900	0.676	0.468	0.052	0.005
Urbanized Cluster (1 = Yes)	3900	0.150	0.357	-0.021	0.131
Northeast (1 = Yes)	3900	0.141	0.348	-0.004	0.783
Midwest (1 = Yes)	3900	0.198	0.399	0.007	0.670
South (1 = Yes)	3900	0.403	0.490	-0.073	0.000
West (1 = Yes)	3900	0.258	0.438	0.070	0.000
Household Socioeconomic Status (SES)	3900	-0.661	0.533	0.450	0.000
Household SES Quintile 1 (1 = Yes)	3900	0.403	0.491	-0.334	0.000
Household SES Quintile 2 (1 = Yes)	3900	0.326	0.469	0.034	0.070
Household SES Quintile 3 (1 = Yes)	3900	0.184	0.388	0.154	0.000
Household SES Quintile 4 (1 = Yes)	3900	0.071	0.256	0.093	0.000
Household SES Quintile 5 (1 = Yes)	3900	0.016	0.124	0.053	0.000
Household Size	3900	4.636	1.673	0.107	0.108
Parents are Married (1 = Yes)	3900	0.470	0.499	0.326	0.000
Mother's Age	3900	25.848	5.868	3.119	0.000
Mother's Age (1 = Missing)	3900	0.008	0.088	-0.009	0.009
Father's Age	3900	30.428	5.681	1.363	0.000
Father's Age (1 = Missing)	3900	0.217	0.413	-0.186	0.000
Mother's Weight (in kilograms)	3900	72.894	17.824	0.161	0.821
Mother's Weight (1 = Missing)	3900	0.195	0.396	-0.012	0.450
Mother's Education = High School (1 = Yes)	3900	0.388	0.487	0.005	0.809
Mother's Education = Some College (1 = Yes)	3900	0.213	0.409	0.134	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	3900	0.034	0.180	0.048	0.000
Mother's Education = Advanced College Degree (1 = Yes)	3900	0.011	0.105	0.028	0.000
Mother's Education (1 = Missing)	3900	0.007	0.081	-0.008	0.017
Father's Education = High School (1 = Yes)	3900	0.364	0.481	0.037	0.056
Father's Education = Some College (1 = Yes)	3900	0.174	0.379	0.105	0.000
Father's Education = Bachelor's Degree (1 = Yes)	3900	0.036	0.187	0.051	0.000
Father's Education = Advanced College Degree (1 = Yes)	3900	0.019	0.135	0.046	0.000
Father's Education (1 = Missing)	3900	0.043	0.203	-0.040	0.000

NOTES: The sample includes only 9-month old insured children from households with income less than 185% of the FPL. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 3900. Sample sizes are rounded to the nearest 50 by requirement.

Table B2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	-0.000	-0.002	-0.002	-0.002
	(0.003)	(0.002)	(0.002)	(0.002)
II. Weight of Child				
Private HI	0.007	0.007	0.006	0.006
	(0.010)	(0.010)	(0.010)	(0.010)
III. Five Minute APGAR Score				
Private HI	0.001	0.008	0.009	0.011
	(0.034)	(0.043)	(0.044)	(0.044)
IV. Number of Gestation Weeks				
Private HI	0.003	0.003	0.003	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
V. Probability of Normal Birth Weight				
Private HI	0.125†	0.087	0.088	0.090
	(0.061)	(0.066)	(0.067)	(0.068)
	[0.017]	[0.011]	[0.011]	[0.011]
VI. Probability of Normal Pregnancy				
Private HI	0.118‡	0.118	0.127‡	0.133‡
	(0.069)	(0.075)	(0.075)	(0.076)
	[0.037]	[0.037]	[0.039]	[0.041]
VII. Probability of Premature Birth				
Private HI	-0.173‡	-0.133	-0.158	-0.169
	(0.095)	(0.101)	(0.103)	(0.104)
	[-0.012]	[-0.008]	[-0.009]	[-0.009]
VIII. Probability of Normal APGAR Score				
Private HI	0.191	0.109	0.126	0.145
	(0.181)	(0.208)	(0.209)	(0.214)
	[0.006]	[0.002]	[0.002]	[0.002]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Sample includes 9 month old infants from households with income less than 185% of the FPL. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the sample means. Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 3 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates.

Table B3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	**τ**	**Implied Ratio**	**Cov(ε,γ)÷ Var(γ)**	**τ**	**Implied Ratio**	**Cov(ε,γ)÷ Var(γ)**	**τ**	**Implied Ratio**
I. Continuous Outcome Variables									
Height of Child	0.003	-0.002 (0.002)	-0.649	0.003	-0.002 (0.002)	-0.655	0.003	-0.002 (0.002)	-0.659
Weight of Child	0.014	0.007 (0.010)	0.509	0.018	0.006 (0.010)	0.363	0.018	0.006 (0.010)	0.359
Five Minute APGAR Score	-0.327	0.008 (0.043)	-0.023	-0.392	0.009 (0.044)	-0.022	-0.489	0.011 (0.044)	-0.022
Number of Gestation Weeks	0.053	0.003 (0.003)	0.057	0.034	0.003 (0.003)	0.097	0.020	0.004 (0.003)	0.185
II. Binary Outcome Variables									
Probability of Normal Birth Weight	1.184	0.012 (0.009)	0.010	0.876	0.013 (0.009)	0.015	0.719	0.013 (0.009)	0.019
Probability of Normal APGAR Score	0.651	0.003 (0.006)	0.004	0.549	0.003 (0.006)	0.005	0.268	0.003 (0.006)	0.012
Probability of Normal Pregnancy	0.931	0.035 (0.023)	0.038	0.657	0.038‡ (0.023)	0.058	0.533	0.040‡ (0.023)	0.074
Probability of Premature Birth	-1.572	-0.007 (0.006)	0.005	-1.014	-0.009 (0.006)	0.009	-0.740	-0.009 (0.006)	0.012

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table B2.

