A MICRO-SIMULATION STUDY OF THE INDIVIDUAL
WELFARE EFFECTS OF THE AFFORDABLE CARE ACT FOR
PREVIOUSLY UNINSURED ADULTS

A Dissertation in
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by
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Abstract

Objective: To evaluate the net effect of the Affordable Care Act (ACA) for the individual welfare of adults who were uninsured before implementation of the law. The ACA improved individuals’ wellbeing by expanding public coverage and subsidizing and reforming the private individual market. The ACA also penalizes those who remain uninsured and establishes a standard private policy that charges premiums and cost sharing expenses. This paper evaluates the welfare implications of the confluence of ACA coverage provisions for previously uninsured individuals and policy-relevant demographic groups.

Data: Health and demographic data are from the 2007-2012 Medical Expenditure Panel Survey (MEPS), supplemented by wealth and state-of-residence data imputed from the 2007-2011 Panel Study of Income Dynamics. The primary analytic sample includes nonelderly, full-year uninsured adults in the MEPS. Average private insurance premiums by state and median deductible for the second-lowest-cost silver-tier exchange plan are each published by the Kaiser Family Foundation and adjusted for ACA subsidies.

Study Design: The change in individual welfare one year after implementation of the ACA is evaluated as a function of health and non-medical consumption. Post-ACA insurance status is simulated from Medicaid eligibility (adjusted for self-rated health status) and survey-based take-up rates by income for private exchange insurance.

The short-term change in health-related welfare is the difference in the expected value of medical care consumed by each individual with and without the ACA, with everyone remaining uninsured in the latter scenario. Parameter values for a three-parameter generalized gamma distribution, estimated from a sample of individuals with all three types of insurance, are used to
project percentile intervals of the random distribution of ex ante medical consumption for each person.

The monetized welfare change related to non-medical consumption resulting from the ACA is the difference in the certainty equivalents of expected utility in each policy environment, assuming CARA risk preferences.

**Principle Findings:** The ACA generates a small net improvement in the individual welfare of previously uninsured adults (+$29) on average. Individuals with incomes below 250% FPL realize an average welfare gain (+$337), two-thirds of whom realize a welfare improvement; on the other hand individuals with incomes above 250% FPL realize an average welfare loss (-$603). A majority of previously uninsured adults remain uninsured after the ACA (64%); their welfare loss corresponds to the penalty for being uninsured (-$244). Medicaid beneficiaries realize a substantial average welfare improvement (+$1,637). The newly privately insured realize a loss on average (-$223) with just over one in five (22%) realizing any improvement. The chronically ill realize substantial average gains (+$1,178); the majority without a chronic illness (72%) realize an average loss (-$425).

Exchange enrollees with chronic illnesses have a much higher average probability of receiving paid claims that exceed their premium payments, compared to enrollees without a chronic illness (40% vs. 7%). Paid claims for the average enrollee are concentrated in catastrophic medical scenarios, where they are likely to have some relief in the form of charity care or bankruptcy if they remain uninsured.

**Conclusions:** The ACA improves the individual welfare of some sub-groups of previously uninsured adults, including low-income and chronically ill individuals on average. Medicaid generates unequivocal welfare gains for its beneficiaries. Most of the previously uninsured
remain without health insurance, despite the ACA, and many are required by the law to pay a fine. Private insurance enrollees who receive more income-based subsidies realize welfare gains on average. For most adults who were uninsured before the ACA, the benefits of a standard private plan from an ACA exchange are outweighed by its subsidized cost.
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Chapter 1: Introduction

The Affordable Care Act (ACA) is the most comprehensive reform of the U.S. medical care system in the past half a century. However, the net welfare effect of the ACA remains unclear. To date, 17.7 million adults have gained health insurance coverage as a result of the law’s insurance expansions (Uberoi, Finegold, & Gee, 2016). On the other hand, the law introduces a financial penalty for being uninsured, and importantly, a majority of individuals who were uninsured before the ACA remain uninsured after its implementation. Moreover, private insurance premiums represent new costs for previously uninsured consumers that might outweigh the welfare gains of enrollment.

In this thesis I develop a framework for evaluating the ACA’s net effect on individual welfare and implement the framework empirically for the population of adults that were uninsured before implementation of the law. In the empirical analysis, I identify groups of individuals whose welfare has improved or declined differently from the population average and evaluate the welfare implications of proposed changes to the law. To account for the critical importance of risk protection in assessing the welfare of insurance consumers, I simulate the ex-ante spread of scenarios that each consumer would face with and without the ACA.

Uninsured adults consume less medical care than their insured counterparts across a spectrum of disease, from acute to chronic illnesses, and consequently experience poorer health outcomes. At the same time, the uninsured are at risk of incurring potentially catastrophic medical expenditures and are more likely to have medical debt.

The ACA mitigates these risks in part by expanding eligibility for Medicaid, which provides care at virtually no cost, to individuals with qualifying incomes who reside in participating states. Just over half of the previously uninsured adult population lives in a
Medicaid expansion state. The law also provides income-based subsidies for private insurance that is purchased through an ACA exchange; however participation in and satisfaction with the exchanges has been low (Kaiser Family Foundation, 2015; Collins, Rasmusen, Doty, & Beutel, 2015). Furthermore, an analysis of the welfare effects of exchange enrollment for non-poor, previously uninsured adults found that most would be worse off if they were to enroll in an exchange plan (Pauly, Leive, & Harrington, 2015).

Rather than evaluating the ACA’s effect for society as a whole, I will evaluate the individual welfare of previously uninsured adults before and after the law. The ACA allocates public resources ultimately obtained by taxing a broad base of Americans to subsidize health care for the subset of Americans without insurance. A newly insured individual will benefit from receiving subsidized health care at little or no cost to themselves. From society’s perspective on the other hand, the value of subsidized care might not outweigh its total cost, and might therefore represent an overall welfare loss. Society’s perspective includes consideration of efficiency, which weighs the marginal benefit and marginal cost of resources consumed by enactment of the ACA, and consideration of equity, which evaluates the social welfare implications of improving the individual welfare of the previously uninsured while reducing the individual welfare of others. Finally, a full social welfare analysis would require consideration of the economic incidence of health care costs, including the taxes, subsidies and premiums, with and without the ACA. I do not incorporate the potential social welfare effects in my analysis. Instead, I analyze the net change to the financial and health-related wellbeing of previously uninsured individuals.

I investigate the welfare effects of the ACA’s Medicaid expansion, private insurance subsidies, and financial penalty for being uninsured on the population of previously uninsured adults by simulating the spread of medical and financial scenarios each individual would face.
with and without the law. The exercise complements previous analyses, which present only the expected value of consumer welfare averaged across all possible scenarios.

My empirical analysis begins with a representative sample of adults that were uninsured prior to the ACA. I simulate post-ACA insurance status (either Medicaid, private insurance, or no insurance) based on income, state of residence, and self-rated health. Then I simulate the spread of potential medical and financial scenarios each individual faces with their post-ACA insurance and without the ACA, assuming the population would otherwise remain uninsured.

My measure of welfare change sums the ACA’s health- and financial-related welfare effects. I measure health-related welfare effects as the change in the quantity of medical care consumed. Presumably the ACA does not change an individual’s underlying health status during the one-year period of this study. Instead, the increase in medical care with insurance represents an increase in the consumer’s production of health, particularly for previously uninsured adults who had disproportionately high rates of undiagnosed and poorly managed chronic illnesses and high mortality from acute diseases. The financial welfare effect derives from a change in the spread of potential medical costs an individual might incur and the amount of money he or she would have remaining for non-medical consumption. I assume the consumers are averse to risk and evaluate the utility of non-medical consumption in each scenario. Then, I find the certain-consumption equivalent to the uncertain spread. For each policy environment, with and without the ACA, I sum (1) the expected value of medical consumption and (2) the certainty equivalent to the utility of non-medical consumption. I evaluate net welfare change by finding the difference between the two sums with and without the ACA.

The empirical results will identify the welfare change for the population as a whole and for segments of the population. While individuals with lower incomes will benefit from certain
aspects of the law, the set of income-based provisions contains some gaps. Nearly half of the population lives in a state that is not expanding Medicaid; individuals in poverty are not eligible for private insurance subsidies; and for individuals above the poverty level, the subsidies decline rapidly with income. Additionally, I will investigate empirically the ACA’s welfare effects on demographic groups of policy-relevance, including race and gender, whose members face varying risk of poverty and medical care needs.

Finally, individuals with chronic illnesses will benefit from the ACA’s community-rating provision because they do not have to pay higher premiums for private insurance than healthy enrollees. Consequently, individuals without chronic illnesses subsidize their chronically ill counterparts. I further investigate the standard exchange plan by exploring the likelihood that an enrollee receives any paid claims or receives more in claims than they paid for the premium. I will also estimate how the standard exchange plan changes enrollees’ likelihood of medical bankruptcy.

I conclude the empirical analysis by simulating the welfare implications of three potential changes to the current ACA law, assuming in each case that total public spending remains fixed. I explore whether the currently progressive subsidies for private insurance should be more progressive. I consider lowering the deductible of the standard exchange plan, with an actuarially equivalent increase in the out of pocket maximum. Lastly I consider extending the threshold for Medicaid eligibility further, from 138% FPL to 200% FPL.

This thesis is organized into seven chapters. Chapter 2 will provide background on the pre-ACA world faced by formerly uninsured adults, including the pre-ACA market for insurance, the medical and financial risks of being uninsured, and the relevant reforms enacted in the ACA. Chapter 3 provides a conceptual framework for the analysis and reviews welfare
evaluations and simulations of medical consumption in the existing literature. Chapter 4 specifies the data and methods I use in my empirical investigation to simulate ex-ante distributions of medical and non-medical consumption.

Chapters Five and Six present and discuss the empirical results. Chapter Five examines the welfare effects of the ACA in its current form, for the population as a whole and among population segments. Chapter Six evaluates the welfare implications of three hypothetical changes to the ACA. Each of the policy alternatives will attempt to further increase insurance coverage without increasing public spending. The final chapter concludes with a brief summary and discussion of the study’s theoretical, methodological, and policy-related implications, its limitations, and directions for future research.
1.1 References: Introduction


Chapter 2: Background

2.1 The Pre-ACA Market for Health Insurance

Both before and after the ACA, most Americans receive health insurance as an employment benefit, either directly or through a family member. Employer-sponsored insurance (ESI) predominates the insurance market because of a federal tax incentive. Employees do not pay income tax on insurance benefits and, as a result, one dollar in health insurance has more purchasing power than one dollar in cash wages.

Medicaid was, and remains, the second leading source of coverage for nonelderly adults, covering an average of 17% of the population between 2007 and 2012 (Table 2.1). Prior to the ACA, most states restricted Medicaid eligibility to the categories of individuals who were eligible for federal grant support: children, pregnant women, and parents of dependent children.\(^1\) The median income eligibility threshold for working parents was 64% of the Federal Poverty Level (FPL) (less than $13,000 for a family of three in 2014 USD); in thirty-four states the threshold was below 100% FPL and in 17 states below 50% FPL (Ross, Jarlenski, Artiga, & Marks, 2009).

The individual marketplace offered a remaining option for nonelderly adults, covering roughly 7% of the population over the five years leading up to the ACA (Fronstin, 2013). Relative to the market for large groups such as employers, the pre-ACA individual marketplace sold high cost, low quality coverage. Enrollees did not receive premium contributions from their employers, and did have a tax break for their premium costs. Additionally the individual marketplace lacked a natural setting for pooling risk and attracted individuals who were likely to utilize medical services, further driving up the costs of enrollment.

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\(^1\) Two states, New York and Massachusetts, began offering Medicaid eligibility to low-income adults without children, in 2001 and 2006 respectively.
Furthermore, the pre-ACA individual market failed to protect consumers from illness over the long run by increasing the price or denying coverage altogether after a serious diagnosis. In most states, insurance in the individual market was strictly intended to protect enrollees from unexpected medical expenses and did not cover any illnesses that the consumer was aware of when they entered the contract. Moreover, any diagnosis in a given year would be considered a pre-existing condition during the subsequent year’s contract, leading to increases in the insurance premium and potentially leading to denial of coverage altogether. In states that required individual market policies to charge each enrollee the same premium, rates of non-group coverage declined following the regulations, as the relatively ill were more likely to enroll (Lo Sasso & Lurie, 2009).

In this thesis I study previously uninsured nonelderly adults because they represent a large group of individuals at whom the ACA is largely targeted who faced relatively uniform pre-ACA regulations. Health insurance for minors and for adults above age 65 are each administered under separate programs, the State Children’s Health Insurance Program (SCHIP) and Medicare, respectively. The ACA does not directly affect the group-based market and was projected to cause a negligible change in premiums between -2% and 1% (Congressional Budget Office, 2009). The ACA’s effect on individual market enrollees depends on the specific context of each state’s pre-ACA regulations.

2.2 Health and Financial Risks to Uninsured Consumers

Consumers of medical care who do not have health insurance face a number of barriers to maintaining their health and financial stability. Uninsured adults are likely to have undiagnosed and poorly managed chronic illnesses, and are unlikely to receive recommended treatment for a new illness. Medical care tends to be unaffordable for consumers who do not have insurance.
Uninsured adults tend to have low incomes, and many struggle to pay outstanding medical bills. In the event of a medical catastrophe, uninsured consumers have access to emergency care, but many will have to face overwhelming debt afterwards.

Uninsured consumers under-utilize medical care to an extent that has practical and measurable negative effects on their quality and length of life. A large and growing body of research across a variety of medical and demographic settings provides a substantial evidence base for the relationship between insurance, health care, and health outcomes. Insurance causes increased consumption of medical care. Medical care in turn produces health, but does so at a diminishing rate. Each additional quantity of medical consumption produces less health for the consumer than the previous quantity produced. In this way, uninsured consumers inhabit an earlier point along the same health production function as their insured counterparts (Hadley, 2003, p. 8S).

Uninsured adults who experience an acute health problem are unlikely to receive the necessary medical care and experience poorer rates of recovery. Following a new chronic illness diagnosis or unintentional injury, uninsured adults are less likely to receive any, and more likely to receive none, of the recommended care (Hadley, 2007). The same study finds a sharper decline in self-reported health status for uninsured patients than for the privately insured, which lasted through the seven months of data collection. When uninsured patients do seek care, they are frequently treated less intensively than their insured counterparts. For example, an analysis of over 15,000 acute trauma hospital records finds that uninsured and privately insured patients are equally likely to be triaged to intensive care, but uninsured patients are significantly less likely to undergo an operation and are 2.15 times more likely to die from an acute trauma hospitalization than their privately insured counterparts (Hadley, 2003).
The uninsured face a number of barriers to accessing medical care including difficulty with obtaining appointments. One study illustrates the difficulty of seeking medical care without insurance (Asplin, et al., 2005). A team of trained interviewers called physician offices and clinics in nine US cities posing as potential patients recently discharged from the emergency department suffering from one of three conditions that each require urgent follow up care. Interviewers contacted the clinics twice (at least two weeks apart) reporting the same condition, once with private insurance and once with either Medicaid or no insurance. Medical providers were more likely to schedule a follow up appointment with randomly assigned callers reporting private insurance than those reporting Medicaid coverage (63.6% vs. 34.2%). Of the 199 clinics contacted by a self-reported uninsured caller, 125 offered timely appointments under the assumption of full cash payment up front (62.8%). When the interviewer requests to bring $20 to the visit and arrange a payment plan for the balance, 75 of the 125 clinics subsequently revoke the appointments. Only one in four reportedly uninsured callers was able to secure urgently needed follow up care on a timely basis without up front payment in full.

Additionally, uninsured adults are less likely to be aware of underlying chronic conditions that are responsive to early treatment, and are more likely to receive late stage diagnoses than insured adults (Committee on the Consequences of Uninsurance, 2009, p. 74). Likelihood of cancer screening decreases stepwise with the number times an individual was uninsured the previous year. Fewer uninsured adults report having had a preventive visit with a physician within the past year (33%) relative to adults with private insurance (74%) or Medicaid (67%) (Garfield, Licata, & Young, 2014).

Uninsured adults who are diagnosed with a chronic illness have difficulty accessing medical care to manage the illness chronic disease management care. They are more than twice
as likely to have problems getting needed prescriptions (14.3% vs. 5.2%), and three times more likely to have problems seeking medical care (18.7% vs. 6.2%) than chronically ill insured adults according to Medical Expenditure Panel Survey Data from 2005 (Committee on the Consequences of Uninsurance, 2009, p. 66). One in five uninsured adults with a chronic disease had no medical care visits within the past year, compared with 8.1% of insured individuals with a chronic disease. Roughly half of previously uninsured adults (49%) have an unmet health care need. Beneficiaries of ESI and Medicaid each have a significantly greater share with an unmet need (28% and 41%). For most of the uninsured (82%), the price of medical care is a barrier to utilization (Committee on the Consequences of Uninsurance, 2009).

Hospitals charge the uninsured up to 2.5 times the price they charge insurers and more than 3 times the price allowed by Medicare, according to an analysis of hospitals that participate in Medicare (Anderson, 2007). Insurers negotiate a preferential price on behalf of their enrollees, which the Institute of Medicine (IOM) lists as one of the two purposes of health insurance2 (2009, p. 16). Hospitals list a charge rate, and then settle with insurers for a lower price. While hospital revenues and hospital costs grew in proportion to one another, hospital charge rates (the prices before negotiation) grew faster than both, between 1984 and 2004 (Anderson, 2007). The study found that the rates charged to uninsured patients increased steadily despite hospitals’ inability to convert much of the increase into an increase in revenues.

While most uninsured adults have jobs, most are also near poverty. Seven in ten uninsured households have a full-time worker (Kaiser Family Foundation, 2013). At the same time, one out of three uninsured households takes in less than $20,000 in income (Fronstin, 2013). Moreover, low-wage jobs tend not to offer health insurance. As a result there are

\footnote{The other being protection from unexpected medical costs}
substantial insurance disparities with respect to income. For example only 16.4% of nonelderly families earning between $10,000 and $20,000 per year have ESI, in contrast to 85% of nonelderly families who earn at least $75,000 annually (Fronstin, 2013, p. 16).

Poor health can further depress the earnings and purchasing power of uninsured consumers. Reduced work hours result from having, or caring for a person with, a physical or mental disability, a serious chronic illness, or fair or poor perceived health (Hadley, 2003). This relationship contains a reinforcing loop: low income adults have difficulty affording insurance and medical care, which leads to poor health outcomes, which in turn leads to lower income.

Uninsured individuals are more burdened by medical debt. Roughly 40% of uninsured adults currently have outstanding medical bills (Cohen & Kirzinger, 2014; Garfield, Licata, & Young, 2014). Uninsured adults tend to seek care in high cost settings such as hospital emergency departments, in part because after delaying for forgoing care their illnesses reach a more advanced stage. Additionally the federal Emergency Treatment and Labor Act (EMTALA) of 1986 requires emergency department to evaluate and treat all patients until stabilized, regardless of their ability to pay. While EMTALA requires a minimum amount of care, no public funds are allocated to pay for it. Most hospitals offer charity discounts to patients who are unable to pay, however the eligibility and generosity of discounts that hospitals remain unregulated even after implementation of the ACA. Although they vary among provider organizations, the differences are not systematically associated with the for-profit or non-profit status of hospitals (Campbell, Smith, & Hostetler, 2013).

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3 The ACA requires nonprofit hospitals to publish a financial assistance policy that clearly stipulates eligibility criteria for financial assistance and the extent of assistance offered to patients who are not able to pay for a medical bill in order to make the differences between non- and for-profit hospitals more evident (Campbell, Smith, & Hostetler, 2013). The ACA does not impose any quantitative measurement requirements for the amount or type of charity care offered.
If a consumer is unable to pay the balance after charity discounts, the consumer negotiates with debt collection agencies where they have financial protection in the form of bankruptcy provisions. Medical providers and the debt collection agencies with which they contract are aware that they will be paid at most a small portion of the debt if the consumer files for bankruptcy. As a result, medical providers have an incentive to settle the debt for an amount that does not substantially exceed cost of bankruptcy, including the value of assets and the cost of legal representation that a consumer would lose in the process. Bankruptcy imposes an upper limit on medical spending by serving as a negotiation point, even for consumers who do not choose to file.

Similarly to a high deductible health plan, bankruptcy provides financial protection in catastrophic scenarios. Through negotiation or bankruptcy, uninsured consumers can discharge any medical debt that exceeds the cost of bankruptcy. Consequently, bankruptcy constitutes an implicit form of high-deductible insurance for uninsured consumers (Mahoney, 2015).

Under federal bankruptcy law, households can discharge their unsecured debts, including medical debt, while keeping the protected value of their assets. State law determines the types and amount of assets protected under bankruptcy. In most states, consumers can keep most or all of their non-financial assets. For example, half of the states protect at least $150,000 in home equity, and 45 states protect the full amount in Individual Retirement Account funds. Similarly, most states seize households’ financial assets in bankruptcy.

Additional rules apply to households above their state’s median level of income. In order to discharge their unsecured debts, these households must relinquish a portion of their income for to patients, but the rules are intended to coerce nonprofit hospitals to prove their community impact in order to remain eligible for tax exemptions.
three to five years. These households may keep all of their assets, provided that the relinquished income is at least as valuable as the assets that would otherwise have been seized.

Many uninsured households do not risk losing substantial wealth in the event of bankruptcy, but might suffer from non-financial costs including stigma. The median uninsured household had $0 of net financial assets in 2004 (Jacobs & Claxton, 2008). Most would lose little more in bankruptcy than the cost of legal representation, roughly $2,000. At the same time, bankruptcy damages filers’ financial reputations and makes it difficult to enter contracts, including loans or credit cards, renting a home, or even adopting a child from an institution that checks credit histories. Bankruptcy remains on a consumer’s credit history for up to ten years.

Medical debt and bankruptcy threaten insured households as well. Unpaid deductibles and co-payments of privately insured patients comprise a significant share of hospitals’ uncollected debts (Thorne & Warren, 2008). Moreover, many insured individuals experience periods of gaps in their insurance coverage. Between 20% and 30% of insured individuals have outstanding medical bills (Cohen & Kirzinger, 2014; Garfield, Licata, & Young, 2014). While insurance does not increase the risk of bankruptcy, a majority of filers (and a majority of American households) have insurance. In three quarters of all medical bankruptcy cases, the filer had insurance at the onset of the illness or accident that sent them into bankruptcy (Thorne & Warren, 2008).

2.3 Costs and Benefits of the ACA

The Affordable Care Act lowers the price of private insurance and expands access to public coverage for adults who were uninsured before the law. The ACA establishes coverage standards in the private insurance marketplace, and subsidizes the cost of enrollment. The law also expands Medicaid eligibility for poor and near poor adults. On the other hand, the newly
privately insured must pay for the unsubsidized share of their coverage, and many poor and near-poor adults live in states that have chosen not to expand Medicaid. Finally, the ACA levies a financial penalty against adults who remain uninsured after implementation of the law. In this section, I discuss the ACA’s reforms of private insurance, then Medicaid. I end with a discussion on evaluating the gains and losses of the reforms.

The ACA introduces a new interface, marketplace exchanges, to the individual market for private insurance. Exchanges act as a mechanism for risk pooling, due in large part to the individual mandate, which requires all individuals to obtain insurance or otherwise pay a penalty that rises with income. The ACA supports the affordability of mandated insurance coverage through income-based subsidies that help consumers to pay the insurance premium and cost sharing requirements.