Table B4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						Specification 2						Specification 3					
	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25
I. Probability of Normal Birthweight																		
Private HI	0.087	-0.000	-0.088	-0.177*	-0.267*	-0.358*	0.088	0.001	-0.086	-0.175*	-0.264*	-0.355*	0.090	0.003	-0.084	-0.173†	-0.263*	-0.354*
	(0.066)	(0.067)	(0.067)	(0.067)	(0.067)	(0.067)	(0.067)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
	[0.002]	[-0.000]	[-0.001]	[-0.003]	[-0.004]	[-0.005]	[0.002]	[0.000]	[-0.001]	[-0.003]	[-0.004]	[-0.004]	[0.002]	[0.000]	[-0.001]	[-0.003]	[-0.003]	[-0.004]
II. Probability of Normal Pregnancy																		
Private HI	0.118	0.031	-0.055	-0.143‡	-0.231*	-0.319*	0.127‡	0.041	-0.046	-0.133‡	-0.221*	-0.309*	0.133‡	0.046	-0.040	-0.127‡	-0.215*	-0.304*
	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.074)	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.076)	(0.076)	(0.076)	(0.076)	(0.075)	(0.075)
	[0.006]	[0.001]	[-0.002]	[-0.006]	[-0.009]	[-0.012]	[0.006]	[0.002]	[-0.002]	[-0.006]	[-0.009]	[-0.012]	[0.006]	[0.002]	[-0.002]	[-0.005]	[-0.008]	[-0.011]
III. Probability of Normal APGAR Score																		
Private HI	0.109	0.019	-0.074	-0.169	-0.266	-0.366‡	0.126	0.036	-0.056	-0.151	-0.247	-0.347	0.145	0.055	-0.037	-0.132	-0.228	-0.328
	(0.208)	(0.210)	(0.211)	(0.212)	(0.214)	(0.215)	(0.209)	(0.210)	(0.212)	(0.213)	(0.214)	(0.215)	(0.214)	(0.216)	(0.217)	(0.218)	(0.219)	(0.220)
	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]
	Specification 1						Specification 2						Specification 3					
	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25
IV. Probability of Premature Birth																		
Private HI	-0.133	-0.046	0.044	0.135	0.227†	0.322*	-0.158	-0.071	0.018	0.108	0.200‡	0.293*	-0.169	-0.082	0.006	0.096	0.187‡	0.281*
	(0.101)	(0.101)	(0.102)	(0.102)	(0.102)	(0.102)	(0.103)	(0.103)	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)	(0.104)	(0.105)	(0.105)	(0.105)
	[-0.001]	[-0.000]	[0.000]	[0.001]	[0.001]	[0.002]	[-0.001]	[-0.001]	[0.000]	[0.001]	[0.001]	[0.001]	[-0.001]	[-0.001]	[0.000]	[0.001]	[0.001]	[0.001]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table B2.

Appendix C

Table C1. Amounts paid by Private HI and Medicaid to their respective beneficiaries aged 0 - 4 years: 2001 - 2007

	Private HI			Medicaid (including CHIP)		
Year	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
2001	1,284	821.95	109.01	1,042	719.96	116.88
2002	1,373	772.43	86.85	1,447	1255.35	474.47
2003	1,120	1202.92	147.94	1,501	915.56	105.15
2004	1,089	1259.41	220.47	1,514	804.93	107.96
2005	1,014	1162.85	112.04	1,503	1034.87	159.85
2006	1,010	1362.18	250.56	1,508	1144.28	387.75
2007	890	1232.92	191.61	1,272	1625.36	633.97

NOTES: Source: http://www.meps.ahrq.gov/mepsweb/data_stats/MEPSnetHC.jsp. All statistics are weighted using MEPS survey weights.

Appendix D

Table D1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	Private HI - Public HI p-value
Private Health Insurance (1 = Yes)	7400	0.554	0.497		
Child's Health Indicators					
Height (in centimeters)	7350	73.055	3.978	0.008	0.929
Weight (in kilograms)	7200	9.575	1.671	-0.028	0.472
Five Minute APGAR Score	5950	8.938	0.624	0.025	0.118
Five Minute APGAR Score ≥ 7 (1 = Yes)	5950	0.989	0.105	0.006	0.020
Normal Birth Weight (1 = Yes)	7400	0.939	0.239	0.040	0.000
Number of Gestation Weeks	7300	38.839	2.383	0.241	0.000
Number of Gestation Weeks 38 - 42 (1 = Yes)	7300	0.779	0.415	0.066	0.000
Number of Gestation Weeks ≤ 33 (1 = Yes)	7300	0.027	0.163	-0.018	0.000
Controls					
Age (in months)	7400	10.415	1.887	-0.111	0.012
Gender (1 = boy)	7400	0.517	0.500	0.014	0.242
White (1 = Yes)	7400	0.554	0.497	0.337	0.000
Black (1 = Yes)	7400	0.138	0.345	-0.160	0.000
Hispanic (1 = Yes)	7400	0.233	0.423	-0.188	0.000
Asian (1 = Yes)	7400	0.029	0.167	0.024	0.000
Urbanized Area (1 = Yes)	7400	0.728	0.445	0.117	0.000
Urbanized Cluster (1 = Yes)	7400	0.125	0.330	-0.048	0.000
Northeast (1 = Yes)	7400	0.167	0.373	0.055	0.000
Midwest (1 = Yes)	7400	0.234	0.423	0.047	0.000
South (1 = Yes)	7400	0.367	0.482	-0.115	0.000
West (1 = Yes)	7400	0.232	0.422	0.012	0.209
Household Socioeconomic Status (SES)	7400	-0.047	0.824	1.070	0.000
Household SES Quintile 1 (1 = Yes)	7400	0.189	0.391	-0.369	0.000
Household SES Quintile 2 (1 = Yes)	7400	0.192	0.394	-0.210	0.000
Household SES Quintile 3 (1 = Yes)	7400	0.201	0.401	0.008	0.393
Household SES Quintile 4 (1 = Yes)	7400	0.204	0.403	0.214	0.000
Household SES Quintile 5 (1 = Yes)	7400	0.213	0.410	0.357	0.000
Household Size	7400	4.263	1.423	-0.419	0.000
Parents are Married (1 = Yes)	7400	0.675	0.468	0.479	0.000
Mother's Age	7400	28.377	6.166	5.640	0.000
Mother's Age (1 = Missing)	7400	0.005	0.070	-0.011	0.000
Father's Age	7400	31.870	5.854	3.273	0.000
Father's Age (1 = Missing)	7400	0.123	0.328	-0.221	0.000
Mother's Weight (in kilograms)	7400	71.485	16.645	-2.150	0.000
Mother's Weight (1 = Missing)	7400	0.194	0.396	-0.007	0.418
Mother's Education = High School (1 = Yes)	7400	0.290	0.454	-0.181	0.000
Mother's Education = Some College (1 = Yes)	7400	0.267	0.442	0.094	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	7400	0.157	0.364	0.223	0.000
Mother's Education = Advanced College Degree (1 = Yes)	7400	0.099	0.298	0.168	0.000
Mother's Education (1 = Missing)	7400	0.004	0.066	-0.009	0.000
Father's Education = High School (1 = Yes)	7400	0.281	0.449	-0.155	0.000
Father's Education = Some College (1 = Yes)	7400	0.236	0.425	0.115	0.000
Father's Education = Bachelor's Degree (1 = Yes)	7400	0.148	0.355	0.211	0.000
Father's Education = Advanced College Degree (1 = Yes)	7400	0.110	0.312	0.173	0.000
Father's Education (1 = Missing)	7400	0.024	0.153	-0.043	0.000

NOTES: The sample includes only 9-month old insured children who have been continuously covered by either private HI, Medicaid or CHIP since birth. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 7400. Sample sizes are rounded to the nearest 50 by requirement.

Table D2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	0.000	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
II. Weight of Child				
Private HI	-0.002	-0.001	-0.002	-0.002
	(0.005)	(0.007)	(0.007)	(0.007)
III. Five Minute APGAR Score				
Private HI	0.025	0.022	0.022	0.021
	(0.019)	(0.032)	(0.033)	(0.033)
IV. Number of Gestation Weeks				
Private HI	0.007*	0.006*	0.006*	0.007*
	(0.002)	(0.002)	(0.002)	(0.002)
V. Probability of Normal Birth Weight				
Private HI	0.331*	0.198*	0.204*	0.209*
	(0.035)	(0.051)	(0.051)	(0.052)
	[0.040]	[0.022]	[0.023]	[0.023]
VI. Probability of Normal Pregnancy				
Private HI	0.221*	0.138†	0.151*	0.157*
	(0.040)	(0.057)	(0.057)	(0.057)
	[0.066]	[0.041]	[0.045]	[0.046]
VII. Probability of Premature Birth				
Private HI	-0.280*	-0.166†	-0.180†	-0.188†
	(0.055)	(0.074)	(0.075)	(0.076)
	[-0.018]	[-0.009]	[-0.010]	[-0.010]
VIII. Probability of Normal APGAR Score				
Private HI	0.217†	0.113	0.128	0.132
	(0.100)	(0.161)	(0.155)	(0.154)
	[0.006]	[0.002]	[0.003]	[0.003]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the means of the independent variables by using the (default) bivariate predicted probability Pr(depvar1=1, depvar2=1). Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 2 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates.

Table D3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio
I. Continuous Outcome Variables									
Height of Child	-0.001	0.002 (0.002)	-2.331	-0.001	0.002 (0.002)	-2.050	-0.001	0.002 (0.002)	-2.052
Weight of Child	-0.002	-0.001 (0.007)	0.651	-0.001	-0.002 (0.007)	1.601	-0.000	-0.002 (0.007)	4.349
Five Minute APGAR Score	1.729	0.022 (0.032)	0.013	1.452	0.022 (0.033)	0.015	1.381	0.021 (0.033)	0.015
Number of Gestation Weeks	0.629	0.006* (0.002)	0.010	0.527	0.006* (0.002)	0.012	0.471	0.007* (0.002)	0.014
II. Binary Outcome Variables									
Probability of Normal Birth Weight	7.814	0.024* (0.006)	0.003	6.389	0.025* (0.006)	0.004	5.608	0.026* (0.006)	0.005
Probability of Normal APGAR Score	1.784	0.002 (0.005)	0.001	1.721	0.003 (0.005)	0.002	1.199	0.003 (0.005)	0.002
Probability of Normal Pregnancy	10.003	0.040† (0.017)	0.004	8.416	0.044* (0.017)	0.005	7.607	0.045* (0.017)	0.006
Probability of Premature Birth	-7.051	-0.010† (0.005)	0.001	-5.056	-0.011† (0.005)	0.002	-4.323	-0.011† (0.005)	0.003

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table 1.