The exchanges help to create transparency for consumers by creating four standardized tiers of coverage, each with a designated metallic tier name. The silver tier, which has a 70% actuarial value, serves as the referent policy to which federal insurance subsidies are tied (see Table 2.2 for a summary of ACA subsidies). The bronze tier is the minimum level of coverage and holds a 60% actuarial value. There are also gold and platinum tiers with 80% and 90% actuarial values, respectively, and there is a high deductible plan for individuals between 25 and 30 years old. The act requires exchange plans to implement out of pocket maximums on enrollees’ medical spending expenditures, and prohibits insurers from capping the level of benefits for covered services over a year or over the lifetime of the enrollee. Each insurance plan must cover ten categories of services deemed essential health benefits, including, hospital, prescription, rehabilitative, preventive, oral and vision care.

4 Starting January 1, 2014, out-of-pocket maximums can be no more than $6,350 for individual policies and $12,700 for family plans.
The ACA establishes a set of related policies: (1) insurers are required to cover all individuals and all of their medical conditions without changing the plan’s premium, and (2) all individuals are required to obtain insurance. Firstly law prohibits nearly all forms of health status based premium pricing, which precludes consumers’ risk of facing escalating premiums in the year following a serious diagnosis. There are two exceptions. The law allows for age-based insurance premium pricing, capped at a 3:1 ratio between the youngest and oldest age groups, and premiums can depend on tobacco use at a ratio no higher than 1.5:1. The individual requirement to obtain coverage is enforced by levying a penalty against the uninsured. The penalty increases from 1% of income per household member in 2014 to 2.5% of income in 2016. The resulting coverage expansion is expected to pool risk across a wide range of previously uninsured individuals, enabling healthier enrollees to purchase comprehensive insurance.

In order to maintain affordability for consumers within a mandated insurance system, the ACA caps the cost of a premium at a percentage of the beneficiary’s household income. For the year 2014, the federal government reimburses any premium costs above 2% of income for individuals in households earning below 138% FPL. If these individuals purchase more comprehensive coverage, with a gold or platinum plan, the dollar value of the premium subsidy will remain tied to the silver policy, and the consumer is responsible for the difference. From 138% FPL to 300% FPL, the income cap increases linearly from 4% to 9.8% of income, for individuals and households from 300% to 400% FPL subsidies will cap the share of income spent towards a silver level insurance plan at 9.8%, and households earning more than 400%

---

5 The penalty is the larger amount between 1% of income, or $95 per adult in 2014 and 2.5% of income or $695 in 2016. Children’s penalties are half of the adult penalty in each household. Households can apply for penalty waivers if the cost of insurance is above 8% of income or if household income is below the federal tax-filing limit.
FPL are not eligible for subsidies. After 2014 income caps gradually increase to a range of 2.1% to 10.2% in 2016. Additional federal subsidies help low-income households pay for cost sharing requirements. For households that earn between 100% and 150% FPL, and between 150% and 200% FPL, the subsidized plan covers 90% and 80% of expected expenditures, respectively. The next income group receives moderate cost sharing subsidies designed to raise the actuarial value of the standard plan from 70% to 73%.

The final major feature of the Affordable Care Act is the expansion of Medicaid eligibility to low-income adults, even those without dependent children. When the ACA was signed in 2010, all states were required to expand Medicaid eligibility to individuals with incomes up to 138% of the federal poverty level (FPL) or risk revocation of federal matching funds for existing Medicaid programs. Under this original structure the federal government would fund 100% of the expansion for all eligible adults who were not previously covered from 2014 to 2016, then gradually phase down to 90% by the year 2020. By contrast the average federal matching rate across states was 57% before the ACA (Kaiser Commission on Medicaid and the Uninsured, 2012).

Premium and cost-sharing obligations are generally limited for those non-elderly adults who obtain Medicaid after the ACA, according to a 2015 survey of state Medicaid programs (Brooks, Touschner, Artiga, Stephens, & Gates, 2015). For example, the highest co-payment charged for a non-preferred brand name drug is $8. Five states charge co-payments at or above $50 for an inpatient hospital visit. Medicaid enrollees with incomes up to 150% FPL may not be charged premiums.

In 2012 Florida led a coalition of twenty-six states that sued the federal government over the ACA’s stipulation that existing federal Medicaid funds would be revoked unless the states
expanded Medicaid. The issue was contentious; for example two states (Iowa and Washington) were on both sides of the lawsuit because their governors and attorney generals took opposing views (Kaiser Family Foundation, 2012). In June of that year a majority of Supreme Court justices concluded that the Medicaid expansion provision was unconstitutionally coercive, making participation in the Medicaid expansion voluntary for state governments. As of July 2015 there are 31 states (including Washington, DC) that are expanding Medicaid, one that is considering expansion, and nineteen that have decided against it.

Distinguishing Between Ex-Ante Risk and Ex-Post Spending

A comparison of the ACA’s costs and benefits must account for the value of reducing risk. Consider the following thought experiment (Meier & Wolfe, 2012). Imagine two families, both at 101% of the Federal Poverty Level, and both of who incurred no medical expenses over the past year. Next suppose that at the beginning of the year one of these families received health insurance at no cost. The families have each realized the same total annual medical expense: $0. However if these individuals have at least some degree of preference for certainty about their future consumption, and some degree of preference for accessing the full continuum of necessary care in the event of a health shock, then the family with insurance received an item of value that is undetected by a measure of realized medical spending. The insured household derives utility from protection against risk, but how much risk was there initially, by how much was it reduced, and how much does a consumer value this benefit?

Consumers without health insurance tend to spend less on medical care than consumers with insurance in a given year, which complicates assessment of the pre-ACA baseline level of financial vulnerability to medical expenses among previously uninsured adults. For the population of nonelderly adults as a whole, median out-of-pocket (OOP) spending as a percent of income rose by 21.9% between 2001 and 2009, while for the subset of uninsured households
median OOP declined by a striking 76.2% over this period (Blumberg, Waidmann, Blavin, & Roth, 2014). Nearly half (44%) of uninsured adults spent exactly $0 on health care over the previous 12 months according to the 2007-2012 Medical Expenditure Panel Survey (MEPS). If a previously uninsured adult who spent $0 on medical care in 2013 obtains subsidized private insurance under the ACA and spends some larger non-zero amount of their income on medical care, their medical expenditure risk will not have increased. However the increase in medical care spending will have imposed a financial burden on the individual. Distinct from risk, the ‘financial burden’ of medical care is measured by the amount of medical spending incurred over the previous year, or medical spending over the previous year as a share of income. The financial burden of medical care takes an ex-post perspective, assessing the level of medical spending realized by the consumer. On the other hand an assessment of risk takes an ex-ante perspective, assessing the potential medical spending a consumer might realize, and considering the degree to which an insurance policy provides protection from catastrophic outcomes that might or might not actually occur.

Relative to a well-established literature on medical care spending and utilization from the ex-post perspective, the concept and measurement of medical expenditure and utilization risk is in the early stages of development. Risk is a function of the likelihood of alternative potential future outcomes. Calculating the share of income spent on medical care does not require any assumptions about the likelihood that an uninsured individual will experience a catastrophic outcome. However interpreting an ex-post measure of financial burden as a measure of risk would lead to the conclusion that uninsured adults face less risk than adults with insurance because uninsured adults tend to spend less on medical care (Banthin & Bernard, 2006).
The National Research Council (NRC) calls for the development of a risk measure that applies to the un- and underinsured populations and edifies the current federal measure of poverty (National Research Council, 2012). The NRC specifically calls for a measure of Medical Care Economic Risk (MCER) defined as the probability of being unable to cover basic needs in the event of a health shock, and/or the probability of forgoing needed care altogether. The Census Bureau began publishing its most recent poverty measure, the Supplemental Poverty Measure (SPM) in 2011 following the recommendations of the NRC Panel on Poverty and Family Assistance (Citro & Michaels, 1995). The (SPM) subtracts out of pocket medical expenses from income to assess the amount of money an individual has available to cover basic needs\(^6\). The SPM thus takes an ex-post perspective by measuring the financial burden imposed by medical care, interpreting the SPM before and after the ACA as an assessment of the change in MCER would produce to inaccurate conclusions about previously uninsured individuals.

The 1995 NRC Panel also recommends a measure separate from the SPM to track the adequacy of health insurance coverage. Following this recommendation the Office of the Assistant Secretary for Planning and Evaluation (ASPE) (a division of the U.S. Department of Health and Human Services (DHHS)) requested that the NRC appoint a separate panel of experts to establish and define the concept of medical expenditure risk and to explore the data required for its development. In 2012 the NRC published *Medical Care Economic Risk: Measuring Financial Vulnerability from Spending on Medical Care*, its review of the state of knowledge on MCER and directions for future research (National Research Council, 2012).

Consumers value insurance and face Medical Care Economic Risk from an ex-ante perspective. Insurance improves access to medical care across a range of potential health

\(^6\) The SPM also adds near-cash government transfers and deducts work expenses and tax payments from income, among other changes.
scenarios faced by each uninsured adult, and provides financial protection against a range of potential financial outcomes. Evaluating the effects of ACA insurance expansions requires the same ex-ante perspective. In the following chapter I examine the existing methods of evaluating the spread of potential medical and financial scenarios that individuals face.
2.4 References: Background


about-the-uninsured-population/


http://kaiserfamilyfoundation.files.wordpress.com/2013/01/8028.pdf

## 2.5 Tables and Figures: Background

### Table 2.1: Trends in Coverage Sources Among Non-Elderly American adults, 2007-2012

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Share</td>
<td>Count</td>
<td>Share</td>
<td>Count</td>
<td>Share</td>
</tr>
<tr>
<td>Total</td>
<td>246.8</td>
<td>100%</td>
<td>247.3</td>
<td>100%</td>
<td>249.1</td>
<td>100%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>36.4</td>
<td>15%</td>
<td>39.4</td>
<td>16%</td>
<td>44.2</td>
<td>18%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>43.4</td>
<td>18%</td>
<td>44.2</td>
<td>18%</td>
<td>48.3</td>
<td>19%</td>
</tr>
<tr>
<td>Private</td>
<td>184.7</td>
<td>75%</td>
<td>182.1</td>
<td>74%</td>
<td>175.7</td>
<td>71%</td>
</tr>
<tr>
<td>ESI</td>
<td>165.9</td>
<td>67%</td>
<td>163.9</td>
<td>66%</td>
<td>157.3</td>
<td>63%</td>
</tr>
<tr>
<td>Direct</td>
<td>18.8</td>
<td>8%</td>
<td>18.2</td>
<td>7%</td>
<td>18.4</td>
<td>7%</td>
</tr>
</tbody>
</table>

Note: Count of nonelderly adults presented in millions; may not add to totals because some individuals have more than one source of coverage.

Data adapted from (Fronstin, 2013, p. 5)
Table 2.2: Standard Exchange Plan Characteristics

<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>Premium Cap</th>
<th>Actuarial Value</th>
<th>OOP max</th>
<th>Avg. Deductible</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100</td>
<td>N/A</td>
<td>70%</td>
<td>$6,350</td>
<td>$3,453</td>
</tr>
<tr>
<td>100 - 138</td>
<td>2%</td>
<td>94%</td>
<td>$2,250</td>
<td>$159</td>
</tr>
<tr>
<td>138 - 150</td>
<td>3% to 4%</td>
<td>94%</td>
<td>$2,250</td>
<td>$159</td>
</tr>
<tr>
<td>150 - 200</td>
<td>4% to 6.3%</td>
<td>87%</td>
<td>$2,250</td>
<td>$659</td>
</tr>
<tr>
<td>200 - 250</td>
<td>6.3% to 8.05%</td>
<td>73%</td>
<td>$5,200</td>
<td>$2,763</td>
</tr>
<tr>
<td>250 - 300</td>
<td>8.05% to 9.5%</td>
<td>70%</td>
<td>$6,350</td>
<td>$3,453</td>
</tr>
<tr>
<td>300 - 400</td>
<td>9.50%</td>
<td>70%</td>
<td>$6,350</td>
<td>$3,453</td>
</tr>
<tr>
<td>400 +</td>
<td>N/A</td>
<td>70%</td>
<td>$6,350</td>
<td>$3,453</td>
</tr>
</tbody>
</table>

Note: This table outlines the cost of a standard, silver tier plan in a private insurance exchange established by the Affordable Care Act. The law allocates federal funding for subsidies that assist low-income adults with incomes the poverty level.
Chapter 3: Conceptual Framework and Literature Review

How and why should one expect the Affordable Care Act to affect the welfare of previously uninsured individuals? What are the primary mechanisms through which individuals derive utility from health insurance? In this chapter I provide an answer to these questions, and define the terms and concepts I use to evaluate the welfare change that previously uninsured individuals will realize after implementation of the law.

The Affordable Care Act (ACA) allocates public funds to reduce the price that consumers pay for health insurance. All of the individuals in my analysis are uninsured prior to the law’s implementation. Before the ACA, these consumers maximized their welfare by optimally allocating wealth between medical and non-medical goods and services within their budget constraints, and concluded that the cost of obtaining insurance did not outweigh its benefits. A reduction in the price of insurance provides the opportunity for individuals to consume more within their budget constraints, which generates consumer welfare.

There is no direct utility from consuming insurance itself. Instead, insurance provides peace of mind by protecting consumers from uncertain future medical needs. Consumers value the financial protections of insurance even if they do not experience a catastrophic event. Additionally, individuals derive utility from insurance through improvements in health, because insured consumers pay a lower price for medical care and can afford more health-improving medical services.

The remainder of this chapter is organized as follows. First I provide a brief overview of the theory of risk aversion, which is a primary component of consumer demand for private insurance. Next I lay out the conceptual framework that will guide my analysis of the ACA’s welfare effects. The following sections will review analytical strategies for simulating potential
medical consumption and the utility of non-medical consumption from the existing health economics and health services research literatures. Finally I will review alternative ideas about the value of marginal increases in medical consumption, a phenomenon known to some as ‘moral hazard,’ and others as ‘improved access.’

I evaluate the risk protection afforded by insurance within an expected utility maximization framework drawn from the health economics discipline. Consumers are inclined to purchase insurance if they would rather pay a known premium than face the possibility of paying large medical bills. Moreover, consumers must be willing to pay more than the average they expect to receive in return, because the insurer’s revenue from premiums must cover administrative costs in addition to paying claims. The risk-averse individual benefits from spreading consumption across the potential scenarios they face, redistributing a relatively small amount from many likely scenarios involving good health to a few unlikely and catastrophic scenarios involving extensive medical consumption and little non-medical consumption.

The interpretation of risk aversion as a preference for certainty derives from the history of the theory of expected utility maximization under uncertainty. It has been only a few decades since analysts began to describe consumers’ attitudes towards uncertainty using expected utility maximization theory. From the time of Bernoulli in the 18th century to the mid twentieth century, expected utility theory was not used to explain consumer preferences about risk and uncertainty because of the following paradox. How is it possible that one observes both a demand for insurance and a demand for gambling, sometimes in the same person? The former suggests that consumers have an affinity for uncertainty and risk, while the latter suggests an aversion to uncertainty and risk.
Because of this paradox, economists generally rejected the notion that consumer choices involving risk could be explained by expected utility maximization theory. Friedman and Savage (1948) offered a solution: individuals’ attitudes towards risk vary according to the risky choice in question and the individual’s income\textsuperscript{7}. The analysis has been extended to propose that individuals might voluntarily gamble because the potential winnings are extraordinarily large or because they feel differently towards income earned from labor relative to non-labor income (Nyman, Welte, & Dowd, 2008). The same consumer might also voluntarily purchase insurance because they prefer certainty within the context of health insurance. Thus the academic literature interpreted the demand for insurance as a context-specific preference for consumption certainty. In the conceptual framework that follows, I will outline the ways in which health insurance affects the welfare of its enrollees in greater detail.

3.1 Conceptual Framework

In my analysis, I organize individual welfare into two categories, (1) non-medical consumption or simply “consumption”, which refers to consumers’ financial wellbeing, and (2) health, which I assume is the underlying driver of consumer demand for medical care:

\begin{equation}
U = U(C, H).
\end{equation}

I invoke the assumption of additive separability, assessing consumers’ financial and health-related welfare separately and summing the effects:

\begin{equation}
U = U_C(C) + U_H(H).
\end{equation}

\textsuperscript{7} Friedman and Savage (1948, p.294) simply state that if a consumer is willing to purchase insurance then the utility of consumption to that individual cannot be everywhere concave. If they are willing to gamble, the utility of consumption cannot be everywhere convex. If they are willing to do both, the simplest explanation is an inflection point.
My analysis takes an ex-ante approach, assuming the perspective of a consumer at the beginning of the year before she knows how much, if any, medical care her insurance policy will pay for on her behalf. No one can be certain about the quantity of medical care they might consume in the future, over the coming year. An insurance policy establishes a contingency plan for the consumer’s uncertain future, one that provides access to medical care if needed and protects an individual’s ability to consume non-medical goods in catastrophic medical scenarios.

Optimization in a Realized Health Scenario

Individuals derive utility from health as a function of a randomly occurring health scenario, \( s \), and medical care consumption, \( m \), measured in dollars:

\[
(3) \quad h = h(m, s).
\]

The random variable \( s \), representing an uncertain health scenario, is drawn from a distribution of health scenarios \( S \), which is defined at the individual-level by medical and demographic characteristics. Individuals face a range of possible medical scenarios for the upcoming year. In likely scenarios individuals experience relatively stable health and do not consume much medical care. In unlikely, catastrophic scenarios individuals consume extensive treatment.

The distribution of potential health scenarios is unique to each person’s propensity for illness, determined by previous diagnoses and demographic characteristics that include age and income, and insurance status. While every consumer faces some chance of experiencing a catastrophic scenario, less healthy individuals consume relatively extensive treatment in every scenario. When a person with a costly, ongoing medical condition experiences a year of good health, he might still consume more medical care than the average individual consumes in a year.

---

\( ^{8} \) When Handel (2013) divides a large sample into small, finely tuned categories of expected medical spending, each observed distribution of medical expenditures exhibits a prominent right tail. This suggests that each individual faces a skewed distribution of potential medical needs.
of good health. When the person with a costly condition experiences a medical catastrophe, he is likely to consume more medical care than a relatively healthy person who experiences a medical catastrophe. Thus, each individual has a unique underlying distribution of health scenarios \( S \), from which some particular health scenario \( s \) is revealed by the passage of time.

Consumers select an optimum quantity of medical care \( m \), measured in dollars, depending on the particular health scenario or realization of \( s \) that they experience. In each health scenario, medical consumption is constrained by the consumer’s total wealth, and also depends on the out-of-pocket price of medical care \( P_m \), which is set by insurance \( Q \):

\[
(4) \quad m = m(s, P_m(Q), W).
\]

I assume that a change in insurance status \( Q \) affects the utility of health only by lowering the price of medical care. Conditional on a realization of \( s \), a reduction in the price of medical care causes an increase in the quantity of health-improving medical care demanded. For simplicity, I assume that a change in insurance status does not affect the distribution of health scenarios an individual faces over the course of the upcoming year; insurance does not prevent health problems in the short term. Nor does insurance status alter the consumer’s productivity or play any direct role in determining a consumer’s wealth in the short term.

In any realized health scenario, individuals allocate their wealth between consumption and health within their budget constraints by selecting an observable, utility maximizing quantity of medical care. I assess the utility of health indirectly as a function of the realized health scenario; the price of medical care, which is determined by insurance; and the consumer’s wealth constraint:

\[
(5) \quad v[m_s] = v[m_s(P_m(Q), W)].
\]
Because the consumer’s wealth constraint imposes scarcity on total consumption, the spread of potential medical consumption scenarios corresponds to a spread of non-medical consumption scenarios defined by the amount of wealth that remains after purchasing the utility-maximizing quantity of medical care in each scenario. Consumption includes everything an individual purchases other than medical care, from basic necessities such as housing and food to luxury, entertainment, and investment. The amount of non-medical consumption available in a given medical consumption scenario comprises initial wealth less any medical spending, including out-of-pocket (OOP) medical spending and the insurance premium $R$:

$$c = W - OOP - R(Q).$$

Some individuals, in some instances, will not have enough wealth to absorb the out of pocket costs associated with a catastrophic medical consumption scenario. For example, if an individual incurs an emergency medical bill of $15,000, has no assets, and earns only $15,001 in annual income, that person will consume more than $1 worth of non-medical goods and services for the year. In these instances I assume that individuals make use of the system of charity care and bad debt that operates throughout the U.S (Mahoney, 2015). Without filing for bankruptcy, consumers can use the potential of bankruptcy as leverage in negotiations. Medical providers, and their debt collection agencies, know that they will not be paid in full if a consumer files for bankruptcy. Providers can, and frequently do, minimize collection costs and maximize revenues by settling for an amount preferred by the consumer (Mahoney, 2015).

In each medical-consumption scenario, I assume that out of pocket spending is equal to the price times the quantity of medical care, or the individual’s financial cost of bankruptcy, whichever is lower:
\[(7) \quad OOP = \min[(P_m \cdot m), \text{FinCostBk}]\]

The financial cost of bankruptcy includes the value of assets that the consumer and the legal costs of filing, which is estimated at $2,000 (Mahoney, 2015). As reflected by its name, the financial cost of bankruptcy does not reflect the non-financial costs of bankruptcy, including future credit problems or stigma.

In summary, each individual chooses whether or not to become insured before \(s\), the realized health scenario, is revealed. Once \(s\) is revealed, the consumer optimally allocates wealth between medical and non-medical consumption by selecting a utility-maximizing quantity of medical care as a function of the price of medical care (determined by the consumer’s previous insurance decision), total wealth, and the revealed health scenario.

Optimization Across Ex-Ante Spread of Scenarios

When consumers purchase insurance they do not know for certain what their health will be over the upcoming year. While individuals are aware of the range of potential health scenarios they face as a function of their medical and personal characteristics, they are nevertheless uncertain about the eventual outcome they will experience within the range. Under these circumstances, health insurance provides two benefits to the consumer: (1) a reduction in the price of medical care, which allows a greater quantity of medical care within the budget constraint; and (2) more certainty about the quantity of consumption that will be possible after purchasing medical care, which is especially important in catastrophic medical scenarios.

I assess individual welfare from the ex-ante perspective of consumers deciding whether or not to purchase insurance, before the realization of the randomly determined health scenario \(s\) is known. I take the expectation across the range of potential health scenarios each individual faces:
(8) \( U[C, H] = E[u(c)] + E[v(m)] \).

Expected medical consumption measures the indirect utility of health:

(9) \( E[v(m)] = E[P_m \cdot m] \).

The difference in expected medical consumption with and without insurance measures the change in the indirect utility of health. I take the expectation of total medical consumption across the individual’s ex-ante distribution of potential health scenarios.