Table D4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						**Specification 2**						**Specification 3**					
	ρ = 0	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**
I. Probability of Normal Birthweight																		
Private HI	0.198*	0.113†	0.028	-0.058	-0.144*	-0.230*	0.204*	0.119†	0.034	-0.051	-0.137*	-0.223*	0.209*	0.124†	0.039	-0.046	-0.132†	-0.218*
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.050)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
	[0.013]	[0.007]	[0.002]	[-0.003]	[-0.007]	[-0.011]	[0.013]	[0.007]	[0.002]	[-0.003]	[-0.007]	[-0.011]	[0.014]	[0.008]	[0.002]	[-0.002]	[-0.007]	[-0.010]
II. Probability of Normal Pregnancy																		
Private HI	0.138†	0.053	-0.032	-0.117†	-0.202*	-0.288*	0.151*	0.067	-0.018	-0.103‡	-0.189*	-0.274*	0.157*	0.072	-0.013	-0.099‡	-0.184*	-0.270*
	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.056)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.056)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
	[0.024]	[0.009]	[-0.005]	[-0.019]	[-0.032]	[-0.043]	[0.026]	[0.011]	[-0.003]	[-0.017]	[-0.029]	[-0.041]	[0.027]	[0.012]	[-0.002]	[-0.016]	[-0.029]	[-0.041]
III. Probability of Normal APGAR Score																		
Private HI	0.113	0.027	-0.060	-0.147	-0.234	-0.323†	0.128	0.042	-0.044	-0.130	-0.216	-0.304‡	0.132	0.046	-0.041	-0.127	-0.215	-0.303‡
	(0.161)	(0.161)	(0.161)	(0.162)	(0.162)	(0.163)	(0.155)	(0.156)	(0.156)	(0.157)	(0.157)	(0.158)	(0.154)	(0.154)	(0.155)	(0.155)	(0.156)	(0.156)
	[0.001]	[0.000]	[-0.001]	[-0.001]	[-0.002]	[-0.002]	[0.002]	[0.000]	[-0.000]	[-0.001]	[-0.002]	[-0.002]	[0.001]	[0.000]	[-0.000]	[-0.001]	[-0.002]	[-0.002]
	Specification 1						**Specification 2**						**Specification 3**					
	ρ = 0	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**
IV. Probability of Premature Birth																		
Private HI	-0.166†	-0.080	0.005	0.091	0.177†	0.264*	-0.180†	-0.095	-0.010	0.075	0.161†	0.247*	-0.188†	-0.103	-0.018	0.067	0.153†	0.239*
	(0.074)	(0.074)	(0.074)	(0.074)	(0.074)	(0.074)	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)	(0.076)	(0.076)	(0.076)	(0.076)	(0.076)	(0.076)
	[-0.006]	[-0.003]	[0.000]	[0.002]	[0.004]	[0.006]	[-0.006]	[-0.003]	[-0.000]	[0.002]	[0.004]	[0.005]	[-0.006]	[-0.003]	[-0.000]	[0.002]	[0.003]	[0.005]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table 1.