I assume that individuals are risk-averse in regard to non-medical consumption. In extremely adverse health scenarios, consumers allocate a significant portion of wealth towards medical care, which severely constrains non-medical consumption. On the other hand, in favorable health scenarios more wealth is available for consumption. In essence, by collecting a premium in all scenarios and returning benefits mostly in unfavorable scenarios, insurance allows consumers to shift consumption from favorable scenarios where consumption is less valued dollar-for-dollar, to unfavorable scenarios where additional consumption is highly valued. To account for variation in the marginal utility of non-medical consumption across potential scenarios, I find the expected value of the utility of consumption across the range of potential consumption scenarios that each individual faces. I evaluate the expected utility of consumption in dollars using its certain consumption equivalent. The certain consumption equivalent represents the dollar amount of consumption that produces an equivalent level of utility as the expected value of the uncertain distribution of utility across the range of potential consumption scenarios.
Welfare Effects of the ACA

The Affordable Care Act will cause some previously uninsured adults to obtain health insurance, thereby improving the individuals’ access to medical care and providing financial protection from uncertain medical spending. The welfare change caused by the ACA is given by the difference in welfare in each policy environment:

\[
\Delta U_{[C,H]} = U_{[C,H]_{ACA}} - U_{[C,H]_{No\ ACA}}.
\]

The ACA’s expansion of insurance affects health-related welfare by reducing the price of medical care, which causes an increase in the quantity of medical care demanded. The increase in medical consumption will presumably cause a marginal improvement in the individuals’ health. In my empirical analysis, I measure the ACA’s effect on the utility derived from health by finding the difference in the expected value of medical consumption with and without implementation of the law. This measure assumes that, within this context, additional medical consumption is approximately as beneficial for health as the initial quantity of medical care consumed.

In theory, marginal benefit declines as the quantity consumed increases. The standard downward sloping demand curve represents a diminishing willingness-to-pay for, and perceived benefit from, additional consumption of a good. For example, suppose an uninsured individual pays price \( P^u \) for medical care and demands the quantity \( Q^u \) in Figure 3.1. If the individual obtains insurance then the price they pay for medical care decreases from \( P^u \) to \( P^i \) and in response, the quantity of medical care demanded increases from \( Q^u \) to \( Q^i \). In the standard analysis, only the portion of additional consumption below the demand curve is welfare improving, represented by Trapezoid \( AQCQ^iQ^u \).
In my analysis, I assume that the entire increase in medical consumption is welfare improving, represented by the larger area of rectangle $ABQ^wQ^i$ in Figure 3.1. I assume that marginal benefit does not decline substantially over the range of increased quantity observed. This measure can be understood as a “best case scenario” for the gain in consumer welfare realized from an increase in medical consumption (Pauly, Leive, & Harrington, 2015). I choose the larger, “best case scenario” area to represent the welfare improvement of medical care induced by the ACA’s expansion of insurance because the alternative measure (Trapezoid $ACQ^1Q^w$ in Figure 3.1) does not adequately account for the income and wealth constraints facing the population of previously uninsured adults. For consumers with severely constrained budgets, medical consumption competes directly with the consumption of basic necessities like food and shelter (Levy & DeLeiere, 2002). Within this context, observed willingness-to-pay might not adequately represent the marginal benefit of health care. Moreover, the Affordable Care Act expressly aims to increase medical consumption in order to improve the poor health outcomes observed among previously uninsured adults (Institute of Medicine (U.S.) Committee on the Consequences of Uninsurance, 2009). The fact of the ACA’s implementation suggests a greater-than-standard marginal benefit over the increase in health care consumed by the previously uninsured.

I will conduct an empirical sensitivity analysis to explore the effect of valuing increased medical consumption with trapezoid in Figure 3.1 as opposed to the rectangle, which reduces the welfare improvement from health care and insurance. Additionally, at the end of this chapter, I review alternative perspectives of the value of increased medical consumption within the existing literature. Next I will review approaches to the primary estimation challenges to empirically implementing this conceptual framework.
3.2 Literature Review

Ex-Ante Medical Consumption

In a world without data limitations, it would be preferable to approximate ex-ante medical consumption without imposing any assumption about the shape of the probability distribution of observations. A researcher might divide the population by insurance status and assume that if 1% of the privately insured consumed more than $5,000 worth of medical care last year, then each privately insured individual had a 1% chance of consuming that amount, independently of the amount of medical care they actually consumed. Similarly, if 10% of the uninsured population consumed between $500 and $600 worth of medical care, then at the beginning of the year each uninsured individual had a one in ten chance of consuming between five and six hundred dollars worth of medical care. The researcher might find that in addition to insurance, gender also determines the spread of medical consumption scenarios that individuals face and create a total of six mutually exclusive groups, with three insurance groups (private, public, and uninsured), each divided into two gender groups. Having a chronic condition, such as cancer or diabetes, might also be an important determinant of future medical consumption, leading to a total of twelve groups.

One can imagine how incorporating additional covariates can quickly create a prohibitively high number of sparsely populated mutually exclusive groups. Analysts using a non-parametric approach must balance the predictive power of finely tuned groups on the one hand and the adequacy of sample sizes on the other. Because insurance is highly valued during rare and extreme health shocks, which by definition are not frequently observed, the sample size limitation presents a serious challenge to the incorporation of covariates and the overall utility of a non-parametric approach.
A parametric approach avoids the sample-size issue that occurs within cells. In these studies, researchers assume that the spread of medical consumption conforms to a mathematically defined probability distribution, and use individual characteristics to estimate the likelihood of observing a given medical consumption value for each individual. It is effectively impossible for distributional assumptions to be correct for 100% of outcomes and covariates. However, parameterization can provide a reasonable approximation of covariate effects that permits comparison of the outcome across a number of individual characteristics.

Non-parametric

Credited as the first medical expenditure risk assessment, Farley (1985) simulated ex-ante out-of-pocket medical spending to evaluate the adequacy of insurance protection in catastrophic scenarios. The study’s non-parametric approach approximates the ex-ante distribution of medical consumption using the observed spread of medical spending within each of two population groups with high and low expected medical costs, respectively, from the 1977 National Medical Care Expenditure Survey (NMCES). By applying cost sharing details about each individual’s policy, the author simulates ex-ante out of pocket (OOP) spending. Because these plan descriptions are no longer being collected, the study’s methods cannot be replicated (Banthin & Bernard, 2006, p. 2713). Farley considered an individual “underinsured” if they would spend more than 10% of family income out of pocket in a catastrophic event, such as the top 5% of ex-ante medical consumption scenarios observed within their group.

Among all nonelderly adults with private health insurance coverage, 8% had a nontrivial 1 in 20 chance of spending at least 10% of family income on medical bills in 1977 (Farley, 1985). After incorporating the 10% of individuals who are uninsured all year and an additional
15% with lapses in coverage or limited insurance, roughly 25% of Americans in 1977, or 50 million people, were inadequately protected against the possibility of large medical bills.

Publishing as Pamela Farley Short, Farley co-authored an updated estimate of underinsurance in the mid-1990’s, which evaluates underinsurance against a definition based on actuarial value in addition to the previous definition involving catastrophic coverage (Short & Banthin, 1995). The actuarial values of private policies in the 1987 NMES (renamed from the NMCES) are compared to two benchmark plans, the Federal Employee Health Benefit plan with the greatest enrollment and another proposed by the Clinton administration in 1994.

The two studies track an upward trend in the catastrophic spending risk between the late 1970s and late 1980s. In 1987, nearly one in five (18.9%) nonelderly adults with private insurance were underinsured from the catastrophic perspective, a 50% increase over the previous estimate. The level of spending that defined the top percentile of medical expenditures increased four-fold over this period, outpacing growth in average medical spending, rates of insurance coverage, and per capita income.

Catastrophic underinsurance, which is explicitly defined as a function of household income, varies substantially according to enrollees’ income and health status. By contrast, income did not predict the likelihood that an individual’s policy met the actuarial benchmark because actuarial values did not vary substantially across the privately insured population, either within or across demographic groups. Within insurance policies that have similar actuarial values, low-income individuals faced high levels of cost sharing relative to their incomes. A majority (61.6%) of individuals with incomes below 125% FPL were inadequately protected from catastrophic spending, roughly three times the national average.
Feldstein and Gruber (1995) used a similar non-parametric simulation method to evaluate consumer welfare under a hypothetical “major risk” insurance program. Privately insured individuals in the 1987 NMES are divided into four demographic categories (single adults, single adults with children, couples, and couples with children). Medical expenditures within each group are ordered, and the ranked list divided into 100 intervals, each with a.01 probability of occurring. Next each household has 50 observations drawn from its respective expenditure category and the average utility of non-medical consumption for each household is found under each of the 50 observations, given the household’s income. The authors note that this framework assumes medical consumption is independent of income, but further dividing the categories further would leave too few observations in each category to draw conclusions on infrequent, large expenditure amounts (Feldstein & Gruber, 1995, p. 119).

Because the proposed coinsurance rate of 50% was higher than those observed within their sample, the authors adjusted medical consumption according to the price elasticity of demand for medical care. There was, and continues to be, substantial uncertainty surrounding the degree of elasticity. The authors select two elasticity values,.33 and.5, from within the range of published estimates. These values are intended to conservatively estimate the effect that a nationalized major risk plan might have on consumer and provider behavior (Feldstein & Gruber, 1995, p. 110).

Data analysis advanced considerably over the following two decades, exemplified by a recent non-parametric simulation that constructs $10^4$ mutually exclusive risk groups (Handel B., 2013). Johns Hopkins ACG software categorizes a sample of privately insured individuals based on millions of observations from detailed claims data. For example the software is able to differentiate between the effects of a chronic vs. acute hospitalization on future medical
consumption (Robert, MacWilliam, Verhulst, Roos, & Atkinson, 2001). The methodology represents substantial progress in the domain of medical risk prediction, but cannot apply directly to an uninsured population for whom detailed claims diagnosis data do not exist.

Semi-Parametric and Parametric

Semi-parametric methods offer a compromise between fully- and non-parametric approaches by fitting observations within separate groups to a probability distribution. In particular, quantile regression is a semi-parametric method that divides the population into $q$ quantiles based on the dependent variable, and conducts separate parametric regression for each (Jones, 2000). For example, a quantile regression study finds that the price of alcohol affects heavy drinkers differently than other drinkers (Manning, Blumberg, & Moulton, 1995). The method is better suited to comparing covariate effects than identifying an expected value or simulating an ex-ante spread of medical consumption. Because observed medical consumption defines each quantile, the ex-ante distribution of medical consumption faced by each group member is restricted within a narrow range.

A similar, more commonly used semi-parametric estimator is the two-part model. The two-part model gets its name from separately estimating the probability of any medical care use, $P(y > 0|x)$, from the estimate of spending levels conditional on receiving care, $E(y|y > 0, x)$. The model reflects two separate underlying data generation processes. The decision to seek medical care is likely to be qualitatively different from the decision to spend slightly more than $0$, which occurs in a clinical setting. The first part of the two part model uses either probit or logit, which do not vary much in practice (Buntin & Zaslavsky, 2004).

Modeling the second part of the TPM, which represents the continuous outcome of medical spending given spending is greater than $0$, faces the problem of heteroscedasticity: the
variance of the error terms of medical spending vary according to individual demographic and medical characteristics. Mullahy (1998) tests the TPM and warns that on the basis of his algebraic and empirical results one should use considerable caution if using the TPM under the assumption that the continuous medical consumption variable exhibits homoscedasticity, in which error variance remains constant (Mullahy, 1998, p. 279).

One can normalize the distribution of error terms in a continuous dependent medical spending variable by taking its natural log (Buntin & Zaslavsky, 2004; Manning, Newhouse, Duan, Emmett, Leibowitz, & Marquis, 1987). The problem with log transformation is in interpreting its results. One must re-transform from the log-scale back to the scale of dollars, considering that “Congress does not appropriate log dollars,” (Manning W., 1998, p. 285). In the presence of complex heteroscedasticity, in which the variance depends on multiple binary variables or a continuous variable, re-transformation causes considerable loss of estimate precision or is simply not possible.

A more recent development in medical expenditure simulation is the generalized linear model (GLM). The GLM is attractive because it models the mean and variance on the original raw-scale of the dependent variable, which is dollars in this case. A linear mean function specifies the vector of covariates $XB$ and a link function specifies the link between the mean function and the expected value of the dependent variable. Researchers often use a log-link for health expenditure data (Buntin & Zaslavsky, 2004).

\begin{equation}
\ln(E(y)) = X'B
\end{equation}

Or alternatively:

\begin{equation}
E(y) = \exp(X'B).
\end{equation}
It is relatively simple to compute and interpret the results of the log link. The GLM does not require the complex retransformation process of the log-transformed OLS, which specifies $E[\ln(y)] = XB$ instead of equation (12). The analyst additionally specifies the relationship between the mean and the variance in GLM:

$$v(x) = v(\mu(x'\beta))^\lambda.$$  

When $\lambda=0$ the variance is constant and when $\lambda=1$ the variance is proportional to the mean. When $\lambda=2$ the variance is proportional to the mean squared, which falls under the gamma-scale family. Assuming the variance of medical spending is proportional to the mean-squared predicts an error term that increases exponentially as the expected value of medical spending increases. Because data on medical spending resemble this shape, researchers have suggested a log-link and gamma-family assumption for modeling medical spending (Buntin & Zaslavsky, 2004; Deb, Manning, & Norton, 2011).

A recent study of ACA welfare effects for previously uninsured non-poor adults approximates ex-ante medical consumption using a GLM-estimated expected value and variance within 16 mutually exclusive risk groups (Pauly, Leive, & Harrington, 2015). The previously uninsured adult population in the 2007 to 2012 Medical Expenditure Panel Survey (MEPS) is categorized according to age (above and below 40 years); gender; income (above and below 250% FPL) and; self-rated health (fair or poor and excellent, very good, or good). The GLM assumes a gamma distribution with a log link. The upper bound estimate for ex-ante medical consumption with ACA insurance is the expected value of medical consumption among pre-ACA full-year privately insured individuals in similarly defined risk-groups, and the lower bound estimate assumes no increase in medical consumption.
The generalized gamma model approach (GGM) represents a final development in the fine-tuning of parametric assumptions to observed data, at least as of this writing. Like the GLM, the GGM allows for separate link and variance functions. The GGM differs in the way it specifies variance. The GGM is defined by three parameters: \( \lambda \), a location parameter defining the expected value of the distribution; \( \sigma \), the spread parameter defining the variance; and \( \kappa \), the shape parameter, which describes the distribution’s shape. Figure 1 below shows alternative gamma distributions with an expected value of 0 to illustrate the effect of varying the shape and spread parameters. The GLM with \( \lambda = 2 \) corresponds to a standard 2-parameter gamma model, which is nested within the generalized gamma. Table 3.2 outlines special cases of the Generalized Gamma distribution based on the value of its shape and spread parameters.

According to Manning, Basu, and Mullahy (2005), who study a variety of simulated and real data, the generalized gamma provides a straightforward formal testing method for choosing among nested cases and typically outperforms its nested models. An adjusted Wald test rejected the use of nested models (including a log normal distribution, Weibull, and standard gamma) that did not fit the simulated data and rarely rejected the true specification. Moreover, the generalized gamma loses little precision relative to the GLM, when estimating the log-scale slope despite having weaker assumptions. When the generalized gamma rejects the nested distributional assumptions, ancillary parameter values can be estimated directly from the data.

The authors analyze an example using data on inpatient medical expenditures, which are particularly relevant to a simulation of medical consumption for uninsured adults. Similarly to the medical consumption observed in a population of uninsured adults, inpatient medical consumption is likely to be heavily skewed with a large share of $0 observations and a few extremely high outliers.
In a nationally representative sample of Medicare beneficiaries, the GGM outperforms nested cases seven out of eight times (Meier, Measuring Medical Expenditure Risk: Implications for the Development of a Measure of Medical Care Economic Risk, 2015). In the first application of the generalized gamma to a model of ex-ante medical expenditure risk, Meier (2015) divides a sample of 10,271 Medicare beneficiaries in the 1996 – 2004 MEPS into risk cells using two types of risk classification, a health-cell approach (using self-reported health and activity limitations) and a risk-score approach (using DCG-HCC Medicare model risk scores9). Total medical expenditures for cell members are fit with a two-part model, the first estimates likelihood of $0 using probit, while the second applies a GGM to the probability distribution of positive medical expenditures.

For all four health cells and three of the four risk-score cells, an adjusted Wald test rejects the null hypothesis that restricting the GGM parameter values to the nested cases of the lognormal, Weibull, or exponential distribution provides a superior fit. The risk-score method has a greater discriminate ability and assigns a much smaller share of the population to the top category relative to the highest risk health-cell (1.5% vs. 7.1%). An adjusted Wald test on the highest risk cell using the score-based classification is unable to reject the superiority of the nested exponential distribution. This cell is the least populated of all eight cells (n = 157), which may lead this result either to be spurious or to reflect the advantage of more stringent parametric assumptions in this sparsely populated cell. Meier constructs a probability distribution of total medical expenditures within each cell assuming an exponential distribution in the highest-risk score cell and the GGM to the remaining seven cells.

9 Scores are available from AHRQ, which produces the MEPS, and are constructed from demographic and medical information
Medical expenditure distributions within each cell approximate cell members’ ex-ante distributions to demonstrate the likelihood of exceeding medical spending thresholds with and without insurance. The author applies a stylized insurance package to the total medical expenditure distribution to demonstrate cell members’ likelihood of spending either ten or fifty percent of income out of pocket.

Meier’s study extends previous examinations by simulating the full distribution of medical spending scenarios that each individual faces with and without claims paid by insurance. By contrast Pauly et al (2015) finds each individual’s unique expected value of medical consumption but does not simulate an ex-ante distribution. The expenditure distributions estimated in Meier (2015) do not account for any reduced utilization that might occur without insurance. The sample is restricted to Medicare beneficiaries, who by definition all have insurance.

In my empirical analysis, which I will detail in the following chapter, I simulate medical consumption by estimating a generalized gamma distribution. The approach extends Meier’s (2015) work by estimating individual-level values for each of the distribution’s three parameters as a function of medical and demographic characteristics, including insurance status.

Utility Of Non-Medical Consumption

Insurance improves the welfare of risk-averse consumers by protecting against potentially catastrophic levels of medical spending. The formal definition of risk aversion assumes a decision maker with a twice-differentiable von-Neumann Morgenstern utility function. She faces an uncertain distribution of consumption, C, and a correspondingly uncertain distribution of utility from consumption, U[C]. The decision maker is risk averse if she would derive more utility from having the expected value of consumption with certainty than from a lottery with the same expected value: \( U[E(C)] > E[U(C)] \).
Arrow (1965) and Pratt (1964) offer a measure of the degree of consumer risk aversion: the rate at which the marginal utility of consumption declines as the level of consumption increases. The measure is the ratio between the first and second derivatives of the utility of consumption. There are two variations of the measure. Constant Absolute Risk Aversion (CARA) is defined as \[ A(C) = \frac{-u''(C)}{u'(C)}. \] The other, Constant Relative Risk Aversion (CRRA), is defined as \[ R(C) = C \cdot A(C) = -\frac{C u''(C)}{u'(C)}. \] Under an assumption of CRRA, risk aversion varies according to the share of an individual’s initial wealth that is at risk.

Researchers have employed a variety of identification strategies to empirically evaluate risk aversion. There are no market data that precisely reveal consumers’ Arrow Pratt risk aversion. Switching costs complicate market data on health insurance choices; people tend to remain in the plans they previously selected despite changes in premium prices or health status. Consumers’ inability to identify levels of acceptable risk and assess differences in small probabilities complicates survey data on hypothetical alternative risky choices (Zweifel, Breyer, & Kifman, 2009). Nevertheless data from randomized and natural experiments (including the Rand Health Insurance Experiment, Federal Employee Health Benefit plans, and insurance claims) reveal some information about consumer preferences.

Martin S. Feldstein’s (1973) seminal paper derived a CARA risk aversion parameter intuitively, rather than from market data, based on the implications a given parameter value would have for the elasticity of the marginal utility function. Feldstein considered the incentive that would be required for a risk-averse individual to accept a hypothetical bet with a 50-50 chance of winning or losing $1,000. He assumed a range of CARA values associated with a $50 incentive \((1*10^{-4})\) to a $333 payment \((7*10^{-4})\) (see Table 3.3 for summary of parameter estimates).
Friedman (1974) found much higher CARA parameter values from an empirical analysis of market data on the health insurance choices of households in the Federal Employee Health Benefits program. Friedman’s estimate of $2.6 \times 10^{-3}$ is an order of magnitude larger than those derived by Feldstein (1973). An individual with this degree of risk aversion is willing to pay $311 to fully insure against a 10% chance of losing $1,000 (an expected loss of $100), which was roughly the risk of one inpatient hospital admission (Friedman B., 1974, p. 213).

Marquis and Holmer (1986) found CARA parameter values similar to Friedman’s (1974) in their analysis of survey data from the Rand health insurance experiment, which asked consumers to choose between hypothetical supplemental insurance policies. The estimated CARA parameter values range from $2.8 \times 10^{-3}$ to $3.6 \times 10^{-3}$ (Marquis & Holmer, 1986). The authors note their analysis assumes that consumer demand for a more comprehensive insurance policy reflects only an aversion to financial risk, rather than also reflecting consumer demand for medical care (Marquis & Holmer, 1986, p. 44).

Feldstein and Gruber found that the welfare implications of catastrophic coverage vary according to the degree of risk aversion, by applying CRRA parameter values from the existing literature (Feldstein & Gruber, 1995). The authors quantify the welfare change due to risk bearing from a hypothetical major risk insurance program with a 50% coinsurance rate and an out of pocket maximum of 10% of household income. Assuming a moderate level of risk aversion (CRRA = 1), the certain consumption equivalent to the utility of consumption was lower on average under the major risk plan than under the households’ original plans. Assuming a high level of risk aversion (CRRA = 3) the utility of consumption was greater with the major risk plan than the households’ original plans. Individuals with a stronger aversion to risk placed more value on the benefit of the out of pocket maximum in their major risk plan.
A more recent analysis that distinguishes between the financial and medical sources of demand for health insurance found CARA parameter values on the same scale as those derived intuitively by Friedman (1974). Handel (2013) analyzes data from a large US based firm that introduced a new menu of health insurance options to its employees. Because the employees had no default option, the data reveal consumers’ preferences in the absence of the inertia, or status quo bias, in which consumers tend to remain in their original plans over time. Additionally, the author had access to detailed claims data on the sample members’ medical consumption. Handel combines claims and insurance choice data to estimate consumers’ risk preferences. The mean CARA parameter was $4.39 \times 10^{-4}$, and increased slightly with expected medical spending and income.

In a following analysis, Handel and colleagues apply the previously estimated CARA parameter to evaluate the welfare implications of community rating regulations, which prohibit insurers from basing the price of an insurance premium on an enrollee’s health status (Handel, Hendel, & Whinston, 2015). Community rating protects against “reclassification risk,” in which enrollees face high insurance premiums in the year following a diagnosis because they are reclassified as high risk consumers. On the other hand, community rating can drive up the average premium price by inducing adverse selection in which less healthy individuals have more incentive to enroll. The authors found that the welfare gains from protection against reclassification risk were five times larger than the losses from adverse selection (Handel, Hendel, & Whinston, 2015). Moreover, the authors calibrated their study to an ACA-relevant population by weighting the sample to reflect the MEPS population of nonelderly adults who were either uninsured or enrolled in the individual market before implementation of the ACA. The re-calibrated sample led to the same welfare conclusions.
In this study, I use the CARA risk aversion parameter estimated by Handel (2013). The estimate is derived from a recent and large source of medical expenditure data. Furthermore, the parameter value varies according to each individual’s income and his or her age. Heterogeneity with respect to age reflects the relationship between risk preferences and expected medical spending. Heterogeneity with respect to income lessens the distinction conceptually between this CARA assumption and an assumption of Constant Relative Risk Aversion. I use the CARA functional form and estimated parameter values to quantify the financial-related welfare effects of insurance. In the following and final section of this chapter, I analyze alternative approaches to quantifying the health-related welfare effects of insurance in the existing literature.