Appendix E

Table E1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	Private HI - Public HI p-value
Private Health Insurance (1 = Yes)	2700	0.129	0.335		
Child's Health Indicators					
Height (in centimeters)	2650	72.870	4.096	0.087	0.712
Weight (in kilograms)	2600	9.507	1.692	0.063	0.519
Five Minute APGAR Score	2150	8.913	0.697	-0.093	0.045
Five Minute APGAR Score ≥ 7 (1 = Yes)	2150	0.985	0.123	-0.001	0.878
Normal Birth Weight (1 = Yes)	2700	0.919	0.272	0.017	0.282
Number of Gestation Weeks	2650	38.696	2.680	0.071	0.645
Number of Gestation Weeks 38 - 42 (1 = Yes)	2650	0.737	0.440	0.022	0.379
Number of Gestation Weeks ≤ 33 (1 = Yes)	2650	0.038	0.190	-0.016	0.145
Controls					
Age (in months)	2700	10.439	1.989	0.099	0.388
Gender (1 = boy)	2700	0.494	0.500	-0.005	0.860
White (1 = Yes)	2700	0.338	0.473	0.131	0.000
Black (1 = Yes)	2700	0.244	0.429	-0.121	0.000
Hispanic (1 = Yes)	2700	0.350	0.477	-0.024	0.390
Asian (1 = Yes)	2700	0.017	0.130	0.025	0.001
Urbanized Area (1 = Yes)	2700	0.667	0.471	0.052	0.053
Urbanized Cluster (1 = Yes)	2700	0.153	0.360	-0.028	0.177
Northeast (1 = Yes)	2700	0.129	0.335	-0.011	0.580
Midwest (1 = Yes)	2700	0.202	0.401	0.002	0.933
South (1 = Yes)	2700	0.407	0.491	-0.076	0.007
West (1 = Yes)	2700	0.262	0.440	0.085	0.001
Household Socioeconomic Status (SES)	2700	-0.795	0.494	0.379	0.000
Household SES Quintile 1 (1 = Yes)	2700	0.514	0.500	-0.324	0.000
Household SES Quintile 2 (1 = Yes)	2700	0.308	0.462	0.099	0.000
Household SES Quintile 3 (1 = Yes)	2700	0.130	0.336	0.115	0.000
Household SES Quintile 4 (1 = Yes)	2700	0.042	0.202	0.090	0.000
Household SES Quintile 5 (1 = Yes)	2700	0.006	0.074	0.020	0.000
Household Size	2700	4.661	1.730	0.232	0.019
Parents are Married (1 = Yes)	2700	0.421	0.494	0.278	0.000
Mother's Age	2700	25.473	5.849	2.671	0.000
Mother's Age (1 = Missing)	2700	0.008	0.087	-0.007	0.138
Father's Age	2700	30.369	5.573	1.754	0.000
Father's Age (1 = Missing)	2700	0.259	0.438	-0.149	0.000
Mother's Weight (in kilograms)	2700	72.770	17.127	-1.074	0.275
Mother's Weight (1 = Missing)	2700	0.200	0.400	-0.023	0.307
Mother's Education = High School (1 = Yes)	2700	0.383	0.486	-0.011	0.689
Mother's Education = Some College (1 = Yes)	2700	0.187	0.390	0.084	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	2700	0.023	0.150	0.066	0.000
Mother's Education = Advanced College Degree (1 = Yes)	2700	0.006	0.077	0.007	0.109
Mother's Education (1 = Missing)	2700	0.007	0.081	-0.006	0.173
Father's Education = High School (1 = Yes)	2700	0.370	0.483	0.055	0.047
Father's Education = Some College (1 = Yes)	2700	0.148	0.356	0.076	0.000
Father's Education = Bachelor's Degree (1 = Yes)	2700	0.025	0.157	0.041	0.000
Father's Education = Advanced College Degree (1 = Yes)	2700	0.015	0.121	0.040	0.000
Father's Education (1 = Missing)	2700	0.051	0.221	-0.034	0.007

NOTES: The sample includes only 9-month old children insured since birth from households with income less than 130% of the poverty threshold. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 2700. Sample sizes are rounded to the nearest 50 by requirement.

Table E2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	0.001	-0.001	-0.001	-0.001
	(0.004)	(0.003)	(0.003)	(0.003)
II. Weight of Child				
Private HI	0.007	0.012	0.012	0.011
	(0.012)	(0.012)	(0.012)	(0.012)
III. Five Minute APGAR Score				
Private HI	-0.093	-0.086	-0.088	-0.088
	(0.060)	(0.074)	(0.074)	(0.074)
IV. Number of Gestation Weeks				
Private HI	0.002	0.000	0.000	0.001
	(0.004)	(0.004)	(0.005)	(0.005)
V. Probability of Normal Birth Weight				
Private HI	0.120	0.073	0.074	0.078
	(0.086)	(0.093)	(0.095)	(0.095)
	[0.017]	[0.010]	[0.010]	[0.010]
VI. Probability of Normal Pregnancy				
Private HI	0.070	0.056	0.062	0.069
	(0.097)	(0.103)	(0.104)	(0.104)
	[0.022]	[0.018]	[0.020]	[0.022]
VII. Probability of Premature Birth				
Private HI	-0.229†	-0.209	-0.231‡	-0.240‡
	(0.116)	(0.136)	(0.140)	(0.140)
	[-0.016]	[-0.012]	[-0.013]	[-0.012]
VIII. Probability of Normal APGAR Score				
Private HI	-0.032	-0.084	-0.085	-0.091
	(0.232)	(0.261)	(0.260)	(0.262)
	[-0.001]	[-0.002]	[-0.002]	[-0.001]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Sample includes 9 month old infants from households with income less than 130% of the poverty threshold. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the means of the independent variables by using the (default) bivariate predicted probability Pr(depvar1=1, depvar2=1). Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 2 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates.

Table E3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio
I. Continuous Outcome Variables									
Height of Child	0.003	-0.001 (0.003)	-0.204	0.003	-0.001 (0.003)	-0.211	0.003	-0.001 (0.003)	-0.182
Weight of Child	-0.015	0.012 (0.012)	-0.779	-0.012	0.012 (0.012)	-0.948	-0.009	0.011 (0.012)	-1.183
Five Minute APGAR Score	-0.620	-0.086 (0.074)	0.138	-0.543	-0.088 (0.074)	0.162	-0.533	-0.088 (0.074)	0.165
Number of Gestation Weeks	0.075	0.000 (0.004)	0.007	0.067	0.000 (0.005)	0.007	0.050	0.001 (0.005)	0.018
II. Binary Outcome Variables									
Probability of Normal Birth Weight	1.231	0.009 (0.012)	0.007	0.910	0.010 (0.012)	0.011	0.731	0.011 (0.012)	0.015
Probability of Normal APGAR Score	0.159	-0.004 (0.012)	-0.028	0.054	-0.004 (0.012)	-0.074	0.225	-0.004 (0.012)	-0.019
Probability of Normal Pregnancy	0.919	0.016 (0.032)	0.017	0.785	0.018 (0.032)	0.022	0.631	0.020 (0.032)	0.031
Probability of Premature Birth	-1.165	-0.012 (0.008)	0.011	-0.865	-0.014‡ (0.008)	0.016	-0.704	-0.015‡ (0.009)	0.021

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table E2.