Welfare Implications of Marginal Medical Consumption

Insurance encourages its enrollees to consume more medical care than they would without insurance by lowering the price of medical care. This behavioral response to the price of medical care has a negative connotation (reflected by its label ‘moral hazard’) because the additional medical consumption is interpreted as less beneficial than the additional social cost of producing the care, and is simply consumed because of its lowered price (Frick & Chernew, 2009). Pauly (1968) laid the conceptual groundwork for analyzing the welfare implications of moral hazard, likening the phenomenon to the prisoner’s dilemma (p. 535). Insured consumers get all of the benefit from their marginal medical consumption, while spreading the cost across the entire pool of enrollees. Pauly argued that the welfare loss from moral hazard is the difference between the cost of the additional medical care consumed with insurance and the consumer’s willingness to pay for the additional services (the area under the uninsured demand curve in Figure 3.1) (Triangle ABC in Figure 3.1). The optimal level of insurance, he argued, balances the welfare losses that result from too much insurance, which encourages moral hazard,
against the welfare gains of insuring against exogenous and uncertain potential medical spending.

Several important analyses sought to quantify the tradeoff that Pauly outlined, and concluded that the welfare losses from moral hazard outweighed the welfare gains of financial risk protection from health insurance. Martin Feldstein (1973) evaluated the welfare effects of increasing the coinsurance rate from the population average of 33% to a higher rate of 50% or 67%, which would reflect the true market cost more closely. While the higher coinsurance rate would generate welfare losses for consumers by exposing them to greater risk, he found that on net the decrease in inefficient moral hazard would generate a net welfare improvement of $4 billion.

Publishing with co-author Jonathon Gruber, Feldstein later analyzes the welfare implications of a major risk insurance program that emphasizes coverage of catastrophic events (Feldstein & Gruber, 1995). By instituting high levels of cost sharing, the plan would reduce medical spending by about 20% in the aggregate, an outcome that the authors considered to be welfare improving. On net, the welfare gains from reduced moral hazard outweighed the welfare losses from increased risk exposure under most of the authors’ assumptions.

In line with the theoretical and empirical analyses of the era, insurers implemented a number of cost-containment policies throughout the 1980s and 1990s, designed to temper the incentives for moral hazard and slow the rapid growth in medical spending. Cost sharing for non-catastrophic care (including deductibles), as well as enrollment in managed care plans each grew increasingly common and extensive and was implemented to reduce moral hazard (Newhouse, 1992). By the close of the 1990s, managed care plans became the dominant type of coverage (Blendon, et al., 1998).
Serious theoretical and political concerns about the welfare implications of cost containment policies designed to address moral hazard emerged over the following decades. In a series of theoretical and empirical analyses, John Nyman (2002) points out that part of the motivation for obtaining insurance is to gain access to important and otherwise unaffordable medical care. He asks, for example, whether any portion of a life-saving liver transplant that is only affordable with insurance should be evaluated as an inefficient price response (1999).

Moreover, it's not clear that the un-subsidized price of medical care reflects the true undistorted opportunity cost to society of the resources used in its production, or that inefficient quantities of medical care can be defined solely on the basis of observed market demand (Hurley, 2000).

The advent of managed care policies was met with considerable public backlash, to the extent that by the end of the 1990s, the US Congress and nearly every state collectively introduced over 1,000 pieces of legislation protecting consumers of health insurance (Blendon, et al., 1998, p. 81). Surveys of privately insured consumers from the era revealed a fear of potentially catastrophic medical spending, independent of their actual medical spending (Blendon, et al., 1998). The consumers’ fear fits the definition of medical expenditure risk and raises questions about the underlying theoretical and empirical evaluations that led to these policies.

Since my analysis is concerned only with the individual welfare gains from the ACA’s expansion of insurance, not a full reckoning of social costs and benefits, my calculations depart in several important ways from the standard calculations determining the optimal amount of insurance. Firstly the standard analysis assumes that the price of insurance is actuarially fair to each consumer such that each consumer bears the full cost of increased utilization induced by insurance through increases in premiums. In my analysis, the ACA subsidizes insurance
premiums based on the individual’s income, which absorbs the cost of increased utilization. Thus the increase in costs to the consumer is not accurately represented by Figure 3.1.

Secondly, while I regard the area under the demand curve as the monetized benefit to the consumer of increased consumption, I do not assume that the demand curve is necessarily downward sloping over the increase in quantity observed for severely income-constrained consumers. For consumers with severe constraints on their consumption, demand for medical care while uninsured (Q'u in Figure 3.1) may primarily reflect the consumers’ competing constraints on consumption, namely for subsistence, rather than signifying the perceived marginal benefit of health care. Finally, my welfare analysis accounts for both the costs and benefits of increased utilization by invoking the additive separability assumption. The cost to the consumer of additional medical care, including out-of-pocket spending and premiums, enter into the non-medical consumption term of the consumer’s utility function, while the monetized benefits of healthcare consumption enter into the calculation of the consumer’s utility of health.

In the following chapter I will describe the data and analytic methods I use to empirically evaluate the ACA’s welfare effects for previously uninsured adults, to project their post-ACA insurance status, and to simulate the distribution of medical and non-medical consumption scenarios that each individual faces with and without the Affordable Care Act. I incorporate major insurance-related features of the ACA, including private insurance costs, state-specific decisions to expand Medicaid access to adults without children, and the amount of wealth that uninsured adults risk losing.
3.3 References: Conceptual Framework and Literature Review


3.4 Tables and Figures: Conceptual Framework and Literature Review

Figure 3.1: Marginal Benefit of Medical Care Consumption

Note: Figure 3.1 illustrates the primary and alternative measures of the welfare effect of increased medical consumption with insurance.

\( P^u, Q^u \) = Price and quantity demanded for uninsured consumer
\( P^i, Q^i \) = Price and quantity demanded for insured consumer

The primary measure is represented by the rectangle \( ABQ^iQ^u \). The alternative measure, explored in a sensitivity analysis, is represented by the trapezoid \( ACQ^iQ^u \). Each measure provides an upper and lower bound to the uncertainty around the marginal benefit to the consumer of consuming additional medical care with insurance relative to remaining uninsured.

Figure 3.1: Consumer Surplus from Medical Care Consumption
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Population (Data)</th>
<th>Outcome of Interest</th>
<th>Expenditure Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farley (1985); (Farley) Short &amp; Banthin (1995)</td>
<td>Adults under 65 years (NMES)</td>
<td>Definition, number of underinsured nonelderly adults</td>
<td>Likelihood OOP spending greater than income-based thresholds in high-risk category (25% of sample defined by individual characteristics) and low-risk category (remaining 75% of sample)</td>
</tr>
<tr>
<td>Feldstein &amp; Gruber (1995)</td>
<td>Nonelderly adult households with private group coverage (NMES)</td>
<td>Welfare effect of public catastrophic coverage plan: social cost of total spending and individual risk of OOP</td>
<td>50 draws from observed medical spending within 4 groups of consumers: single adults, adults with kids, couples, couples with kids</td>
</tr>
<tr>
<td>Handel (2013)</td>
<td>Nonelderly adult households with private group coverage (Insurance claims)</td>
<td>Interaction between inertia and adverse selection in setting premiums</td>
<td>Semi-parametric distribution of observed medical spending in $10^4$ risk cells defined by medical and demographic characteristics.</td>
</tr>
<tr>
<td>Barcellos and Jacobsori (2014)</td>
<td>Medicare beneficiaries (MEPS)</td>
<td>Risk premium over potential OOP spending with and without Medicare</td>
<td>Quantile regression of continuous OOP distribution controlling for individual characteristics, with 99 quantiles of OOP spending</td>
</tr>
</tbody>
</table>

Note: This table summarizes examples from the existing literature of approaches to simulating future medical spending from the ex-ante consumer perspective.
Table 3.2: Special Cases of the Generalized Gamma Distribution

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Implied Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kappa = 0</td>
<td>Lognormal</td>
</tr>
<tr>
<td>Kappa = 1</td>
<td>Weibull</td>
</tr>
<tr>
<td>Kappa = Sigma = 1</td>
<td>Exponential</td>
</tr>
<tr>
<td>Sigma = 1</td>
<td>Gamma</td>
</tr>
<tr>
<td>Kappa = 0</td>
<td>Lognormal</td>
</tr>
</tbody>
</table>

Note: This table presents special cases nested within the generalized gamma distribution. When the GGM parameter values equal those listed in the left hand column, the GGM distribution equals the distribution listed in the right hand column.
Table 3.3: Selected Risk Aversion Parameters in the Health Economics Literature

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Estimate of R</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feldstein</td>
<td>1973</td>
<td>1*10^{-4}</td>
<td>No data; intuitively derived</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3*10^{-4}</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7*10^{-4}</td>
<td></td>
</tr>
<tr>
<td>Friedman</td>
<td>1974</td>
<td>2.6*10^{-3}</td>
<td>Federal Employee Health Benefits</td>
</tr>
<tr>
<td>Marquis &amp; Holmer</td>
<td>1986</td>
<td>2.8<em>10^{-3} to 3.6</em>10^{-3}</td>
<td>Rand Health Insurance Experiment survey on hypothetical alternative deductible rates</td>
</tr>
<tr>
<td>Feldstein &amp; Gruber</td>
<td>1995</td>
<td>CRRA: $p = 0$ and $p = 2$</td>
<td>Assumed value, applied to National Medical Expenditure Survey data</td>
</tr>
</tbody>
</table>
| Einav and Cohen (auto-insurance) | 2007 | Mean 6.7 *10^{-3}  
Median 2.6*10^{-5} | Choice of deductible in auto-insurance contracts |
| Handel                        | 2013   | 2.32*10^{-4}           | Insurance enrollment, claims data from large US- based firm |
| Handel, Hendel, & Whinston    | 2015   | 4.39*10^{-4}           | Insurance enrollment, claims data from large US- based firm |

Note: This table summarizes Arrow Pratt measures of consumer risk preferences from the health economics literature.
Chapter 4: Simulation Methods

The empirical goal of this study is to quantify the magnitude of welfare gains and losses generated by the Affordable Care Act (ACA) for the population of non-elderly adults who were uninsured before implementation of the law. Welfare gains are generated from increases in the quantity of medical care consumed across a range of possible health scenarios, and from protection against the risk of potentially catastrophic medical spending.

I employ a micro-simulation model to make projections about individual welfare under the ACA. A micro-simulation model uses data about individuals and simulates their outcomes individually in order to draw conclusions that apply to higher levels of aggregation. Although some projected details might have a degree of inaccuracy, the value of micro-simulation lies in its illustration of orders of magnitude.

The micro-simulation model has five primary components. It begins with a representative sample of non-elderly adults who are uninsured before the ACA, and ends with a monetary valuation of the benefit these individuals derive from the law. In this chapter, I first provide a brief summary of the model’s components then describe each component in greater detail.

1. Representative Sample: The model begins with data on medical history, past medical spending, and demographic characteristics for a nationally representative sample of non-elderly American adults who are uninsured for a full year in the years leading up to the Affordable Care Act. These data are from the Medical Expenditure Panel Survey, to which I add data on wealth and state of residence from the Panel Survey of Income Dynamics.

2. Post-ACA Insurance: I simulate each individual’s insurance status after the ACA as one
of three insurance types: public, private, and no insurance. I randomly assign Medicaid enrollment among eligible individuals, where individuals with poorer health are more likely to enroll. I then assign private insurance enrollment based eligibility for private insurance subsidies, which predicts the likelihood of enrollment.

3. **Medical Consumption Distributions:** I use the medical history and past spending data to simulate a range of medical consumption scenarios that each individual might incur without insurance and with his or her post-ACA insurance. I project 100 equally possible medical consumption scenarios, representing the individual’s probability distribution of medical consumption.

4. **Non-Medical Consumption Distributions:** The fourth component of the model defines the amount of wealth and income the individual would have left over in each of the medical consumption scenarios, after purchasing insurance if the individual is privately insured and after purchasing medical care.

I find the level of utility that each individual derives from non-medical consumption in each of the possible consumption scenarios that the individual might face. I assess the utility of consumption in terms of its certain-consumption equivalent, which reflects both the expected value of consumption across the distribution of scenarios as well as the utility of certainty.

5. **Changes in Individual Welfare:** Finally I assess the welfare gains and losses from the ACA by finding the difference between individual welfare with and without the law. Individual welfare in each policy environment is measured as the sum of the expected value of medical consumption and the certainty-equivalent of the utility of non-medical consumption.
4.1 Data

The model begins with a representative sample of all non-institutionalized American individuals of all ages from panels 12 through 16 of the 2007-2012 Medical Expenditure Panel Survey (MEPS). Agency for Healthcare Research and Quality (AHRQ), which produces the MEPS, describes the survey as “the most complete source of data on the cost and use of health care and health insurance coverage [in the United States]” (Agency for Healthcare Research and Quality, 2009). The household component is supplemented by a provider component, which is used to verify respondents’ reports of medical expenditures. AHRQ verifies and edits data by sampling the medical providers of consenting respondents to obtain data on charges, payments, and procedure codes.

The MEPS collects information from respondent households a total of five times over a two-year period. From the MEPS I obtain demographic data including family income, education level, race, and region of residence; medical data including diagnoses, physical limitations, and perceived health; and health insurance data including source and length of coverage.

The primary analytic sample in this study is comprised of uninsured non-elderly American adults. Data on an individual from a given year are included if they are uninsured for the full year. I use case wise deletion for a final analytic sample of 12,805 unique uninsured non-elderly adults with complete expenditure and diagnosis information. In order to analyze each person-year individually, I reshape the data to a long format, which produces a final primary analytic sample of 21,352 person-years.

In general I refrain from making statements about the statistical significance of differences of welfare estimates. The manner in which I estimate each individual’s distribution of
medical and non-medical consumption scenarios introduces an additional layer of uncertainty above the complex sampling structure of the MEPS. I present weighted population averages to account for oversampling in the MEPS. I weight the data using the MEPS person-level sample weights, which account for the survey’s sampling design including oversampling of minority populations. For infrequent occasions in analysis when there is a single sampling unit within a stratum I use the scaling option in Stata. Stata creates a scaling factor by calculating the average of the variances from strata with multiple sampling units.

I incorporate state of residence in my analysis to compare individual welfare between states that expand and do not expand Medicaid. Additionally, I incorporate assets because individuals use household assets to fund catastrophic medical events (National Research Council, 2012). Each of these types of data are restricted in the MEPS, so I impute this information from the 2007-2011 waves of the Panel Survey of Income Dynamics (PSID).

The PSID is a longitudinal dataset that has been continuously collected at two-year intervals beginning in the year 1968. Information on the original sample members and their descendants is also supplemented by the addition of an “Immigrant Refresher Sample” in 1997 to reflect post-1968 demographic changes. The PSID includes individual- and family-level units of analysis; most of the data in this study are from the family-level data. From the family-level data I include information on race, state of residence, family income, assets and debts. I use the cross-year PSID individual dataset to obtain unique individual identifiers, region of residence, age, education, and health insurance status. I sub-set the individual data to include only non-elderly adults who are uninsured at the time of the interview and did not have health insurance.

---

10 The survey assigns the adult male as “head of household” if there is one present and the adult female as “wife” if there is one present. I find it noteworthy that social scientists in particular assign a head of household and do so on the basis of gender.
for twelve months of the previous year. I then combine the family and individual data, keeping only the observations that appear in both, using Stata code provided by the University of Michigan (Institute for Social Research, 2015). After a case wise deletion for missing variables, I retain a sample of 3,341 unique individual uninsured non-elderly adults, which produces 5,587 total person years of data.


I impute state, assets, and debts from the PSID using a hot-deck imputation method. Within each sample (MEPS and PSID), I organize individual into mutually exclusive groups based on characteristics that correlate with wealth and state of residence. Under the hot-deck imputation command, the Stata software randomly samples individuals from the PSID with replacement within each group to match with an individual from the MEPS in the same group. The MEPS individual takes on the assigned asset and state values.

Too many groups, defined by many characteristics, will not contain enough group members for random assignment to take place, but too broad of categories risks assigning inaccurate, or arbitrary, asset values. I weighed these concerns by running repeated linear regressions on log-transformed assets within the PSID data to identify the most influential predictors and ran the hot-deck imputation with a decreasing number of predictive categories.
The final imputation method uses 96 groups defined by five characteristics: age (above and below 35 years), region (four regions defined by the Census Bureau), race (non-Hispanic black and other), income (three quintiles of the combined MEPS-PSID sample), and education (with and without a high school diploma). After imputation, a similar share of population members within each census region reside in a Medicaid expansion state as reported in the PSID and simulated in the MEPS (Table 4.1). For the seizable asset variable that I construct and use in the simulation, the population mean in the imputed sample is within $2,000 of the population mean as reported in the PSID (Table 4.1). I proceed using the MEPS sample with imputed data on assets, debts, and state of residence.

4.2 Post-ACA Insurance Simulation

After implementation of the Affordable Care Act, previously uninsured adults may either obtain private insurance purchased through an exchange marketplace; enroll in Medicaid if their income is below the eligibility threshold and they live in a Medicaid expansion state; or they may remain uninsured.

First I simulate Medicaid enrollment among eligible individuals. As a general rule the threshold for Medicaid eligibility in expansion states is 138% FPL, while in non-expansion states adults without dependent children remain ineligible for the program. There are three exceptions to this rule reflected in the model’s definition of Medicaid eligibility. Washington, DC expanded eligibility under the ACA up to 215% FPL. Additionally, while Wisconsin and Wyoming did not expand Medicaid under the ACA, these two states do offer Medicaid to childless adult residents up to 100% FPL and 138% FPL, respectively.

Conditional on eligibility, I randomly assign Medicaid participation based on an assumed rate of participation. Each eligible individual receives a random number between 0 and 1
inclusive. If an individual’s number is below the assumed participation rate, that individual is assigned to Medicaid. To account for selection into Medicaid, I assume an 85% participation rate for eligible individuals with fair or poor self-rated health, and 65% for those with excellent, very good, or good self-rated health. On average 69.7% of eligible individuals enroll in Medicaid after the simulation.

After assigning Medicaid participation, I simulate enrollment in private insurance as a function of poverty status. Because poverty status determines the amount of federal subsidy, poverty status is the most important determinant of exchange enrollment (Pauly, Leive, & Harrington, 2015; Avalere Health, 2015). Early survey data reveal sharply declining rates of enrollment across the categories of poverty level that determine eligibility for varying amounts of federal subsidy (Buettgens, Kenney, & Pan, 2015; Avalere Health, 2015).

I assign enrollment in private insurance using a random number technique that is similar to my method of assigning Medicaid participation. In this case, rates of enrollment in private insurance vary by categories of poverty level. The healthcare management company Avalere, published rates of enrollment by poverty category among individuals who were uninsured or were insured in the individual insurance market prior to the ACA (Avalere Health, 2015). I use these published rates, and administer a random number between 0 and 1 to the sample members who are not assigned to Medicaid. If the random number does not exceed the reported enrollment rate for the individual’s poverty category, I assign the individual to private insurance. Among individuals who were not assigned to Medicaid, a population average of 25.4% enrolls in private insurance.
After assigning a post-ACA insurance status to each sample member, I simulate the distribution of medical consumption scenarios that each individual faces, which is in part determined by his or her insurance status.

4.3 Medical Consumption Distributions

In this simulation, the spread of medical consumption observed across a population of medically and demographically similar individuals proxies for the spread of ex-ante potential scenarios of medical consumption that each individual faces. For example, if the highest-consuming one percent of similar people reaches $10,000 worth of medical consumption, then I assume that each individual will consume $10,000 worth of medical care one percent of the time.

Rather than dividing the population into discrete, mutually exclusive groups to identify similar individuals, I conduct a parametric regression and control for a series of individual characteristics using a generalized gamma distribution (GGM), also called the three-parameter gamma distribution. I use the GGM because of its flexible functional form. Each of the GGM’s three parameters defines a feature of the distribution, which allows the expected value, shape, and spread, respectively of the probability distribution of medical consumption to each vary according to individual characteristics. This flexibility is particularly important for simulating medical consumption with and without insurance because medical consumption patterns vary significantly according to insurance status. I use total annual medical expenditures as reported in the MEPS as the dependent variable in the regression include medical, demographic, and insurance indicators as independent variables.

To my knowledge no studies have estimated individual-level values of each of the three parameters of a generalized gamma distribution to simulate ex-ante medical consumption. Previous studies have estimated the three parameters at the sample-level. In this study I estimate
each of the parameters at the individual level, based on medical and demographic covariates, to estimate the shape and spread of each individual’s ex-ante probability distribution of medical consumption.

While the primary analytical sample is restricted to full-year uninsured adults, I include full-year insured adults in the regression to estimate the effect of insurance on medical consumption. I select non-elderly adults with either full-year private insurance from an employer or full-year coverage from Medicaid and estimate the coefficient of insurance for each of the parameters. Before the ACA’s Medicaid expansion, adults with dependent children were eligible for Medicaid. Additionally, adults with disabilities were eligible for Medicaid and Medicare. I remove individuals who were dually enrolled in both programs, and I remove Medicaid beneficiaries with any form of physical limitation to avoid a selection bias.

The following three equations are run simultaneously, and Stata software produces each coefficient:

\[
\lambda_i = \beta_0 + \beta_1 Ins + \beta_2 Dx + \beta_3 Demog + \varepsilon_i
\]

\[
\sigma_i = \delta_0 + \delta_1 Ins + \delta_2 Dx + \delta_3 Demog + \varepsilon_i
\]

\[
\kappa_i = \zeta_0 + \zeta_1 Ins + \zeta_2 Dx + \zeta_3 Demog + \varepsilon_i
\]

In this specification \(\lambda_i\) represents XB, the expected value parameter of the probability distribution of medical consumption. \(\kappa_i\) approximates the shape of the distribution, and \(\sigma_i\) approximates the distribution’s spread. After running the generalized gamma regression I use the packaged command in the Stata software program ("predict lambda, xb") to generate the expected value parameter. The constants and coefficients of the shape and spread parameters, \(\kappa\) and \(\sigma\), are predicted in the regression, which I use to construct the value of the parameter for each individual by implementing equations (2) and (3). Specifically, I multiply each parameter
coefficient with the individual’s observed value of the independent variable, and sum each of
these values together with the parameter’s constant value generated in the regression. I use a total
of twenty-six demographic, medical and insurance variables to estimate the expected value,
shape, and spread of each individual’s ex-ante probability distribution of medical consumption.