Table E4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						Specification 2						Specification 3					
	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25	ρ = 0	ρ = 0.05	ρ = 0.10	ρ = 0.15	ρ = 0.20	ρ = 0.25
I. Probability of Normal Birth Weight																		
Private HI	0.073	-0.019	-0.113	-0.208†	-0.305*	-0.404*	0.074	-0.018	-0.111	-0.206†	-0.303*	-0.401*	0.078	-0.014	-0.107	-0.202†	-0.298*	-0.396*
	(0.093)	(0.094)	(0.094)	(0.094)	(0.094)	(0.094)	(0.095)	(0.095)	(0.095)	(0.096)	(0.096)	(0.096)	(0.095)	(0.096)	(0.096)	(0.096)	(0.096)	(0.096)
	[0.001]	[-0.000]	[-0.001]	[-0.002]	[-0.003]	[-0.003]	[0.001]	[-0.000]	[-0.001]	[-0.002]	[-0.003]	[-0.003]	[0.001]	[-0.000]	[-0.001]	[-0.002]	[-0.002]	[-0.003]
II. Probability of Normal Pregnancy																		
Private HI	0.056	-0.035	-0.128	-0.220†	-0.314*	-0.408*	0.062	-0.029	-0.121	-0.214†	-0.307*	-0.401*	0.069	-0.022	-0.114	-0.207†	-0.300*	-0.394*
	(0.103)	(0.103)	(0.103)	(0.103)	(0.103)	(0.102)	(0.104)	(0.104)	(0.104)	(0.103)	(0.103)	(0.102)	(0.104)	(0.104)	(0.104)	(0.104)	(0.103)	(0.103)
	[0.002]	[-0.001]	[-0.004]	[-0.006]	[-0.008]	[-0.010]	[0.002]	[-0.001]	[-0.003]	[-0.006]	[-0.008]	[-0.010]	[0.002]	[-0.001]	[-0.003]	[-0.006]	[-0.008]	[-0.010]
III. Probability of Normal APGAR Score																		
Private HI	-0.084	-0.181	-0.280	-0.382	-0.486‡	-0.593†	-0.085	-0.181	-0.280	-0.380	-0.484‡	-0.590†	-0.091	-0.187	-0.285	-0.386	-0.488‡	-0.594†
	(0.261)	(0.262)	(0.264)	(0.264)	(0.265)	(0.265)	(0.260)	(0.262)	(0.263)	(0.263)	(0.263)	(0.263)	(0.262)	(0.263)	(0.264)	(0.264)	(0.264)	(0.264)
	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]

	Specification 1						Specification 2						Specification 3					
	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25	ρ = 0	ρ = -0.05	ρ = -0.10	ρ = -0.15	ρ = -0.20	ρ = -0.25
IV. Probability of Premature Birth																		
Private HI	-0.209	-0.116	-0.021	0.077	0.177	0.279†	-0.231‡	-0.139	-0.045	0.052	0.150	0.251‡	-0.240‡	-0.148	-0.054	0.042	0.140	0.240‡
	(0.136)	(0.137)	(0.137)	(0.138)	(0.138)	(0.138)	(0.140)	(0.140)	(0.141)	(0.142)	(0.142)	(0.142)	(0.140)	(0.141)	(0.142)	(0.143)	(0.143)	(0.143)
	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.001]	[0.001]	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.000]	[0.001]	[-0.001]	[-0.001]	[-0.000]	[0.000]	[0.000]	[0.001]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table E2.