I implement the gamma regression using a survival analysis tool in Stata (the ‘streg’
command) and treat total annual expenditures as the ‘time’ dimension of the model11. I use an
accelerated failure-time (AFT) model, the only one of the two commonly used survival models
that supports the generalized gamma distribution. The generalized gamma distribution takes the
following functional form:

\[
F(MEDcons) = \begin{cases} 
\exp\{\lambda + \frac{\sigma}{\text{sign}(\kappa)|\kappa|} \cdot \ln\left[\text{invgtail}(a, p)/a\right] \} & \text{if } \kappa > 0 \\
\exp\{\lambda + \frac{\sigma}{\text{sign}(\kappa)|\kappa|} \cdot \ln\left[\text{invg}(a, p)/a\right] \} & \text{if } \kappa < 0 
\end{cases}
\]

(17) 

where

\[
a = |\kappa|^{-2}
\]

(18) 

\[
\text{invg}(a, p) = \text{inverse cumulative gamma distribution}
\]

(19) 

\[
\text{invgtail}(a, p) = 1 - \text{invg}(a, p) = \text{reverse inverse cumulative gamma distribution}
\]

The function ‘invg (a, p)’ represents the inverse cumulative gamma distribution. If the
gamma distribution returns a probability value of p = .25 for \(G \sim (a, m)\) the inverse gamma would
return the value \(m\) for \(\text{invg} \sim (a, p = .25)\). Using the inverse gamma distribution function, and its
complement the inverse gamma tail distribution when \(\kappa < 0\), I find the value of medical
consumption at probability points along the probability distribution of medical consumption
scenarios. The generalized gamma distribution is only defined over strictly positive values of the

\[11\] Survival analysis was originally developed to illustrate the conditional probability of surviving
beyond a given amount of time, but I use it to model the probability of consuming a given
amount of medical care.
dependent variable, in this case total annual medical expenditure. To run the regression, I replace each $0 observation with a uniformly distributed number between $1 and $1512.12

I include binary indicators for a number of chronic condition diagnoses, each of which represents whether the individual has ever been diagnosed with the condition. I also include a binary indicator of either fair or poor perceived health, an indicator of poor perceived mental health status, and an indicator of any functional or sensory limitation. Each condition is listed in Table 4.3, along with the variables’ estimated parameter coefficients.

Demographic variables include age, gender, race, marital status, education, income as a percent of the federal poverty level, region of residence, metropolitan statistical area residence (MSA), and year of MEPS survey participation. Age is represented categorically by 5 binary variables, with age 18-29 years left out as the referent group. Race includes 4 binary categories: Hispanic, non-Hispanic black, Asian, and white and other. I estimate the effect of income with a continuous measure of household income as a percent of the Federal Poverty Level, which incorporates the absolute level of income as well as family size. Marital status includes one binary indicator of whether the individual has ever been married. Region is represented with four binary indicators corresponding to each of the census bureau US regions, with the southern region left out as the referent group because it is most represented in the sample. Finally, year of MEPS survey participation is represented in a series of binary indicators for each year of the sample with 2011 as the referent group. I control for year of participation in addition to adjusting respondents’ reported income and medical expenditures to constant dollars.

Each of the variables predicts the expected value of sample members’ medical consumption distributions, and a sub-set is used to predict the shape and spread. Despite

---

12 In the regression sample overall, 26% has $0 of medical consumption. Among previously uninsured members of the primary analytic sample, 51% has $0 of medical consumption.
including over 66,300 person-year observations in the regression, there are not enough data to use all twenty-six of the medical, demographic, and insurance variables to estimate each parameter. The shape parameter requires a larger sample to compute variable effects, and the spread parameter a still larger sample. Spread is predicted by all variables except year of survey participation, and the shape parameter is predicted by five binary variables: physical limitation, fair or poor perceived health, age above 59 years, no insurance, and Medicaid.

I evaluate the distribution by constructing discrete intervals. Rather than evaluating the distribution at each percentile, I take the average dollar value of medical consumption in the probability region surrounding a given percentile. For example to construct the 85th percentile, $p = .85$, I use the individual’s three predicted parameters to evaluate the gamma distribution at $p = .851$, $p = .852$, … , $p = .859$, and use the mean across these 9 values to represent the 85th percentile.

The 100th percentile represents the upper bound on an individual’s potential medical consumption range. The gamma distribution continues into infinity, making the 100th percentile technically undefined. In reality, the upper bound of medical consumption cannot be infinity; there is some point at which one cannot continue to consume health care. I use the mean across the ten values of $p = .9991$ through $p = .999$ plus $p = .99999$, to estimate an upper bound.

I use the model to simulate 100 ex-ante scenarios of total medical consumption that each individual faces over the upcoming year. An individual’s distribution of medical consumption depends on his or her medical history, demographic characteristics, and post-ACA insurance status. Medical care consumption varies in two ways: (1) for each individual, according to the scenario he or she realizes that year; and (2) across the population according to individual characteristics (Table 4.4). Variation in medical consumption down the probability distribution
reflects the range of scenarios that each individual might face. Variation across the population
distribution reflects individual-level differences in illness and medical care needs.

Out of Pocket Spending
An individual’s insurance status determines the amount of total medical consumption for
which a consumer pays out of pocket. I assume that Medicaid beneficiaries are not subject to any
level of cost sharing. Most state Medicaid programs do not implement cost sharing, for those that
do require cost sharing amounts are low from a risk- protection standpoint and usually do not
exceed $20. For individuals without health insurance, out of pocket spending has a one-to-one
correlation with total medical consumption subject an upper limit.

With private insurance, out of pocket spending depends on the total amount of medical
care consumed that year. I assume that previously uninsured adults who obtain private insurance
as a result of the ACA enroll in the standard level policy offered through the ACA exchanges.
Most individuals select the standard plan although there are four tiers of coverage available
(Office of the Assistant Secretary of Planning and Evaluation, 2014). Because the standard plan
covers one preventive visit to a physician each year, I assume the first $100 are free to the
enrollee. Medical consumption between $100 and the policy’s deductible has a one-to-one
correspondence with out of pocket spending. I assume all enrollees (except those eligible for
federal cost sharing subsidies) have the median deductible for a standard policy $3,453 (Kaiser
Family Foundation, 2015). Between the deductible and the out of pocket maximum, I assume a
15% coinsurance rate. The ACA sets an out of pocket maximum for private insurance policies at
$6,350 for an individual, also excepting those eligible for cost sharing subsidies (see Table 2.3
for deductible and out of pocket limits with cost sharing reductions).

Equation (21) maps total medical consumption to out of pocket spending for enrollees in
private insurance. Out of pocket spending in a given medical consumption scenario $OOP_s$ is the
total cost of medical consumption in that scenario, $Med_s$, if medical consumption does not exceed the deductible $Dct$. For scenarios in which the exchange enrollee exceeds the deductible, out of pocket spending is the deductible amount plus the coinsurance cost sharing for any medical consumption that exceeds the deductible if out of pocket spending does not exceed the out of pocket maximum. For any scenario in which out of pocket spending would otherwise exceed the OOP max, enrollees pay the out of pocket maximum:

\[
OOP_s = \begin{cases} 
Med_s & Med_s < Dct \\
Dct + .15(Med_s - Dct) & Med_s > Dct \text{ and } OOP_s < OOP_{\text{max}} \\
OOP_{\text{max}} & Med_s > OOP_{\text{max}}
\end{cases}
\]

4.4 Non-Medical Consumption Distributions

The distribution of medical consumption scenarios corresponds to a distribution of non-medical consumption scenarios: the range of financial outcomes that the individual faces after paying for any medical expenses. In this section, I describe each component of non-medical consumption in the order presented in Equation (22).

\[
Cons_s = Wlth - UNINSpenalty - \text{premium} - \min(OOP_s, OOP_{\text{ceiling}}).
\]

Each individual starts with a level of initial wealth, which is his or her total consumption in the absence of any medical spending. I define initial wealth as total family income for the year plus total household equity in assets. While I analyze medical consumption at the individual level, I analyze wealth and income at the household level because individuals draw upon total family wealth to fund their medical consumption needs (National Research Council, 2012; Banthin & Bernard, 2006).

\[
Wlth = \text{Income} + \text{Equity}
\]
I use family income data from the MEPS and construct the value of household equity using asset data imputed from the PSID. To construct equity, I add only the positive values of equity held in the following eight categories of assets: home; non-primary real-estate; vehicle; business, including farms; individual retirement accounts; cash including checking and savings accounts; stocks; and other financial assets including trusts and savings bonds, see Table 4.1 for the sample distribution of initial wealth.

\[
Equity = \max(HOME_{eq}, 0) + \max(NP_{req}, 0) + \max(VE_{heq}, 0) + \max(BU_{seq}, 0) + \max(IRA, 0) + \max(cash, 0) + \max(stock, 0) + \max(other\;fin, 0)
\]

I use only positive values of assets to measure household wealth, because I assume that an outstanding debt in one asset category does not preclude an individual from drawing on other asset types to pay for an unexpected medical need. If, for example, an individual owes a considerable sum on their home mortgage, he or she may still be able to convert the home’s equity into income. Furthermore, owing money on a mortgage does not preclude the individual from converting other assets such as financial assets into income to fund their medical consumption.

Individuals who remain uninsured after implementation of the ACA face a financial penalty if they are deemed able to afford insurance (for Medicaid or private insurance enrollees, the penalty is $0). In 2014, adults who are uninsured after the ACA must pay the greater amount
between $95 and 1% of the amount of family income that exceeds the prior year’s federal tax-filing threshold ($10,150 for an individual in 2014). The final penalty amount cannot be greater than the national average premium for the lowest tier of exchange ($2,448 in 2014) (Internal Revenue Service, 2014):

\[
UNINS\text{penalty} = \min\{\max\{95, 1\% (Inc - thrshld)\}, 2448\}.
\]

The newly privately insured pay a premium in every scenario, (premium is $0 for individuals with Medicaid or those who remain uninsured). Enrollees pay the average premium within his or her state of residence for the standard second-lowest-cost silver-tier insurance policy (The Henry J. Kaiser Family Foundation, 2015).

Finally, individuals with no insurance or those with private insurance may experience a medical consumption scenario that exceeds their ability to pay. In these instances I institute an upper limit to the amount that an individual will spend on medical care out-of-pocket, which also acts as a lower bound on the level of non-medical goods and services an individual will consume over a given year.

**Financial Cost of Bankruptcy as Out of Pocket Ceiling**

I assume that in each medical consumption scenario, individuals pay the lesser amount between (1) out of pocket costs, as determined by their total medical consumption and their insurance status; and (2) the household’s financial cost of bankruptcy, which forms the OOP ceiling (see Chapter 2 for background). There are two forms of bankruptcy, Chapter 13, and the means-tested Chapter 7 program, each of which has a different cost to the debtor.

First I determine whether the household is eligible to file under Chapter 7. A household is eligible to file under Chapter 7 if its seizable income, defined as total income net of living
allowances, is less than the state median income for a family of its size. I use state median income data from the Department of Justice (DoJ) guidance on bankruptcy means testing (US Trustee Program, 2015). Seizable income is defined as total family income minus the total of the living allowances, some of which are indexed by family size, \( f \), state, \( j \), and/or region, \( r \):

\[
(26) \quad SzInc = \text{Inc} - \left[ \text{Hous\&Utli}_f + \text{Food\&Clthg}_f + \text{Trans}_{rc} + \text{Ins} + \text{Tax} + \text{Phone} \right]
\]

Of the six living allowance categories, the DoJ provides the dollar value of exempted income for three categories, food and clothing, housing, and transportation allotments, which vary by state, family size, and in the case of transportation expenditures, region and number of vehicles, \( c \) (US Trustee Program, 2015). I use average consumer spending from the 2011 Consumer Expenditure Survey to assign insurance and phone allowances, which amount to $333.69 and $1,290.57, respectively. Finally, I construct tax allowances using the National Bureau of Economic Research Taxsim program. The Taxsim program interfaces with Stata statistical programming software through the command “Taxsim 9”. Individuals whose seizable household income below their state’s median income level are assigned to Chapter 7 bankruptcy, while the remaining individuals are assigned to Chapter 13.

Next I assess the household financial cost of bankruptcy:

\[
(27) \quad FinCostBK = \begin{cases} 
\text{SzAsts} - DDebt + \$2,000 & \text{if } Ch = 7 \\
\max [5 \cdot SzInc - Ddebt + \$2,000, \text{Ch7 cost}] & \text{if } Ch = 13
\end{cases}
\]

Under Chapter 7 bankruptcy, states seize a portion of household assets, deemed seizable assets, and households keep the remaining exempted portion of assets. The stipulations and generosity of asset exemptions vary according to filer’s state of residence and the type of asset in question. Only a handful of states exempt any financial assets, but many states exempt an unlimited value
of home equity and individual retirement accounts. Seizable Assets are a function of asset ownership and asset exemption laws, which vary according to state $j$ (Mahoney, 2015).

$$SzAst = \max\{\text{Home equity} - \text{Homestead exempt}_j, 0\}$$
$$+ \max\{\text{Vehicle equity} - \text{Vehicle exempt}_j, 0\}$$
$$+ \max\{\text{Retirement assets} - \text{Retirement exempt}_j, 0\}$$
$$+ \max\{\text{Financial assets} - \text{Financial exempt}_j, 0\}$$
$$+ \text{Other assets} - \text{Wildcard exempt}_j$$

Households can discharge all of their medical debt in bankruptcy as well as most other forms of consumer debt excluding student loans. The PSID began reporting individuals’ student loan debt in 2011 as it has grown in frequency and value. For the PSID waves from 2007 and 2009, the data include only the variable total debt. To find dischargeable debt for observations from 2007 and 2009, I assume that student debt comprises the same share of total debt as it does in 2011. The PSID sample includes only those respondents with all three years of data.

Households that are not eligible for Chapter 7 pay the greater amount between the Chapter 7 cost and the alternative Chapter 13 cost, which equals five times seizable income, over a period of five years, less dischargeable debt. Under both chapters of bankruptcy the household pays a legal and administrative cost of $2,000 in addition to any assets or income seized (Mahoney, 2015). The financial cost of bankruptcy, which forms the out of pocket spending limit, is the sum of household equity from equation (27), less the sum of seizable assets from equation (28), plus the $2,000 filing cost for households whose seizable income is below the state median income level.

In each non-medical consumption scenario after implementation of the Affordable Care Act, individuals pay an insurance premium, if they have private insurance; a penalty if they remain uninsured; and any out of pocket medical costs, or the financial cost of bankruptcy
whichever is smaller. In each non-medical consumption scenario under the alternative policy environment in which the ACA is not enacted, all previously uninsured adults remain uninsured. In this policy environment, individuals do not pay a premium or a penalty, and are only subject to out of pocket costs with the financial cost of bankruptcy as the upper limit.

Utility of Non-Medical Consumption

The value of health insurance depends in part on a consumer’s ability to avoid uncertainty about his or her financial status. I incorporate the welfare effect of non-medical consumption uncertainty (or ‘consumption uncertainty’) by finding the utility of consumption in each of the potential consumption scenarios that an individual faces.

I assume Constant Absolute Risk Aversion preferences. The utility of consumption, $U(C)$, depends on the amount of consumption available in a given scenario, $s$, which range from $s = 1$ to $s = 100$:

$$U(C_s) = \frac{-1}{\gamma} \cdot e^{-\gamma C_s}.$$

To implement the CARA assumption, I construct an individual-level risk aversion parameter, $\gamma_i(X)$ that is normally distributed across the population about a mean, $\mu_\gamma(X)$, with standard deviation $\sigma_\gamma^2$ (Handel, Hendel, & Whinston, 2015). The population mean of the risk aversion parameter is linearly related to observable characteristics $X$:

$$\gamma_i(X) \sim N(\mu_\gamma(X), \sigma_\gamma^2)$$

$$\mu_\gamma(X) = \beta_0 + \beta_1 AGE + \beta_2 Income$$

The mean and median CARA parameter value for the MEPS population is $4.09 \times 10^{-4}$ (Table 4.7). I use the individual-level risk aversion parameter to find the utility of consumption for each of
the 100 consumption scenarios that individuals face with the ACA, and then for the consumption scenarios without implementation of the ACA.

Next I find the expected value of utility across the uncertain distribution of consumption scenarios that individuals face:

\[
E(U_C) = \frac{\sum_{s=1}^{100} U_s(C)}{100}.
\]

Finally I find the amount of certain consumption that would produce the same level of utility as the expected value of the uncertain distribution. I insert the expected value of utility into the left hand side of equation of equation (16) and re-arrange to find the certainty equivalent:

\[
CertEquiv = \frac{-1}{\gamma} \cdot \ln[-\gamma \cdot E(U_C)].
\]

4.5 Changes in Individual Welfare

Within each policy environment, with and without implementation of the ACA, individual welfare is the sum of the expected value of medical consumption and the certainty equivalent of non-medical consumption:

\[
\]

The final measure of the ACA’s welfare effect is the difference between individual welfare with and without the law:

\[
\Delta Wlr = Wlr_{ACA} - Wlr_{noACA}.
\]

The primary drivers of welfare gain are (1) increased quantity of medical consumption with insurance; and (2) reduced uncertainty about non-medical consumption, each for individuals who obtain insurance after implementation of the ACA. The primary driver of welfare loss is reduced consumption, caused by (1) private insurance premiums, (2) increased out of pocket spending, and/ or (3) the financial penalty for those who remain uninsured.
While those who remain uninsured do not realize any welfare gain from medical consumption or financial protection, they might pay a penalty for being uninsured. Individuals that obtain private insurance have gains in welfare from consuming more medical care than they would without insurance. My analysis assumes that previously uninsured adults who obtain private insurance will consume medical care similarly to their counterparts that were privately insured through an employer before the ACA (the population I use to obtain parameter estimates for the medical consumption simulation). The standard ACA plan, however, has higher levels of cost sharing than the average employer-sponsored plan. As a result, predicted medical consumption of newly privately insured enrollees may increase to a degree in which out of pocket spending causes a loss in welfare. In this model, out of pocket spending reduces welfare both by lowering the absolute level of non-medical consumption and through the disutility of consumption uncertainty.

If the levels of cost sharing in the standard ACA plan are such that formerly uninsured enrollees realize welfare losses from increasing their medical consumption, that result forms a relevant component of the law’s welfare effects. Data are not currently available to assess whether or not previously uninsured enrollees increase their medical consumption to a level similar to their previously privately insured counterparts. However the Affordable Care Act was instituted with the intent of providing medical coverage to a population of uninsured adults with low rates of utilization for valuable medical services (National Research Council, 2012).

While Medicaid beneficiaries have gains in welfare from medical consumption and financial protection, the value of medical care consumed is lower with Medicaid than with private insurance on average. Beneficiaries of Medicaid are not subject to any of the three drivers of welfare loss. I assume that Medicaid recipients pay no premiums or cost sharing for medical
services, and because they are insured they are not subject to financial penalty. Within the context of the gamma regression, the Medicaid coefficient simulates a lower value of medical consumption than the private insurance coefficient, conditional on diagnoses and demographic characteristics. Within the context of health care policy more generally, private insurers reimburse medical providers at higher rates than Medicaid. As a result private insurance enrollees realize greater gains in welfare from medical consumption than do beneficiaries of Medicaid, conditional on each individual’s characteristics.

In the following Chapter, I present the results of my analysis of the individual welfare effects of the Affordable Care Act for previously uninsured adults. The tradeoffs between the welfare gains and losses within each insurance type form the backdrop of the discussion that follows.
4.6 References: Simulation Methods


(2), 710-746.


4.7 Tables and Figures: Simulation Methods

Figure 4.1: Flow Chart of Simulation Methods

(1) Representative Sample
*Diagnoses and medical spending from non-elderly uninsured adults in the 2008 to 2012 MEPS, combined with state and asset data from the 2009 – 2011 PSID*

(2) Post-ACA Insurance
*Medicaid, Private, or no insurance based on health status, income, and state*

(3) Medical Consumption Scenarios
*Projected range of medical spending scenarios with and without the ACA, based on insurance status, and demographic and medical characteristics*

(4) Non-Medical Consumption Scenarios
*Wealth and income remaining after medical spending, measured as the certain equivalence of the distribution of utility*

(5) Welfare Gains and Losses
*Sum of the utilities of consumption and medical care*
Table 4.1: Imputed vs. Observed Assets and State Medicaid Expansion Status

<table>
<thead>
<tr>
<th>Medicaid Expansion State Residence*</th>
<th>MEPS</th>
<th>PSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Midwest</td>
<td>75%</td>
<td>74%</td>
</tr>
<tr>
<td>South</td>
<td>17%</td>
<td>16%</td>
</tr>
<tr>
<td>West</td>
<td>94%</td>
<td>95%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asset equity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$98,200</td>
<td>$100,026</td>
</tr>
<tr>
<td>25%</td>
<td>$2,398</td>
<td>$2,105</td>
</tr>
<tr>
<td>Median</td>
<td>$12,343</td>
<td>$12,138</td>
</tr>
<tr>
<td>75%</td>
<td>$60,688</td>
<td>$67,530</td>
</tr>
<tr>
<td>90%</td>
<td>$193,431</td>
<td>$217,518</td>
</tr>
</tbody>
</table>

Note: This table compares data observed in the 2007–2011 Panel Survey of Income Dynamics (PSID), to those imputed into the analytical sample for this study from the 2007-2012 Medical Expenditure Panel Survey (MEPS). Each sample is restricted to adults who are uninsured for the full year of their participation in the survey. Asset data are adjusted to 2015 USD.