Appendix F

Table F1. Summary Statistics

Variable	N	Mean	SD	Private HI - Public HI Mean	Private HI - Public HI p-value
Private Health Insurance (1 = Yes)	3600	0.202	0.402		
Child's Health Indicators					
Height (in centimeters)	3550	72.929	4.108	0.011	0.947
Weight (in kilograms)	3450	9.559	1.742	0.102	0.163
Five Minute APGAR Score	2900	8.924	0.684	-0.003	0.936
Five Minute APGAR Score ≥ 7 (1 = Yes)	2900	0.986	0.117	0.006	0.288
Normal Birth Weight (1 = Yes)	3600	0.921	0.270	0.016	0.142
Number of Gestation Weeks	3500	38.726	2.589	0.103	0.343
Number of Gestation Weeks 38 - 42 (1 = Yes)	3500	0.743	0.437	0.033	0.071
Number of Gestation Weeks ≤ 33 (1 = Yes)	3500	0.034	0.180	-0.011	0.137
Controls					
Age (in months)	3600	10.435	1.987	0.102	0.217
Gender (1 = boy)	3600	0.498	0.500	-0.005	0.800
White (1 = Yes)	3600	0.374	0.484	0.161	0.000
Black (1 = Yes)	3600	0.216	0.412	-0.119	0.000
Hispanic (1 = Yes)	3600	0.337	0.473	-0.053	0.007
Asian (1 = Yes)	3600	0.019	0.135	0.021	0.000
Urbanized Area (1 = Yes)	3600	0.668	0.471	0.061	0.002
Urbanized Cluster (1 = Yes)	3600	0.152	0.359	-0.029	0.052
Northeast (1 = Yes)	3600	0.135	0.342	0.002	0.912
Midwest (1 = Yes)	3600	0.206	0.405	0.009	0.612
South (1 = Yes)	3600	0.405	0.491	-0.092	0.000
West (1 = Yes)	3600	0.254	0.435	0.082	0.000
Household Socioeconomic Status (SES)	3600	-0.659	0.536	0.461	0.000
Household SES Quintile 1 (1 = Yes)	3600	0.404	0.491	-0.334	0.000
Household SES Quintile 2 (1 = Yes)	3600	0.323	0.468	0.024	0.219
Household SES Quintile 3 (1 = Yes)	3600	0.185	0.388	0.156	0.000
Household SES Quintile 4 (1 = Yes)	3600	0.071	0.257	0.095	0.000
Household SES Quintile 5 (1 = Yes)	3600	0.017	0.128	0.059	0.000
Household Size	3600	4.624	1.663	0.128	0.063
Parents are Married (1 = Yes)	3600	0.476	0.499	0.334	0.000
Mother's Age	3600	25.870	5.843	3.292	0.000
Mother's Age (1 = Missing)	3600	0.008	0.087	-0.009	0.013
Father's Age	3600	30.462	5.707	1.672	0.000
Father's Age (1 = Missing)	3600	0.220	0.414	-0.184	0.000
Mother's Weight (in kilograms)	3600	73.021	17.680	0.126	0.863
Mother's Weight (1 = Missing)	3600	0.193	0.395	-0.018	0.269
Mother's Education = High School (1 = Yes)	3600	0.390	0.488	-0.008	0.696
Mother's Education = Some College (1 = Yes)	3600	0.215	0.411	0.125	0.000
Mother's Education = Bachelor's Degree (1 = Yes)	3600	0.032	0.177	0.054	0.000
Mother's Education = Advanced College Degree (1 = Yes)	3600	0.011	0.103	0.031	0.000
Mother's Education (1 = Missing)	3600	0.007	0.081	-0.008	0.023
Father's Education = High School (1 = Yes)	3600	0.369	0.483	0.042	0.036
Father's Education = Some College (1 = Yes)	3600	0.175	0.380	0.106	0.000
Father's Education = Bachelor's Degree (1 = Yes)	3600	0.034	0.182	0.044	0.000
Father's Education = Advanced College Degree (1 = Yes)	3600	0.020	0.140	0.050	0.000
Father's Education (1 = Missing)	3600	0.043	0.204	-0.039	0.000

NOTES: The sample includes only 9-month old children insured since birth from households with income less than 185% of the poverty threshold. Public insurance is defined as Medicaid and/or CHIP. All analyses are weighted using Wave 1 specific sample weights. Omitted category for race is 'other', area type is 'rural', mother's education is 'less than high school', and father's education is 'less than high school'. Child's height, weight, five minute APGAR score, and number of gestation weeks have N < 3600. Sample sizes are rounded to the nearest 50 by requirement.

Table F2. Baseline Results

	OLS/Probit			
	No Controls	**Specification 1**	**Specification 2**	**Specification 3**
I. Height of Child				
Private HI	0.000	-0.002	-0.002	-0.002
	(0.003)	(0.002)	(0.002)	(0.002)
II. Weight of Child				
Private HI	0.007	0.007	0.007	0.007
	(0.010)	(0.011)	(0.011)	(0.011)
III. Five Minute APGAR Score				
Private HI	-0.003	0.007	0.008	0.009
	(0.036)	(0.047)	(0.047)	(0.047)
IV. Number of Gestation Weeks				
Private HI	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)
V. Probability of Normal Birth Weight				
Private HI	0.117‡	0.083	0.082	0.085
	(0.063)	(0.070)	(0.070)	(0.071)
	[0.016]	[0.011]	[0.011]	[0.011]
VI. Probability of Normal Pregnancy				
Private HI	0.104	0.094	0.102	0.109
	(0.071)	(0.078)	(0.079)	(0.079)
	[0.033]	[0.030]	[0.032]	[0.034]
VII. Probability of Premature Birth				
Private HI	-0.165‡	-0.128	-0.150	-0.169
	(0.100)	(0.107)	(0.109)	(0.110)
	[-0.011]	[-0.008]	[-0.008]	[-0.009]
VIII. Probability of Normal APGAR Score				
Private HI	0.189	0.101	0.117	0.138
	(0.183)	(0.214)	(0.215)	(0.223)
	[0.006]	[0.002]	[0.002]	[0.002]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Sample includes 9 month old infants from households with income less than 185% of the poverty threshold. All analyses are weighted using Wave 1 specific sample weights. Marginal effects are reported in brackets in Panels V through VIII. These are calculated at the means of the independent variables by using the (default) bivariate predicted probability Pr(depvar1=1, depvar2=1). Height, weight and number of gestation weeks are in natural logarithm. Specification (1) includes age, gender dummy, 4 SES dummies, 4 race dummies, 2 region dummies, 2 city type dummies, 5 mother's education dummies, 5 father's education dummies, dummy for married parents, father's age, mother's age, mother's weight, and household size. Specification (2) adds squared and interaction terms for the continuous covariates; Specification (3) includes cubic terms for the continuous covariates and interaction terms among the linear and squared terms involving the continuous covariates.