+ Proportion of population in each region that resides in one of the 30 states, including DC, that expanded eligibility as of August, 2015; does not include the state of Alaska, which expanded Medicaid eligibility in December, 2015.
Table 4.2: Previously Uninsured Adult Simulated Insurance Status

<table>
<thead>
<tr>
<th>Insurance</th>
<th>Share</th>
<th>Frequency</th>
<th>Weighted Count (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>22%</td>
<td>4,909</td>
<td>6,894,830</td>
</tr>
<tr>
<td>Medicaid</td>
<td>14%</td>
<td>3,465</td>
<td>4,518,878</td>
</tr>
<tr>
<td>Uninsured</td>
<td>64%</td>
<td>12,978</td>
<td>20,229,062</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>21,352</td>
<td>31,642,771</td>
</tr>
</tbody>
</table>

Note: This table presents the distribution of simulated post-ACA insurance status for adults who were uninsured before implementation of the Affordable Care Act.
Table 4.3: Parameter Estimates for Ex-Ante Medical Consumption with Generalized Gamma

<table>
<thead>
<tr>
<th></th>
<th>$\lambda$</th>
<th>$\ln(\sigma)$</th>
<th>$\kappa$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. (Std. Err.)</td>
<td>Coeff. (Std. Err.)</td>
<td>Coeff. (Std. Err.)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.887 (0.042)</td>
<td>0.741 (0.013)</td>
<td>0.716 (0.013)</td>
</tr>
<tr>
<td><strong>Insurance Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>-2.751 (0.037)</td>
<td>0.135 (0.007)</td>
<td>-0.988 (0.025)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>-0.77 (0.077)</td>
<td>0.178 (0.014)</td>
<td>-0.492 (0.052)</td>
</tr>
<tr>
<td><strong>Demographic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 30-39</td>
<td>-0.017 (0.026)</td>
<td>0.029 (0.009)</td>
<td>-- --</td>
</tr>
<tr>
<td>Age 40-49</td>
<td>-0.019 (0.027)</td>
<td>0.013 (0.009)</td>
<td>-- --</td>
</tr>
<tr>
<td>Age 50-59</td>
<td>0.083 (0.029)</td>
<td>0.015 (0.01)</td>
<td>-- --</td>
</tr>
<tr>
<td>Age 60-64</td>
<td>0.161 (0.045)</td>
<td>-0.002 (0.014)</td>
<td>-0.097 (0.032)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.514 (0.022)</td>
<td>0.038 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>Black</td>
<td>-0.445 (0.023)</td>
<td>0.072 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>Asian</td>
<td>-0.541 (0.032)</td>
<td>0.097 (0.012)</td>
<td>-- --</td>
</tr>
<tr>
<td>No degree</td>
<td>-0.177 (0.024)</td>
<td>-0.014 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>Bachelors</td>
<td>0.312 (0.021)</td>
<td>-0.062 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>Graduate</td>
<td>0.322 (0.021)</td>
<td>-0.082 (0.009)</td>
<td>-- --</td>
</tr>
<tr>
<td>Northeast</td>
<td>0.038 (0.023)</td>
<td>0.009 (0.009)</td>
<td>-- --</td>
</tr>
<tr>
<td>Midwest</td>
<td>0.208 (0.021)</td>
<td>-0.029 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>West</td>
<td>0.049 (0.02)</td>
<td>0.01 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>MSA</td>
<td>0.102 (0.024)</td>
<td>-0.013 (0.009)</td>
<td>-- --</td>
</tr>
<tr>
<td>Female</td>
<td>0.722 (0.016)</td>
<td>-0.045 (0.006)</td>
<td>-- --</td>
</tr>
<tr>
<td>%FPL</td>
<td>0.000 (0)</td>
<td>0 (0)</td>
<td>-- --</td>
</tr>
<tr>
<td>Never married</td>
<td>-0.211 (0.021)</td>
<td>0.013 (0.007)</td>
<td>-- --</td>
</tr>
<tr>
<td><strong>Medical Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High blood pressure</td>
<td>0.441 (0.019)</td>
<td>-0.064 (0.008)</td>
<td>-- --</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>0.366 (0.058)</td>
<td>0.012 (0.023)</td>
<td>-- --</td>
</tr>
<tr>
<td>Angina</td>
<td>0.015 (0.07)</td>
<td>0.006 (0.028)</td>
<td>-- --</td>
</tr>
<tr>
<td>Heart attack</td>
<td>0.263 (0.066)</td>
<td>-0.032 (0.027)</td>
<td>-- --</td>
</tr>
<tr>
<td>Condition</td>
<td>Parameter Estimate</td>
<td>Standard Error</td>
<td>Lower Bound</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Other heart disease</td>
<td>0.267 (0.031)</td>
<td>-0.053 (0.013)</td>
<td>--</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>0.487 (0.019)</td>
<td>-0.125 (0.008)</td>
<td>--</td>
</tr>
<tr>
<td>Fair/ poor physical health</td>
<td>0.656 (0.033)</td>
<td>0.08 (0.009)</td>
<td>0.093 (0.026)</td>
</tr>
<tr>
<td>Poor mental health</td>
<td>0.268 (0.069)</td>
<td>0.075 (0.023)</td>
<td>--</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.281 (0.064)</td>
<td>0.028 (0.025)</td>
<td>--</td>
</tr>
<tr>
<td>Emphysema</td>
<td>-0.024 (0.083)</td>
<td>0.009 (0.032)</td>
<td>--</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.768 (0.03)</td>
<td>-0.11 (0.013)</td>
<td>--</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.541 (0.033)</td>
<td>-0.018 (0.013)</td>
<td>--</td>
</tr>
<tr>
<td>Any activity limitations</td>
<td>0.634 (0.033)</td>
<td>0.008 (0.009)</td>
<td>0.037 (0.027)</td>
</tr>
<tr>
<td>Asthma</td>
<td>0.472 (0.028)</td>
<td>-0.067 (0.011)</td>
<td>--</td>
</tr>
<tr>
<td>Arthritis</td>
<td>0.413 (0.021)</td>
<td>-0.055 (0.009)</td>
<td>--</td>
</tr>
</tbody>
</table>

**Year of Observation**

<table>
<thead>
<tr>
<th>Year</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>0.251 (0.031)</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2008</td>
<td>0.087 (0.024)</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2009</td>
<td>0.141 (0.023)</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2010</td>
<td>0.015 (0.024)</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2012</td>
<td>-0.081 (0.027)</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: This table presents estimated parameter values of the generalized gamma distribution.
Table 4.4: Simulated Ex-Ante Medical Consumption Distributions

<table>
<thead>
<tr>
<th>Population Distribution</th>
<th>Private</th>
<th>Probability Distribution</th>
<th>25&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Median</th>
<th>75&lt;sup&gt;th&lt;/sup&gt;</th>
<th>90&lt;sup&gt;th&lt;/sup&gt;</th>
<th>95&lt;sup&gt;th&lt;/sup&gt;</th>
<th>99&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Medicaid</th>
<th>Probability Distribution</th>
<th>25&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Median</th>
<th>75&lt;sup&gt;th&lt;/sup&gt;</th>
<th>90&lt;sup&gt;th&lt;/sup&gt;</th>
<th>95&lt;sup&gt;th&lt;/sup&gt;</th>
<th>99&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Uninsured</th>
<th>Probability Distribution</th>
<th>25&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Median</th>
<th>75&lt;sup&gt;th&lt;/sup&gt;</th>
<th>90&lt;sup&gt;th&lt;/sup&gt;</th>
<th>95&lt;sup&gt;th&lt;/sup&gt;</th>
<th>99&lt;sup&gt;th&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>25&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$176</td>
<td>$321</td>
<td>$733</td>
<td>$2,110</td>
<td>$4,608</td>
<td>$16,671</td>
<td>50&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$320</td>
<td>$565</td>
<td>$1,253</td>
<td>$3,377</td>
<td>$7,166</td>
<td>$23,922</td>
<td>75&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$533</td>
<td>$914</td>
<td>$1,949</td>
<td>$5,145</td>
<td>$10,191</td>
<td>$34,655</td>
<td>90&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$792</td>
<td>$1,334</td>
</tr>
<tr>
<td>Medicaid</td>
<td>25&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$134</td>
<td>$257</td>
<td>$606</td>
<td>$1,973</td>
<td>$3,454</td>
<td>$13,850</td>
<td>50&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$237</td>
<td>$446</td>
<td>$1,040</td>
<td>$3,087</td>
<td>$5,302</td>
<td>$19,823</td>
<td>75&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$398</td>
<td>$734</td>
<td>$1,610</td>
<td>$4,740</td>
<td>$7,770</td>
<td>$25,789</td>
<td>90&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$611</td>
<td>$1,103</td>
</tr>
<tr>
<td>Uninsured</td>
<td>25&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$17</td>
<td>$31</td>
<td>$68</td>
<td>$181</td>
<td>$354</td>
<td>$1,272</td>
<td>50&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$30</td>
<td>$53</td>
<td>$111</td>
<td>$281</td>
<td>$536</td>
<td>$1,874</td>
<td>75&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$54</td>
<td>$93</td>
<td>$188</td>
<td>$454</td>
<td>$848</td>
<td>$2,743</td>
<td>90&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$97</td>
<td>$163</td>
</tr>
</tbody>
</table>

Note: This table presents the range of medical consumption scenarios simulated by the Generalized Gamma Distribution parameters. Moving down a column within a panel, medical consumption scenarios become increasingly catastrophic. Moving across the population distribution row, individuals have higher projected medical consumption, as a result of individual characteristics.

For example, the value in the upper left hand corner indicates that for 25% percent of the population, individuals spend $176 in the 25% least catastrophic medical consumption scenarios. Moving down the column, for the same 25% of the population each individual spends $991 at the 95<sup>th</sup> percentile of the distribution, which corresponds to the top 5% most catastrophic scenarios.
Table 4.5: Population Distribution of Household Wealth Imputed from PSID to MEPS

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Household Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>$3</td>
</tr>
<tr>
<td>5%</td>
<td>$6,527</td>
</tr>
<tr>
<td>10%</td>
<td>$12,662</td>
</tr>
<tr>
<td>25%</td>
<td>$26,061</td>
</tr>
<tr>
<td>Median</td>
<td>$58,044</td>
</tr>
<tr>
<td>75%</td>
<td>$131,742</td>
</tr>
<tr>
<td>90%</td>
<td>$271,159</td>
</tr>
<tr>
<td>95%</td>
<td>$451,811</td>
</tr>
<tr>
<td>99%</td>
<td>$1,302,898</td>
</tr>
<tr>
<td>Mean</td>
<td>$144,581</td>
</tr>
</tbody>
</table>

Note: This table presents the distribution of wealth available to the population of previously uninsured adults, in the absence of any medical spending.

Wealth combines equity in assets imputed from the PSID and total household income as reported in the MEPS.
Table 4.6: Population Distribution of CARA Risk Aversion Parameter

<table>
<thead>
<tr>
<th>CARA Risk Aversion Parameter</th>
<th>CARA Risk Aversion</th>
<th>Interpretation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.09E-04</td>
<td>$96.11</td>
</tr>
<tr>
<td>5th percentile</td>
<td>8.54E-05</td>
<td>$99.15</td>
</tr>
<tr>
<td>25th percentile</td>
<td>2.76E-04</td>
<td>$97.32</td>
</tr>
<tr>
<td>Median</td>
<td>4.09E-04</td>
<td>$96.08</td>
</tr>
<tr>
<td>75th percentile</td>
<td>5.42E-04</td>
<td>$94.87</td>
</tr>
<tr>
<td>95th percentile</td>
<td>7.28E-04</td>
<td>$93.22</td>
</tr>
<tr>
<td>99th percentile</td>
<td>8.58E-04</td>
<td>$92.10</td>
</tr>
</tbody>
</table>

Note: This table presents the weighted sample distribution of Constant Absolute Risk Aversion (CARA) parameter values, which represent the risk preferences of uninsured adults in the Medical Expenditure Panel Survey. CARA parameter values vary with income and age (Handel, Hendel, & Whinston, 2015).

* Individuals are indifferent between a 50/50 gamble, winning $100 and losing $X, vs. a status quo in which nothing happens. Weighted sample distribution of $X as estimated within the data.
Chapter 5: Initial Results of Effects of the ACA on the Individual Welfare of Previously Uninsured Adults

The goal of this study is to determine whether, and how much, the expansion of insurance under the Affordable Care Act (ACA) improves the welfare of adults who were uninsured before the law’s implementation. My measure of welfare change weighs the benefits and costs that individuals incur as a result of the law. Individuals who obtain insurance will benefit from financial protection from the risk of potentially catastrophic medical spending, and from an increase in medical consumption. On the other hand, individuals who enroll in private insurance will pay premiums in exchange for medical and financial benefits. Individuals who remain uninsured will face the financial penalty levied by the ACA against uninsured adults. The net effect of the ACA on individual welfare will balance offsetting effects and will depend on varying individual circumstances.

The results presented below identify groups of individuals that benefit, lose, or are essentially unaffected by the ACA on average. The welfare gains (or, if the gains are negative, welfare losses) of each individual are quantified in monetary terms. I begin by presenting welfare changes averaged across the population of previously uninsured adults as a whole, then the averages for broad demographic groups. Next I explore welfare changes within each demographic group in greater detail. I select some demographic groups that are uniquely affected by one or more provisions of the ACA. Individuals with low or moderate incomes benefit from insurance subsidies; individuals in states that expand Medicaid benefit from access to the public health program; and individuals with a chronic illness benefit from the community rating provision that prevents premiums from varying according to an enrollee’s health status. I also
examine changes in individual welfare according to race and gender to analyze how stipulations of the law interact with the varying characteristics and circumstances between these groups.

5.1 Individual Welfare Effects of the ACA

Averaged over the population of previously uninsured adults as whole, I find that the ACA generates a small net improvement of $29 in individual welfare, shown in Table 5.1. The population average includes welfare gains for some individuals and losses for others. Slightly fewer than one out of five (19%) previously uninsured adults have some welfare improvement from the ACA, while the remaining four out of five do not.

According to my simulation, a majority (64%) of previously uninsured adults remain uninsured after implementation of the ACA. Several sources of survey data, which I incorporated into the simulation, corroborate this finding (ASPE, 2015; Collins, Rasmusen, Doty, & Beutel, 2015). The only effect the ACA has for those who remain uninsured is a financial penalty, though the fee is waived for low and moderate-income individuals. The post-ACA uninsured have an average welfare loss of $244, which represents the average penalty.

In contrast to those who remain uninsured, all new Medicaid beneficiaries have an improvement in welfare after the ACA (Figure 5.2). Medicaid beneficiaries consume more medical care than they would have without health reform; they gain financial protection from potentially catastrophic medical spending; and they pay no cost for either benefit. The ACA generates an average welfare improvement of $1,637 for Medicaid beneficiaries. Only a small fraction (14%) of previously uninsured adults enroll.

The remaining 22% of previously uninsured adults enroll in private insurance through an ACA exchange. The share of exchange enrollees who have an improvement in welfare lies somewhere between the share of the uninsured (0%) and the share of the publicly insured
(100%) who have welfare improvements (Figure 5.2). Among those who enroll in private insurance, slightly more than one-fifth (22%) has an improvement in welfare. Enrollees consume more medical care with private coverage than they would have without the ACA. The standard policy also provides financial protection from catastrophic scenarios by limiting out-of-pocket spending, and paying claims for medical care that exceeds the plan’s deductible. On average, the welfare improvement from enrollment does not exceed its cost, generating an average welfare loss of $223 for enrollees.

As previously mentioned, the population average effect comprises gains for some individuals and losses for others. The population average gain of $29 can be interpreted as the weighted sum of its constituent groups. Privately insured individuals have an average welfare loss of $223 and comprise 22% of the population of previously uninsured adults. Weighted according to their share of the population, the group of enrollees in private insurance contributes -$49 (=-$223*22%) to the population average of +$29, shown in the far right column of Table 5.1. Medicaid beneficiaries have an average welfare gain of $1,637, comprise 14% of the population, and contribute +$160 (=$1,637 * 14%) to the population average of +$29. Finally the majority of individuals who remain uninsured contribute a weighted average change in welfare of -$128 (=-$200 * 64%) toward the population average welfare gain of +$29 (Table 5.1).

Individuals with a chronic illness13 have greater gains on average from the ACA and its expansion of health insurance than individuals without a chronic illness (Figure 5.2). On average, previously uninsured adults with a chronic illness have a welfare gain of $1,178 from the ACA (Table 5.1). Although they represent a minority (28%) of the population, the chronically ill

---

13 Diagnoses include: angina, coronary heart disease, myocardial infarction, emphysema, cancer, diabetes, fair or poor self-reported mental health, asthma, and any functional, activity, or sensory limitations
contribute a weighted average of +$334 (=$1,178*28%) towards the population average welfare gain of $29. The majority of individuals without a chronic illness has a welfare loss of $425 on average, and contributes a weighted average welfare change of -$305 towards the population average of +$29 (Table 5.1).

Household income shapes the ACA’s effect on individual welfare (Figure 5.3). At the lowest level of income, individuals below the poverty level are not eligible for private insurance subsidies. Very few (1% of) people in poverty enroll in private insurance; a majority (62%) remains uninsured but do not pay any financial penalty (Table 5.2). Those who reside in a state that has chosen to expand Medicaid become eligible for the program under the ACA. On average, previously uninsured adults in poverty have a $597 welfare gain from the law, though fewer than half (37%) has an improvement in welfare.

At the next level of income, individuals between 100% and 138% FPL are eligible for Medicaid if they live in an expansion state. If they do not live in an expansion state, they are eligible for subsidies that assist with premiums and out of pocket expenses in private insurance. Only 15% of the previously uninsured remains uninsured within this income bracket. Nearly half (45%) enrolls in private insurance and an additional 40% enroll in Medicaid. A majority (62%) has a net improvement in welfare after implementation of the ACA (Table 5.2). Because this income group receives substantial subsidies for private insurance, the average welfare gain from Medicaid (which is entirely free to the consumer) is comparable to the average gain from private insurance ($1,514 vs. $1,034).

Individuals in the next income bracket, above 138% FPL and below 200% FPL, are eligible for subsidies that lower the premium and cost sharing expenses of private insurance, but are not eligible for Medicaid. Individuals within this income bracket are fairly evenly split
between obtaining private insurance (49%) and remaining uninsured (51%) after the ACA (Table 5.2). A small minority of the group (9%) has a net improvement in welfare. Exchange enrollees have an average gain of $85, while the post-ACA uninsured have a net loss of $78 on average due to the financial penalty.

Individuals with incomes above 200% FPL and below 250% FPL are eligible for premium subsidies and limited cost sharing subsidies in private insurance. A majority (70%) remains uninsured after the ACA. Relative to the lower income groups, a smaller share (3%) has a net welfare gain from the ACA (Table 5.2).

Between 250% and 400% FPL, individuals are only eligible for premium subsidies in private insurance, and are not eligible for cost sharing subsidies. Roughly one out of five (19%) individuals with incomes within this income range enroll in private insurance, while the remaining 81% remain uninsured after the ACA (Table 5.2). On average, this income group has a net loss of $509 from the ACA.

Individuals above four times the federal poverty level are not eligible for any subsidies under the ACA. I estimate that 98% of this group remains uninsured. On average, previously uninsured adults above 400% FPL have a welfare loss equal to $719 after the Affordable Care Act.

State decisions about Medicaid expansion affect the welfare of poor and near poor previously uninsured adults. In expansion states, individuals who are below 138% FPL are eligible for Medicaid under the ACA. Below this poverty threshold, previously uninsured residents of expansion states are far more likely to become insured (79% vs. 25%) or to have a net welfare improvement (74% vs. 12%) relative to non-expansion state residents (Table 5.3).
The average welfare gain for residents of expansion states far exceeds that of non-expansion state residents ($1,180 vs. $267), below 138% FPL.

On average, the ACA generates a net welfare gain of $757 for previously uninsured adults below 138% FPL (Table 5.3). While non-expansion state residents comprise only a slightly greater share (54%), they contribute a weighted average of +$633 (=1,180*54%) towards the $757 population average. By contrast, non-expansion state residents comprise 45% of previously uninsured adults below 138% FPL, and contribute +$124 (=267*45%) towards the $757 average welfare gain.

While women and men share similar patterns of post-ACA insurance status, women have a greater improvement in welfare on average (Figure 5.4). Previously uninsured women have an average gain of $433, while men have an average loss of $281 (Table 5.4). Women get more out of health insurance because they consume more medical care on average than their male counterparts (Bertakis, Azari, Helms, Callahan, & Robbins, 2000). Moreover, women tend to have a lower poverty status than men, and are thus eligible for greater assistance under the ACA (Table 5.4).

Among exchange enrollees, women realize an average gain in welfare of $908, while men have an average loss in welfare of $1,104 (Table 5.4). Among Medicaid beneficiaries, men and women each have welfare gains, but women have a greater gain on average ($2,356 vs. $1,024). Expected medical consumption is the primary determinant of individual welfare gains with Medicaid. Among the post-ACA uninsured, women have a smaller average loss in welfare than men (-$195 vs. -281). For the post-ACA uninsured, household income is the primary determinant of the ACA’s welfare effect because the financial penalty is a percentage of taxable income.
Among racial groups, non-Hispanic whites makeup the greatest share of previously uninsured adults (47%), followed by the group of individuals that are Hispanic, Asian, or another race\textsuperscript{14} (40%), while the remaining 14% are non-Hispanic black (Table 5.5). Whites are the only racial group that has an average improvement in welfare after the ACA ($264), while blacks, and Hispanic, Asian, and other adults have an average welfare loss (-$32 and -$226) (Table 5.5).

Relative to each of the other racial groups, black individuals are least likely to live in a Medicaid expansion state. While six out of ten black individuals live in a non-expansion state, the proportion is flipped for each of the non-black populations, of whom six out of ten live in an expansion state (Table 5.5). Hispanic, Asian, and other race adults are more likely to enroll in Medicaid than either blacks or whites after the ACA.

Between 20% and 24% of each racial group enrolls in private insurance through an ACA exchange. Non-Hispanic white individuals are the only group to have an average welfare improvement from private insurance ($805), despite being least likely to meet the 250% FPL threshold for cost sharing subsidies (60% vs. 73% of blacks and 74% of others). Non-Hispanic blacks realize an average welfare loss of $397 from private insurance, while Hispanic, Asian, and other race adults have an average loss of $1,201 (Table 5.5).

Among Medicaid beneficiaries, white adults realize the largest improvement in welfare on average ($2,446), followed by black ($1,309) and other race adults ($1,045). After implementation of the ACA, non-Hispanic whites (67%) are as likely as non-Hispanic blacks (67%) and more likely than adults of other races (59%) to remain uninsured (Table 5.5). Whites

\textsuperscript{14} Hispanic Americans comprise 83% of the Hispanic and other group, Asian Americans comprise 11%, and individuals who identify their race as ‘other’ comprise 5.5% (data not shown).
realize a larger welfare loss on average from remaining uninsured ($294) than black ($170) or other race adults ($205), which is a function of household income.

Last I examine the ACA’s welfare effect by health status. Individuals that are less healthy and tend to consume more medical care gain more from the ACA than healthier adults (Figure 5.2). Only a minority (28%) of the previously uninsured has a chronic illness. Chronically ill individuals are about twice as likely to have a net benefit from the ACA than individuals without a chronic illness (29% vs. 15%, Table 5.6).

Among exchange enrollees, the chronically ill have a net gain of $2,969, while the non-chronically ill have a net welfare loss of $1,487 on average (Figure 5.4). While all Medicaid beneficiaries have a welfare improvement, the average gain for beneficiaries with a chronic illness ($3,707) is much greater than the average gain for beneficiaries without a chronic illness ($526).

5.2 Ex-ante Likelihood of Paid Claims with Private Insurance

In this section I examine the spread of costs and benefits faced by the newly privately insured. I evaluate three aspects of the distribution of paid claims, and then end by illustrating the average ex-ante distribution of paid claims. First I find the likelihood that an enrollee has any medical claims paid on their behalf by exceeding the plan’s deductible. Next I find the likelihood an enrollee receives a net transfer from the insurance pool by receiving more in paid medical claims than they paid for the plan’s premium. Then, I assess whether exchange enrollment reduces the likelihood of medical bankruptcy. Last, I end with an illustration of the probability distribution of paid claims across the range of potential medical care scenarios that each enrollee might experience.
For each enrollee, I find the probability at which his or her ex-ante distribution of medical consumption exceeds their plan’s deductible. Each enrollee’s ex-ante distribution of potential medical consumption begins close to $0 in the more routine health scenarios and increases, as the scenario grows increasingly catastrophic. Along this distribution, I identify the ex-ante probability at which medical consumption exceeds the insurance deductible for each enrollee. Below, I present the weighted average probability of exceeding the deductible by finding the mean across the population. I use a similar ex-ante analysis to find the likelihood that an enrollee receives a net transfer from the pool. I find the probability at which an individual’s paid claims exceeds his or her plan’s premium, and present the ex-ante likelihood as a weighted population average. Finally, I assess each enrollee’s likelihood of medical bankruptcy. An individual’s ex-ante probability of bankruptcy is the point at which out of pocket spending exceeds their household cost of bankruptcy.

On average, previously uninsured adults that enroll in the standard private policy through an ACA exchange exceed their plan’s deductible in half (50%) of the potential scenarios they face, as shown in Table 5.7. Notice that an individual’s probability of exceeding the deductible, which triggers the payment of any claims, is higher than the individual’s probability of having paid claims that exceed the premium. On average, enrollees receive a transfer from the pool by exceeding the premium in the 17% most catastrophic potential scenarios (Table 5.7).

Because the ACA offers lower deductibles, out of pocket limits, and premiums to low- and moderate-income enrollees, the likelihood of receiving paid claims and transfers each depend on income. Most previously uninsured adults who enroll in an exchange plan earn less than 250% FPL, on average these individuals are more likely than their higher earning counterparts to exceed their plan’s deductible (57% vs. 12%) or receive a transfer (19% vs. 6%).
Additionally, the likelihood of receiving claims and transfers vary by health status. On average, exchange members with a chronic illness exceed their plan’s deductible in over seven out of ten (72%) medical spending scenarios (Table 5.7). Chronically ill enrollees draw transfers from the insurance pool in 40% of potential medical scenarios on average, as compared to 7% of scenarios for beneficiaries without a chronic illness (Table 5.7).

Under the assumption that the newly privately insured consume medical care similarly to their counterparts with employer-sponsored insurance, I find that exchange enrollment does not reduce the likelihood of medical bankruptcy (Table 5.8). Instead, OOP spending is more likely to exceed the cost of bankruptcy with an exchange plan (24%) than without any insurance (19%) on average. Enrollees with a chronic illness see the greatest increase in the likelihood of medical bankruptcy, at a 13-percentage point increase on average.

A quarter of exchange plan enrollees have a household net worth that is less than $0 and an additional quarter of enrollees have a net worth of $0 (Table 5.8). In total, half of exchange enrollees, most of whom have low and moderate levels of income, cannot absorb increases in out of pocket medical spending.

To further examine the effects of exchange enrollment, I assess the ex-ante distribution of paid claims that enrollees receive in the standard exchange plan. As a comparison, I also illustrate the ex-ante distribution of OOP spending that each enrollee would have faced if they were to remain uninsured. I construct an average ex-ante distribution of paid claims by averaging the 1st, then 2nd, through the 100th percentiles of each enrollee’s ex-ante distribution of paid claims. Similarly, I construct an average ex-ante distribution of OOP spending without insurance by averaging each percentile of each enrollee’s ex-ante distribution of OOP spending without
insurance. In the latter case, the ex-ante distribution of OOP spending without insurance incorporates the relatively low medical consumption of the uninsured.

In the least catastrophic 25% of scenarios, exchange enrollees draw $605 in medical claims on average (Table 5.9). This figure includes a stipulation that exchange plans cover one free preventive care check up for each enrollee each year. The 75th percentile of the cumulative distribution represents poorer health scenarios, and enrollees draw an average of $1,555 in claims, still less than the average policy’s premium. From the 75th to 95th percentiles claims increase rapidly, reflecting the skewed nature of the distribution of medical spending. The average enrollee receives $2,767 in claims in the 95th percentile (Table 5.9). Finally in the 1% most catastrophic medical spending scenarios, the average enrollee draws $5,425 worth of claims. This level of catastrophic medical spending is an instance in which it pays to be insured.

On the other hand without insurance, enrollees would have consumed far less medical care, both in the more likely scenarios with relatively little medical spending needed and in the extreme or catastrophic events. In the median medical consumption scenario the average enrollee would have spent $95 if they did not have health insurance (Table 5.9). In the top 1% most catastrophic scenarios the average enrollee would have spent $1,505 without health insurance on average.

Figure 5.5 illustrates the distributions presented in Table 5.9. Pictured in purple, average paid claims increase rapidly as the medical consumption scenario becomes increasingly catastrophic from the 1st to the 100th percentiles of the cumulative distribution. The distribution of claims culminates in a prominent right tail of catastrophic outcomes. Reimbursements are concentrated in the right tail.
Pictured in blue, the distribution of OOP spending without insurance is also skewed to the right, but to a lesser degree (Figure 5.5). The distance, measured in dollars, between paid claims (purple) and OOP spending without insurance (blue) is largest in the most catastrophic scenarios. The implicit insurance provided by bankruptcy laws and charity care limit out-of-pocket spending in the worst-case scenarios.

5.3 Discussion

On average, the Affordable Care Act generates a small improvement in the welfare of adults who were uninsured before its implementation. Most previously uninsured adults remain uninsured after the law took effect. The post-ACA uninsured will necessarily have a decline in welfare on average because they may be required to pay a penalty but do not have any welfare gain from the law’s insurance expansions. Because they form a majority of the population, the post-ACA uninsured pull the population average welfare change towards 0.

The ACA is especially helpful to lower income people who benefit from the expansion of Medicaid and from subsidized premiums and cost sharing in private insurance. Medicaid unequivocally improves the welfare of its beneficiaries. Neither enrollees in private insurance nor individuals who remain uninsured have welfare improvements on average. Medicaid beneficiaries comprise the only post-ACA insurance group to have an average welfare gain.

There is a significant disparity between the ACA’s effect on the welfare of people who live in expansion states relative to that of non-expansion state residents. Considering the millions of population members affected, each state’s decision not to expand Medicaid and the Supreme Court’s decision to allow states to opt-out of Medicaid expansion is each associated with substantial losses in individual welfare.
Consider the population of adults who were uninsured before the ACA who are below the Medicaid eligibility threshold of 138% FPL. Those who live in an expansion state have an average welfare gain of $1,180, while their counterparts in non-expansion states (three quarters of whom remain uninsured) have an average gain of $267. Multiplying the $913 in forgone welfare (= $1,180 - $267) by each of the 9.6 million lower-income residents of non-expansion states suggests over $8.7 billion worth of forgone improvement in individual welfare that result from the Supreme Court’s and the individual states’ decisions not to expand Medicaid nationally.

Though we cannot know with certainty the value of welfare forgone as a result of Medicaid opt-outs, the fact remains that millions of low-income adults in non-expansion states did not gain access to medical care or financial risk protection from the Affordable Care Act. Simulating individuals’ medical scenarios and analyzing the law’s effects on the consumption of medical care and the uncertainty of non-medical consumption produces a reasonable estimate of the magnitude.

Medicaid expansion is particularly effectual for the welfare of previously uninsured adult women. Because women tend to earn less than men and are also more likely to be single heads of households, women are more likely to meet the poverty status requirements for Medicaid eligibility. Additionally women tend to consume more medical care than men on average. As a result Medicaid expansion and private insurance subsidies that are administered progressively according to poverty level generate welfare improvements for previously uninsured women.

Non-Hispanic white adults have a greater improvement in welfare than individuals of other races on average. Non-Hispanic black individuals are more likely to live in non-expansion states than individuals of other races. A pew research poll indicates that while black Americans makeup 14% of previously uninsured adults, they comprise 25% of the population in the
‘coverage gap’ with incomes below the threshold for private insurance subsidies and in a state that is not expanding Medicaid (Wiltz, 2015). On average, Hispanic, Asian, and other race adults benefit less from private insurance than adults of other races, which may be driven by average medical consumption. My data do not account for citizenship or immigration status, which affect eligibility for Medicaid and private insurance subsidies.

Individuals with a chronic illness have a substantial improvement in welfare from the ACA on average. These individuals have more to lose from being uninsured and more to gain from insurance than individuals without a chronic illness. While exchange enrollees overall have a decline in welfare on average, enrollees with a chronic illness benefit from exchange enrollment on average. Enrollees with a chronic illness receive more in paid claims than they pay for the premium in almost half of the potential medical scenarios they face. If chronically ill enrollees are likely to receive transfers in a substantial share of scenarios, then members without a chronic illness are likely providing transfers in as many instances. Under the ACA, enrollees pay the same premium regardless of their health status, which facilitates transfers from healthy to ill enrollees.

Low-income enrollees in exchanges have an average gain that is comparable in magnitude to that of Medicaid beneficiaries. Enrollees slightly above the federal poverty level do not have considerable excess money to dispense and are required to pay some amount towards premiums and out of pocket expenses with private coverage. Nevertheless the medical care access and financial protection provided by private insurance generate a net improvement on average. As income increases, enrollees receive fewer subsidies and are less likely to enroll (Avalere Health, 2015). As one would expect from welfare-maximizing households, I found that
the welfare loss from enrollment gets worse, or more negative, as an income increases and observed rates of enrollment decline.

Although some enrollees benefit, the newly privately insured have the greatest loss in welfare of any post-ACA insurance status on average. Paid claims are concentrated in catastrophic scenarios, in which enrollees would have access to charity care or bankruptcy as options for financial relief if they had remained uninsured. The value of paid claims in catastrophic scenarios far exceeds the amount of consumption the enrollee would risk losing without insurance.

My finding that medical bankruptcy increases for exchange enrollees rests on the assumption that they consume more medical care after becoming insured than they would have without insurance. The standard ACA policy has a high deductible; the median deductible is $3,453. If an enrollee consumes more medical care than did without insurance, they will pay for that medical care out of pocket except in the more extreme health scenarios. Many previously uninsured individuals will have difficulty absorbing an increase in medical spending.

It is also possible that rather than filing for bankruptcy, these individuals and households will instead refrain from consuming more medical care with insurance than they would have without insurance. Neither scenario generates individual welfare in the original spirit of “The Affordable Care Act”.

In the following chapter I extend my analysis by simulating potential reforms to the ACA. I explore whether each reform would generate more welfare without spending additional public resources. I consider re-arranging the ACA’s subsidies for private insurance to explore whether a more progressive design would generate welfare. Next I consider lowering the deductible of the standard exchange plan, while raising the out of pocket limit to pay for more
routine medical care. Last I explore whether less public money would be spent by expanding Medicaid higher, from 138% FPL to 200% FPL, than would otherwise be spent on private insurance subsidies for these individuals.

In contrast to the following analyses, the remaining challenges of the Affordable Care Act may require additional public spending. My analysis in this chapter serves to identify the challenges. My analysis in the following chapter serves to identify types of policies that might generate welfare for previously uninsured individuals. In the chapter that concludes I will use the lessons from these analyses to discuss allocation of additional investments.
5.4 References


5.5 Figures: Initial Results: Individual Welfare Effects of the ACA

Figure 5.1: Distribution of Post-ACA Insurance Status, Medicaid Expansion, Income, and Chronic Illness

Post-ACA Insurance Status

- Uninsured: 64%
- Private: 22%
- Medicaid: 14%

Medicaid expansion

- No Medicaid Expansion: 43%
- Medicaid Expansion: 57%

Income % FPL

- <=250% FPL: 67%
- >250% FPL: 33%

Chronic Illness

- No Chronic Illness: 72%
- Chronic Illness: 28%

Note: This figure presents characteristics of the population of previously uninsured adults in panels 12 through 16 of the 2007-2012 Medical Expenditure Panel Survey (MEPS). Post-ACA Insurance status and Medicaid expansion state residence are simulated; income and chronic illness diagnosis are reported in the MEPS.
Figure 5.2: Average Welfare Gains by Population Segment

Note: This figure presents average welfare gains realized by segments of the previously uninsured adult population from the Affordable Care Act.
Figure 5.3: Graph of ACA Welfare Effects by Insurance and Income

Note: This figure presents the average welfare gains and losses realized by previously uninsured adults from the Affordable Care Act, by income and insurance status.

As income increases, the average consumer realizes losses from private insurance, is not eligible for Medicaid, and pays larger fines for remaining uninsured.
Figure 5.4: ACA Welfare Gains and Losses by Gender and Race

Note: This figure presents the average welfare gains and losses realized by previously uninsured adults from the Affordable Care Act, by gender, race, and chronic illness diagnosis.
Figure 5.5: Probability Distribution of Claims Received vs. Out-Of-Pocket Spending if Uninsured

Note: This figure compares the range of claims reimbursement scenarios faced by the average exchange enrollee, and the range of out-of-pocket medical spending scenarios the average individual would face if he or she were to remain uninsured.

Dollar amounts represent weighted population average medical consumption at each discrete percentile interval. The 100th percentile is the average across the ten values 99.91% through 99.99% and 99.999%.
## 5.6 Tables: Initial Results: Individual Welfare Effects of the ACA

Table 5.1: Individual Welfare Gains and Losses from the ACA

<table>
<thead>
<tr>
<th>Population Distribution</th>
<th>Proportion $^\circ$</th>
<th>Wtd. Count (Millions)</th>
<th>Proportion with Welfare Gain</th>
<th>Welfare Gain</th>
<th>Mean</th>
<th>Contribution $^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Previously Uninsured</td>
<td>100%</td>
<td>31.6</td>
<td>19%</td>
<td>--</td>
<td>$29</td>
<td>--</td>
</tr>
<tr>
<td>Private</td>
<td>22%</td>
<td>6.9</td>
<td>22%</td>
<td>5%</td>
<td>-$223</td>
<td>-$49</td>
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<tr>
<td>Medicaid</td>
<td>14%</td>
<td>4.5</td>
<td>100%</td>
<td>0%</td>
<td>$1,637</td>
<td>$234</td>
</tr>
<tr>
<td>Uninsured</td>
<td>64%</td>
<td>20.2</td>
<td>0%</td>
<td>0%</td>
<td>-$244</td>
<td>-$156</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>57%</td>
<td>18.1</td>
<td>28%</td>
<td>16%</td>
<td>$125</td>
<td>$71</td>
</tr>
<tr>
<td>No Medicaid Expansion</td>
<td>43%</td>
<td>13.6</td>
<td>7%</td>
<td>3%</td>
<td>-$98</td>
<td>-$42</td>
</tr>
<tr>
<td>Chronic Illness</td>
<td>28%</td>
<td>9.0</td>
<td>29%</td>
<td>8%</td>
<td>$1,178</td>
<td>$334</td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>72%</td>
<td>22.7</td>
<td>15%</td>
<td>11%</td>
<td>-$425</td>
<td>-$305</td>
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</tbody>
</table>

Note: This table presents average welfare gains and losses realized by previously uninsured adults.

$^\circ$ Each population segment sums to 100%.

$^*$ Population segment weighted average; contributions within each panel sum to overall mean.
<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>Population Distribution</th>
<th>Proportion with Welfare Gain</th>
<th>Welfare Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proportion°</td>
<td>Count</td>
<td>Proportion</td>
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<tr>
<td>&lt;100</td>
<td>25%</td>
<td>7.9</td>
<td>37%</td>
</tr>
<tr>
<td>Private</td>
<td>1%</td>
<td>0.1</td>
<td>7%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>37%</td>
<td>2.9</td>
<td>100%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>62%</td>
<td>4.9</td>
<td>0%</td>
</tr>
<tr>
<td>100-138</td>
<td>12%</td>
<td>3.9</td>
<td>62%</td>
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<tr>
<td>Private</td>
<td>45%</td>
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<td>Medicaid</td>
<td>41%</td>
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<td>100%</td>
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<td>15%</td>
<td>0.6</td>
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<tr>
<td>138-200</td>
<td>18%</td>
<td>5.7</td>
<td>9%</td>
</tr>
<tr>
<td>Private</td>
<td>49%</td>
<td>2.8</td>
<td>19%</td>
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<td>--</td>
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<td>--</td>
</tr>
<tr>
<td>Uninsured</td>
<td>51%</td>
<td>2.9</td>
<td>0%</td>
</tr>
<tr>
<td>200-250</td>
<td>12%</td>
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<td>3%</td>
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</tr>
<tr>
<td>Medicaid</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Uninsured</td>
<td>70%</td>
<td>2.7</td>
<td>0%</td>
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<td>250-400</td>
<td>18%</td>
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</tr>
<tr>
<td>Medicaid</td>
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<tr>
<td>Uninsured</td>
<td>81%</td>
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<td>0%</td>
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<tr>
<td>&gt;400</td>
<td>15%</td>
<td>4.6</td>
<td>0%</td>
</tr>
<tr>
<td>Private</td>
<td>2%</td>
<td>0.1</td>
<td>4%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Uninsured</td>
<td>98%</td>
<td>4.5</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note: This table presents average ACA welfare gains and losses realized by previously uninsured adults by income as a percent of the Federal Poverty Level (FPL).

°Each population segment sums to 100%.

*Population segment weighted average; contributions within each panel sum to overall mean.
Table 5.3: Welfare Effects on Low-Income Adults by Medicaid Expansion Status

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proportion</td>
<td>Contribution*</td>
</tr>
<tr>
<td>All Previously Uninsured &lt;138% FPL</td>
<td>100%</td>
<td>11.9</td>
<td>45%</td>
<td>--</td>
</tr>
<tr>
<td>Expansion</td>
<td>54%</td>
<td>6.4</td>
<td>74%</td>
<td>40%</td>
</tr>
<tr>
<td>Private</td>
<td>9%</td>
<td>0.6</td>
<td>45%</td>
<td>4%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>70%</td>
<td>4.4</td>
<td>100%</td>
<td>70%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>22%</td>
<td>1.4</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>46%</td>
<td>5.5</td>
<td>12%</td>
<td>6%</td>
</tr>
<tr>
<td>Private</td>
<td>24%</td>
<td>1.3</td>
<td>46%</td>
<td>11%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>1%</td>
<td>0.1</td>
<td>100%</td>
<td>1%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>75%</td>
<td>4.1</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note: This table presents average ACA welfare gains and losses realized by previously uninsured adults with incomes below 138% FPL by state Medicaid expansion decision.

°Each population segment sums to 100%.
*Population segment weighted average; contributions within each panel sum to overall mean.
Table 5.4: ACA Welfare Effects on Women and Men

<table>
<thead>
<tr>
<th>Population Distribution</th>
<th>Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion° Wtd. Count</td>
<td>Proportion Gain</td>
</tr>
<tr>
<td>Women</td>
<td>43% 13.8</td>
</tr>
<tr>
<td>Private</td>
<td>22% 6.9</td>
</tr>
<tr>
<td>Medicaid</td>
<td>15% 4.8</td>
</tr>
<tr>
<td>Uninsured</td>
<td>63% 19.9</td>
</tr>
<tr>
<td>&lt;=250% FPL</td>
<td>71% 22.4</td>
</tr>
<tr>
<td>&gt; 250% FPL</td>
<td>29% 9.2</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>56% 17.7</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>44% 13.9</td>
</tr>
<tr>
<td>Men</td>
<td>57% 17.9</td>
</tr>
<tr>
<td>Private</td>
<td>22% 3.9</td>
</tr>
<tr>
<td>Medicaid</td>
<td>14% 2.4</td>
</tr>
<tr>
<td>Uninsured</td>
<td>65% 11.6</td>
</tr>
<tr>
<td>&lt;=250% FPL</td>
<td>65% 11.5</td>
</tr>
<tr>
<td>&gt; 250% FPL</td>
<td>35% 6.3</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>58% 10.4</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>42% 7.5</td>
</tr>
</tbody>
</table>

Note: This table presents average ACA welfare gains and losses realized by previously uninsured adults by gender.

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Table 5.5: ACA Welfare Effects by Race

<table>
<thead>
<tr>
<th>Population Distribution</th>
<th>Proportion(^a)</th>
<th>Wtd. Count</th>
<th>Proportion Gain</th>
<th>Welfare Mean Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hisp Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>21%</td>
<td>0.9</td>
<td>25%</td>
<td>-$397</td>
</tr>
<tr>
<td>Medicaid</td>
<td>13%</td>
<td>0.5</td>
<td>100%</td>
<td>$1,309</td>
</tr>
<tr>
<td>Uninsured</td>
<td>67%</td>
<td>2.9</td>
<td>0%</td>
<td>-$170</td>
</tr>
<tr>
<td>&lt;=250% FPL</td>
<td>73%</td>
<td>3.2</td>
<td>24%</td>
<td>$204</td>
</tr>
<tr>
<td>&gt; 250% FPL</td>
<td>27%</td>
<td>1.2</td>
<td>0%</td>
<td>-$679</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>40%</td>
<td>1.7</td>
<td>34%</td>
<td>$150</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>60%</td>
<td>2.6</td>
<td>7%</td>
<td>-$152</td>
</tr>
<tr>
<td>Non-Hisp White</td>
<td>47%</td>
<td>14.8</td>
<td>19%</td>
<td>$264</td>
</tr>
<tr>
<td>Private</td>
<td>20%</td>
<td>3.0</td>
<td>33%</td>
<td>$805</td>
</tr>
<tr>
<td>Medicaid</td>
<td>12%</td>
<td>1.8</td>
<td>100%</td>
<td>$2,446</td>
</tr>
<tr>
<td>Uninsured</td>
<td>67%</td>
<td>10.0</td>
<td>0%</td>
<td>-$294</td>
</tr>
<tr>
<td>&lt;=250% FPL</td>
<td>60%</td>
<td>8.8</td>
<td>31%</td>
<td>$808</td>
</tr>
<tr>
<td>&gt; 250% FPL</td>
<td>40%</td>
<td>6.0</td>
<td>1%</td>
<td>-$539</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>59%</td>
<td>8.8</td>
<td>25%</td>
<td>$360</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>41%</td>
<td>6.0</td>
<td>10%</td>
<td>$123</td>
</tr>
<tr>
<td>Hispanic and Other*</td>
<td>40%</td>
<td>12.5</td>
<td>20%</td>
<td>-$226</td>
</tr>
<tr>
<td>Private</td>
<td>24%</td>
<td>3.0</td>
<td>11%</td>
<td>-$1,201</td>
</tr>
<tr>
<td>Medicaid</td>
<td>17%</td>
<td>2.2</td>
<td>100%</td>
<td>$1,045</td>
</tr>
<tr>
<td>Uninsured</td>
<td>59%</td>
<td>7.4</td>
<td>0%</td>
<td>-$205</td>
</tr>
<tr>
<td>&lt;=250% FPL</td>
<td>74%</td>
<td>9.3</td>
<td>27%</td>
<td>-$65</td>
</tr>
<tr>
<td>&gt; 250% FPL</td>
<td>26%</td>
<td>3.2</td>
<td>0%</td>
<td>-$693</td>
</tr>
<tr>
<td>Medicaid Expansion</td>
<td>60%</td>
<td>7.6</td>
<td>30%</td>
<td>-$154</td>
</tr>
<tr>
<td>Non-Expansion</td>
<td>40%</td>
<td>5.0</td>
<td>5%</td>
<td>-$337</td>
</tr>
</tbody>
</table>

Note: This table presents average ACA welfare gains and losses realized by previously uninsured adults by race.

* Hispanics comprise a weighted 83%, Asians 11%, and other races comprise 5.5%.
Table 5.6: ACA Welfare Effects by Chronic Illness

<table>
<thead>
<tr>
<th>Chronic Illness</th>
<th>Population Distribution</th>
<th>Proportion with Welfare Gain</th>
<th>Welfare Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proportion°</td>
<td>Count</td>
<td>Proportion</td>
</tr>
<tr>
<td>Chronic Illness</td>
<td>28%</td>
<td>9.0</td>
<td>29%</td>
</tr>
<tr>
<td>Private</td>
<td>22%</td>
<td>2.0</td>
<td>53%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>18%</td>
<td>1.6</td>
<td>100%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>61%</td>
<td>5.4</td>
<td>0%</td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>72%</td>
<td>22.7</td>
<td>15%</td>
</tr>
<tr>
<td>Private</td>
<td>22%</td>
<td>4.9</td>
<td>10%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>13%</td>
<td>2.9</td>
<td>100%</td>
</tr>
<tr>
<td>Uninsured</td>
<td>65%</td>
<td>14.8</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note: This table presents welfare gains and losses from the ACA for previously uninsured non-elderly adults according to whether or not the individual has been diagnosed with a chronic illness.