Table F3. Sensitivity Analysis: Amount of Selection on Unobservables Relative to Selection on Observables Required to Attribute the Entire Private Health Insurance Effect to Selection Bias

	Specification 1			Specification 2			Specification 3		
	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio	Cov(ε,γ)÷ Var(γ)	τ	Implied Ratio
I. Continuous Outcome Variables									
Height of Child	0.003	-0.002 (0.002)	-0.587	0.003	-0.002 (0.002)	-0.594	0.003	-0.002 (0.002)	-0.589
Weight of Child	0.018	0.007 (0.011)	0.413	0.020	0.007 (0.011)	0.332	0.020	0.007 (0.011)	0.328
Five Minute APGAR Score	-0.458	0.007 (0.047)	-0.016	-0.501	0.008 (0.047)	-0.015	-0.564	0.009 (0.047)	-0.016
Number of Gestation Weeks	0.074	0.003 (0.003)	0.036	0.055	0.003 (0.003)	0.053	0.028	0.003 (0.003)	0.124
II. Binary Outcome Variables									
Probability of Normal Birth Weight	1.098	0.011 (0.009)	0.010	0.879	0.012 (0.009)	0.014	0.718	0.013 (0.009)	0.018
Probability of Normal APGAR Score	0.675	0.003 (0.007)	0.004	0.548	0.003 (0.007)	0.006	0.275	0.003 (0.007)	0.012
Probability of Normal Pregnancy	1.174	0.029 (0.024)	0.024	0.922	0.031 (0.024)	0.033	0.718	0.033 (0.024)	0.046
Probability of Premature Birth	-1.593	-0.007 (0.006)	0.004	-1.077	-0.008 (0.006)	0.008	-0.748	-0.009 (0.006)	0.012

NOTES: ‡ $p<0.10$, † $p<0.05$, * $p<0.01$. Robust standard errors are in parentheses. Height, weight and number of gestation weeks are in natural logarithm. All analyses are weighted using Wave 1 specific sample weights. Panel II outcome variables are estimated by probit. For other details, see Table F2.

Table F4. Sensitivity Analysis: Bivariate Probit Results with Different Assumptions Concerning Correlation Among the Disturbances

	Correlation of Disturbances																	
	Specification 1						Specification 2						Specification 3					
	ρ = 0	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**	**ρ = 0**	**ρ = 0.05**	**ρ = 0.10**	**ρ = 0.15**	**ρ = 0.20**	**ρ = 0.25**
I. Probability of Normal Birthweight																		
Private HI	0.083	-0.004	-0.092	-0.181*	-0.270*	-0.362*	0.082	-0.005	-0.092	-0.180†	-0.270*	-0.361*	0.085	-0.001	-0.089	-0.177†	-0.267*	-0.357*
	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.072)	(0.071)
	[0.002]	[-0.000]	[-0.002]	[-0.003]	[-0.004]	[-0.005]	[0.002]	[-0.000]	[-0.002]	[-0.003]	[-0.004]	[-0.005]	[0.002]	[-0.000]	[-0.001]	[-0.003]	[-0.004]	[-0.004]
II. Probability of Normal Pregnancy																		
Private HI	0.094	0.008	-0.079	-0.166†	-0.254*	-0.342*	0.102	0.016	-0.071	-0.158†	-0.245*	-0.334*	0.109	0.023	-0.064	-0.151‡	-0.239*	-0.327*
	(0.078)	(0.078)	(0.078)	(0.078)	(0.078)	(0.077)	(0.079)	(0.079)	(0.079)	(0.078)	(0.078)	(0.078)	(0.079)	(0.079)	(0.079)	(0.079)	(0.079)	(0.078)
	[0.004]	[0.000]	[-0.003]	[-0.007]	[-0.010]	[-0.013]	[0.005]	[0.001]	[-0.003]	[-0.007]	[-0.010]	[-0.013]	[0.005]	[0.001]	[-0.003]	[-0.006]	[-0.009]	[-0.012]
III. Probability of Normal APGAR Score																		
Private HI	0.101	0.011	-0.082	-0.177	-0.274	-0.373‡	0.117	0.026	-0.066	-0.160	-0.256	-0.355	0.138	0.048	-0.044	-0.138	-0.235	-0.334
	(0.214)	(0.216)	(0.218)	(0.219)	(0.220)	(0.221)	(0.215)	(0.217)	(0.218)	(0.219)	(0.221)	(0.222)	(0.223)	(0.225)	(0.226)	(0.227)	(0.228)	(0.229)
	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.001]	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]	[0.000]	[0.000]	[-0.000]	[-0.000]	[-0.000]	[-0.000]
	Specification 1						Specification 2						Specification 3					
	ρ = 0	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**	**ρ = 0**	**ρ = -0.05**	**ρ = -0.10**	**ρ = -0.15**	**ρ = -0.20**	**ρ = -0.25**
IV. Probability of Premature Birth																		
Private HI	-0.128	-0.040	0.049	0.140	0.232†	0.327*	-0.150	-0.063	0.026	0.116	0.208‡	0.301*	-0.169	-0.082	0.006	0.096	0.187‡	0.280†
	(0.107)	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.109)	(0.109)	(0.110)	(0.110)	(0.110)	(0.110)	(0.110)	(0.111)	(0.111)	(0.111)	(0.111)	(0.111)
	[-0.001]	[-0.000]	[0.000]	[0.001]	[0.001]	[0.002]	[-0.001]	[-0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[-0.001]	[-0.001]	[0.000]	[0.001]	[0.001]	[0.001]

NOTES: ‡ p<0.10, † p<0.05, * p<0.01. Robust standard errors are in parentheses. Marginal effects are in brackets. All analyses are weighted using Wave 1 specific sample weights. For other details, see Table
F2.