°Each population segment sums to 100%.
*Population segment weighted average; contributions within each panel sum to overall mean.
Table 5.7: Probability of Paid Claims and Net Transfers for Exchange Enrollees

<table>
<thead>
<tr>
<th></th>
<th>Deductible</th>
<th>Net Transfer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All privately insured</td>
<td>50%</td>
<td>17%</td>
</tr>
<tr>
<td>&lt;250% FPL*</td>
<td>57%</td>
<td>19%</td>
</tr>
<tr>
<td>&gt;= 250% FPL</td>
<td>12%</td>
<td>6%</td>
</tr>
<tr>
<td>Chronic Illness</td>
<td>72%</td>
<td>40%</td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>41%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Note: This table presents the probability that an individual will incur medical expenditures that exceed insurance thresholds.
*Deductible amount varies with income (See Appendix Table A1)
*Transfer occurs when claims reimbursements exceed premium spending

Table 5.8: Exchange Enrollees’ Likelihood of Medical Bankruptcy

<table>
<thead>
<tr>
<th>Population Distribution</th>
<th>Likelihood of Medical Bankruptcy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without ACA</td>
</tr>
<tr>
<td>All privately insured</td>
<td>6.9</td>
</tr>
<tr>
<td>Chronic Illness</td>
<td>2.0</td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Note: This table presents the likelihood that a previously uninsured enrollee of a standard ACA exchange plan will incur medical spending that justifies filing for medical bankruptcy, defined as medical expenditures that exceed the individual’s household cost of bankruptcy.
Table 5.9: Probability Distribution of Paid Claims with ACA Insurance and OOP Spending without Insurance

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Paid Claims with Insurance</th>
<th>OOP without Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>$605</td>
<td>$61</td>
</tr>
<tr>
<td>50</td>
<td>$1,001</td>
<td>$95</td>
</tr>
<tr>
<td>75</td>
<td>$1,555</td>
<td>$152</td>
</tr>
<tr>
<td>95</td>
<td>$2,767</td>
<td>$347</td>
</tr>
<tr>
<td>100</td>
<td>$5,425</td>
<td>$1,505</td>
</tr>
</tbody>
</table>

Note: This figure compares the amount of medical care reimbursed by insurers on behalf of beneficiaries across the range of medical consumption scenarios that the average private insurance beneficiary might face, and the range of out-of-pocket medical spending scenarios the average enrollee would face if he or she had remained uninsured. As the scenario becomes increasingly catastrophic, reimbursements with insurance increase more quickly than OOP spending without insurance.

Dollar amounts represent the weighted population average amount of medical consumption at discrete percentile interval. The 100th percentile is the average across the ten values 99.91% through 99.99% and 99.999%.
Chapter 6: Additional Results- Simulations of Potential ACA Reforms

In my initial analysis of the ACA’s effect on the individual welfare of previously uninsured adults, I found only a small average gain in welfare for the population as whole. In this chapter, I conduct a series of simulations to explore three alternative federal policies to reform the Affordable Care Act. In the analyses, the structure of each reform keeps federal spending on the ACA unchanged. Two simulations explore potential reforms to private insurance. First, I consider redistributing the ACA’s premium subsidies from upper income adults to lower income adults, to make the subsidies more progressive. Second, I consider lowering the deductibles for enrollees without altering the actuarial value (i.e., the division of expenses between insurer and enrollee), to provide coverage for more routine medical care. Finally, I consider extending the Medicaid eligibility threshold beyond the ACA expansion level, to cover a greater number of people with less public spending than a private insurance subsidy.

This chapter will build on the methods and background discussion of my analysis of the ACA in the previous chapter. Each section in this chapter includes a description of the potential reform, methods that are specific to each simulation, and a presentation and short discussion of the results. A brief concluding section synthesizes the results of each reform and identifies areas for reform that would be fruitful in generating individual welfare on a fixed public budget.

6.1 Redistribute Premium Subsidies to Lower Income Households

The Affordable Care Act establishes a progressively designed private insurance subsidy for adults who were uninsured before its implementation: as household income increases, federal assistance for private insurance declines. The design reflects a policy interest in assisting individuals who are the least able to afford insurance.
In the preceding analysis, exchange enrollees with the heaviest subsidies had the greatest improvement in welfare on average. The simulated welfare effects predict observed rates of enrollment, reflecting consumers’ tendency to make welfare-maximizing choices. Individuals who are eligible for heavier subsidies are the most likely to enroll in private insurance (Avalere Health, 2015). As subsidies decline, the welfare improvement from enrollment declines, and previously uninsured consumers are decreasingly likely to enroll in private insurance.

After implementation of the ACA, exchange enrollees with moderate household income might get the most benefit from additional subsidies. Their lower-income counterparts are already heavily subsidized, while their higher-income counterparts are better able to afford insurance with their income.

In this simulation, I quantify the welfare effect of redistributing federal subsidies from previously uninsured adults with higher household incomes to those with more moderate levels of household income. The redistributed subsidy dollars will lower the price of private insurance for enrollees in the lowest-income group to have a welfare loss from enrollment on average, between 200% and 250% FPL, by removing the subsidy from individuals above 250% FPL.

Methods
This analysis evaluates whether greater progressivity in private insurance subsidies generates greater improvements in individual welfare. I estimate the total amount of federal subsidies offered to previously uninsured adults with higher household income, and then redistribute that amount to exchange enrollees with moderate household income. I treat the total amount offered as the amount available for redistribution, and then count only current exchange enrollees among the individuals receiving subsidies to the produce an upper-bound estimate of the welfare gains that might be realized.
First I find the amount of subsidy available for redistribution from previously uninsured adults above 250% FPL. I find the difference between the income-based cap on premiums set by the ACA, and the average premium for the standard plan in an ACA exchange. I use the average premium within each individual’s state of residence (The Henry J. Kaiser Family Foundation, 2015). The difference between the plan’s premium and the ACA’s cap on premiums provides the amount of premium subsidies that the federal government would provide to the enrollee. I construct a weighted average premium subsidy across the population of previously uninsured adults with incomes above 250% FPL. I use the average premium subsidy to find the total allotted federal spending for the population by multiplying the average premium subsidy by the number of previously uninsured adults above 250% FPL.

Next I find the amount of additional premium subsidy that each moderate-income enrollee receives from redistribution. I divide the total allotted federal subsidy for higher income enrollees by the number of previously uninsured exchange enrollees between 200% and 250% FPL. Finally I add the average additional premium subsidy to the mean and median welfare change found in my preceding evaluation of the ACA in Chapter 5. The results indicate whether exchange enrollment with a greater subsidy improves the welfare of exchange enrollees on average or improves the welfare of at least half of the group relative, remaining uninsured.

**Results**

Under the ACA as currently structured, average premium subsidies decline steeply with poverty status (Figure 6.1). On average, the ACA currently allots a premium subsidy of $124 to previously uninsured adults between 250% and 300% FPL, $10 to individuals between 300% and 400% FPL, and no subsidy to individuals above 400% FPL (Table 6.1). In total, the federal government allots $346 million to 10.4 million previously uninsured adults above 250% FPL who may enroll in private insurance through an ACA exchange (Table 6.1). Redistributing $346
million in subsidies offered to individuals above 250% FPL to the 1.1 million enrolled
individuals just below 250% FPL yields an additional $310 in premium subsidies per moderate-
income enrollee (Table 6.2).

Even after adding an additional $310 of subsidy per enrollee, the average and median
welfare effects of enrollment are substantially negative. Relative to remaining uninsured,
enrollees with the greater, redistributed subsidies have a loss in welfare of $1,321 on average
(Table 6.2). The median enrollee has a welfare loss of $2,358 relative to remaining uninsured
(Table 6.2).

Discussion
The amount of subsidy available for redistribution is of a much smaller magnitude than
the welfare loss from enrollment for the moderate-income enrollees. Greater progressivity in
premium subsidies did not generate greater improvements in individual welfare even within an
analysis designed to yield an upper bound estimate on the welfare improvement.

6.2 Reduce Deductibles in Standard Exchange Plan
The standard private insurance policy in an ACA exchange has a high deductible.
Deductibles exceed $1,500 in a sizeable majority (86%) of exchange policies that meet the
ACA’s standard level of coverage (The Henry J. Kaiser Family Foundation, 2015). As a result,
most standard policies meet the IRS definition of a high deductible health plan, defined as a
deductible of at least $1,300 (Internal Revenue Service, 2015).

The standard, high deductible policy primarily pays for an enrollee’s medical care in
catastrophic scenarios. If the enrollee had remained uninsured, they would have access to
alternative financial protections in catastrophic scenarios, including charity care and medical
bankruptcy. Overlap between these benefits might contribute to low rates of enrollment in private insurance through the ACA exchanges.

In this policy simulation I explore the welfare effect of lowering the deductible for the standard exchange plan. To maintain the same level of generosity within the plan, I concomitantly increase the limit on out-of-pocket spending. I evaluate whether enrolling in the low deductible plan improves the welfare of enrollees relative to remaining uninsured, and relative to the standard ACA plan.

Methods
This analysis evaluates whether enrolling in a low deductible plan with a high OOP limit would improve the welfare of previously uninsured adults. I maintain the same level of plan generosity between the new plan and the standard ACA insurance policy, to serve as a comparison. The standard plan has an actuarial value of 70%. I construct a new plan that maintains the same 70-30 division of total medical spending between the insurer and the enrollee.

First I find the expected value of each enrollee’s ex-ante distribution of OOP under the standard ACA policy. I calculate average expected OOP for the population of previously uninsured enrollees. Because of the ACA’s cost sharing subsidies, which depend on household income, I find average expected OOP within categories of poverty status. Within each poverty category, I find the lowest possible deductible and the lowest corresponding out-of-pocket limit that will maintain the same 70-30 split of total medical spending between insurers and enrollees. Some deductibles are too low to maintain the actuarial value because increasingly higher limits on OOP have a diminishing effect on actuarial value and cannot offset further reductions in the deductible. For example, there is little difference between insurers paying for all costs above a $50,000 limit and a $70,000 limit because only a fraction of enrollees will ever reach that level
medical consumption even in the most catastrophic scenarios. I do not include the role of charity care and bad debt in my calculation of enrollees’ expected out of pocket spending, because charity care does not directly affect the plan’s actuarial value.

Because lowering the deductible effectively lowers the price of medical care, I inflate medical consumption for enrollees in the new plan. In a recent analysis of medical claims data from a large employer that switched from full insurance to a high deductible plan, medical consumption below the deductible declined by 42.2% (Brot-Goldberg, Chandra, Handel, & Kolstad, 2015). I assume the corollary, that consumers moving from a high- to a low- deductible plan increase their medical consumption by the same factor. I inflate medical consumption below the deductible by 57.8% (=1 - 42.2%). Consumers are only affected by the price change after they reach the new, low deductible, and before they reach the standard, high deductible. For each enrollee’s ex-ante distribution of total medical consumption in the low deductible plan, I inflate the value of medical consumption that exceeds the low deductible and does not exceed the high deductible.

Next I construct distributions of consumption and of the utility of consumption in the new insurance policy with the methods I used in my previous analysis of the ACA. Relative to the standard ACA policy, the new policy has a higher OOP limit, which exposes enrollees to more financial risk. As a robustness check, I assess whether the new policy generates welfare gains if I assume a greater degree of risk aversion. In my primary analysis I assume that consumers exhibit Constant Absolute Risk Aversion (CARA) preferences and apply a CARA parameter value from the existing literature. The value of the CARA parameter is normally distributed about the population as a function of individual age and income. In the sensitivity analysis below, I apply a
risk aversion parameter equal to the 95th percentile\textsuperscript{15} of the weighted population distribution of the parameter, $\gamma = 7.2129 \times 10^{-4}$.

The difference in individual welfare with no insurance and welfare in the low deductible plan measures the welfare effect of enrolling in the new insurance policy. Additionally, I construct a direct comparison between the new low deductible plan and the standard ACA plan with a difference-in-difference approach. I find the difference between the welfare effect of enrolling in the standard plan and the welfare effect of enrolling in the new, low deductible plan, for each previously uninsured enrollee.

Results

Without the financial protections of charity care or bankruptcy, in the standard ACA plan, expected out of pocket spending equals $875 on average (Table 6.3). This estimate does not incorporate the protections of medical bankruptcy or charity care in order to serve as a measure of the plan’s actuarial value. By construction, in the new low deductible plan, expected out of pocket spending approximately equals out of pocket spending in the standard ACA plan, for the population as a whole and by categories of poverty status (Table 6.3). In the standard ACA plan, average expected OOP ranges across categories of poverty status from $547 to $1,368, and in the low deductible plan from $546 to $1,369.

Deductibles in the standard ACA plan range from $159 to $3,453 across categories of poverty status because of the ACA’s cost sharing subsidies. The new, reformed policies have the lowest possible deductibles that are able to maintain the ACA’s standard actuarial value. In the new policies, deductibles range from $80 to $2,150 across categories of poverty status. The corresponding OOP limit in the new policies range from $6,500 to $15,000, which are greater

\textsuperscript{15} The 95th percentile of the MEPS sample distribution is similar to the 95th percentile of the sample distribution on which the parameter was estimated, which is $\gamma = 7.31 \times 10^{-4}$ (Handel, Hendel, & Whinston, 2015).
than the standard ACA OOP limits that range from $2,250 to $6,350 across categories of poverty level (Table 6.3).

In the preceding estimates, enrollees without the benefits of charity care and medical bankruptcy faced the same expected amount of cost sharing in both the standard ACA plan and the new low deductible plan. However, after incorporating charity care and bankruptcy, enrollees spend less money out of pocket in the new low deductible policy (Table 6.4). Enrollees spend less out of pocket on average within each category of poverty status, with the exception of the group of individuals between 200% and 250% FPL, who spend $8 more on average. Overall only 3% of the sample has an increase in expected OOP spending (data not shown).

Even though enrollees spend less out of pocket in the new low deductible plan relative to the standard ACA plan, enrolling in the new plan does not generate an average welfare gain relative to remaining uninsured (Table 6.5). On average, enrollees in the new low deductible plan have a welfare loss of $191 relative to remaining uninsured. The median enrollee has a welfare loss of $748. In the standard ACA plan, enrollees had a welfare loss of $193 on average, and the median enrollee had a welfare loss of $982.

Comparing the welfare effect of enrolling in the low deductible plan relative to the standard ACA plan, the low deductible plan generates a smaller welfare loss. The average welfare loss of enrolling in the low deductible plan is $2 less than the average welfare loss from the standard plan ($191 vs. $193). Additionally, the median welfare loss is smaller with the low deductible plan than with the standard ACA plan, by $43 ($748 vs. $982).

Poverty status shapes the welfare effects of the low deductible plan. Below the federal poverty level, enrollees have a substantial welfare loss in both the low deductible plan and the standard ACA plan on average. These individuals are not eligible for premium or cost sharing
Individuals in poverty have a smaller loss in welfare loss in the low deductible plan relative to the standard ACA plan ($2,226 vs. $2,040; Table 6.5).

Between 150% and 200% FPL, enrollees have a greater welfare gain in the low deductible plan than in the standard ACA plan (by $107) on average, though the median enrollee has a welfare loss in either case ($1,039 low deductible, vs. $1,237 standard plan). For enrollees above 200% FPL, the median welfare loss is smaller with the low deductible plan than the standard plan (Table 6.5). However, the average welfare loss is greater for enrollees above 200% FPL in the low deductible relative to the ACA’s standard plan.

In each category of poverty status, the median enrollee of the low deductible, high OOP plan is no worse off (and in most cases better off) than they would be in the standard ACA plan, even with a high degree of risk aversion. While the magnitude of the welfare difference depend on the assumed degree of risk aversion, the direction remains consistent (Table 6.6).

Discussion
Relative to the standard ACA plan, the low deductible plan improves individual welfare by increasing the quantity of medical care that enrollees consume in routine health scenarios. In the standard ACA plan, paid claims were concentrated in the same catastrophic scenarios that uninsured consumers have access to charity care and bankruptcy relief. In the low deductible plan, enrollees still have access to uncompensated care in catastrophic scenarios (similarly to being uninsured), but would also have help from their insurance with routine care. A reduction in the cost of routine care causes an increase in the quantity of welfare-improving health care consumed.

Most enrollees (more than half) would benefit from a low deductible plan, even if the out of pocket maximum must be raised to maintain the actuarial value, and even if I assume among the highest level of intolerance for financial risks. The small magnitude in the difference between
the welfare effect of each plan give cause for further consideration before implementing this plan. However the analysis points to welfare gains forgone in the standard, high deductible plan.

6.3 Extend Medicaid Eligibility to a Higher Income Level

The last reform I consider is extending Medicaid eligibility higher than under the ACA, to 200% FPL. In this analysis, I assess whether Medicaid could universally cover the population of uninsured adults below 200% FPL using only the amount of money spent to subsidize private insurance for a subset of the population who enrolled private insurance after the ACA. I study only those states that have expanded Medicaid under the ACA up to 138% FPL, and consider the costs of extending the eligibility threshold from 138% to 200% FPL.

I model the costs of extending Medicaid on Minnesota’s State Basic Health Program, which accepts individuals up to 200% FPL, charges beneficiaries a small premium, and requires little cost sharing (see Table 6.7 for premium amounts). The ACA established the State Basic Health Program for states to extend Medicaid eligibility up to 200% FPL. As of 2015, only 2 states have done so, Minnesota and New York. The law requires that a beneficiary’s premiums and out of pocket spending do not exceed the enrollee’s subsidized costs in a standard exchange plan. Otherwise states can administer the programs with flexibility (Dorn & Tolbert, 2014). Minnesota administers the program through existing contracts established for the state Medicaid program, and pays 96% to 99% of medical care on behalf of beneficiaries, similarly to traditional Medicaid (Single State Medicaid Agency, 2015).\(^\text{16}\)

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\(^\text{16}\) The state of New York SBHP pays for between 93% and 99% of covered medical services, and also administers the SBHP through existing contracts established for Medicaid (New York State Department of Health, March). I model my analysis on Minnesota’s program because the actuarial value is closer to that of traditional Medicaid, making my regression-based simulation of medical consumption scenarios with Medicaid more accurate within the context.
Methods

In this policy simulation, I find the net cost of extending the income threshold for Medicaid eligibility in ACA expansion states. I define the net extension cost as the total cost of expansion, minus the amount of federal money redirected from subsidies for private insurance, assuming that all exchange enrollees switch from private to public coverage.

First I find the cost of extending Medicaid to the new beneficiaries, who include previously uninsured adults below 200% FPL who did not enroll in Medicaid after implementation of the ACA. I find the expected value of medical reimbursements by simulating each individual’s ex-ante distribution of medical consumption with Medicaid. I use the generalized gamma model from the previous analyses, and apply the coefficient for Medicaid to each parameter. I take the expectation across each individual’s ex-ante distribution of medical consumption, and then find the mean value of expected medical consumption across the population of new beneficiaries.

Next I subtract the average premium paid by the new beneficiaries, adopting the premium schedule developed for the Minnesota State Basic Health Program (SBHP). Monthly premiums range from $0 to $80 based on poverty status (Table 6.7). I multiply the monthly premium by 12 to put the premium on an annual time frame that is consistent with the annual time frame of the simulated medical consumption distributions. I find the weighted average premium across the population of new beneficiaries, and subtract this amount from the average medical reimbursement to calculate the average cost of Medicaid extension per beneficiary. Finally, I calculate the total cost of extension by multiplying the average cost by the population count.

Next I find the amount of federal money that would be redirected from subsidies for private insurance premiums and cost sharing, assuming that all exchange enrollees switch to Medicaid. To calculate out of pocket subsidies, I find the difference in ex-ante out of pocket
spending for each individual with and without the ACA’s subsidies for cost sharing. I find the expected value of out of pocket subsidies for each individual, and then find the weighted average expected OOP subsidy across the population. I calculate the premium subsidy by finding the difference between the average premium in each individual’s state of residence and the subsidized premium for the enrollee under the ACA then find the weighted population average of ACA premium subsidies.

To find the total amount of federal money that would be redirected from private insurance subsidies to the Medicaid program, I sum the average subsidies for premiums and OOP spending and multiply the resulting sum by the number of privately insured population members. Finally I find the net cost of extending Medicaid by subtracting the redirected private insurance subsidies from the total cost of extending Medicaid eligibility.

Results

If all Medicaid expansion states were to extend eligibility up to 200% FPL and all uninsured and privately insured individuals (who were uninsured prior to the ACA) were to switch from private to public coverage, Medicaid would gain 5.21 million new beneficiaries (Table 6.8). The average expected value of medical consumption for the new beneficiaries is $1,193, which represents the average cost of providing medical care to the newly enrolled population. Some new Medicaid beneficiaries would be required to pay a premium. On average, new beneficiaries would pay $389 per year in premiums for Medicaid. The total program cost comes to $4.19 billion, at an average cost of $804 per new beneficiary (Table 6.8).

Under the current ACA law, the federal government provides an average of $1,913 in premium subsidies per previously uninsured enrollee below 200% FPL in Medicaid expansion states (Table 6.8). Additionally, under the current ACA law, the federal government provides cost sharing subsidies for private insurance to this population at an average expected value of
$326 per enrollee per year. On average, the federal government would redirect $2,240 per person to Medicaid from premium and cost sharing subsidies for private insurance. Multiplied by the number of subsidized enrollees below 200% FPL in expansion states, the federal government would redirect a total of $4.79 billion dollars from private insurance subsidies into a Medicaid expansion.

The total cost of subsidizing private insurance for 2.14 million exchange enrollees ($4.79 billion) is greater than the total cost of providing Medicaid to all exchange enrollees plus all currently uninsured population members, a total of 5.21 million individuals, more than two times the number of exchange enrollees.

Discussion

This exercise indicates that Medicaid expansion would be a cost saving means of attaining universal health insurance coverage in a low-income population of previously uninsured adults. The analysis rests on an assumption that medical care costs less when administered through Medicaid than it costs through private insurance. Medicaid has historically reimbursed providers at lower rates than Medicare or private insurers. The low cost of Medicaid has created a barrier to access for its beneficiaries (Decker, 2012).

The ACA temporarily increased Medicaid reimbursement rates to equal those of Medicare for the years 2013 and 2014. Prior to the temporary increase, Medicaid paid physicians 66% of the amount that Medicare paid physicians on average (Kaiser Family Foundation, 2012). Under the ACA’s temporarily increased rates, Medicaid beneficiaries were better able to access primary care (Polsky, et al., 2015). After congress failed to renew federal support for the increased reimbursement rates, most states have allowed the rates to revert back to pre-ACA levels (Tollen, 2015).
While expanding Medicaid costs less than subsidizing private insurance, if the beneficiaries remain unable to access medical care, it may defeat the purpose of expansion. At Medicare reimbursement rates, federal subsidies for the subset of exchange enrollees would not cover the cost of providing Medicaid to the larger set of previously uninsured adults below 200% FPL. However even at Medicare rates, public coverage costs less per beneficiary than subsidies for private insurance.

6.4 Conclusion

These policy simulations provide some indication of the individual welfare implications of potential reforms to the ACA. Firstly, adding more progressivity to the ACA’s design of private insurance subsidies did not yield much improvement in individual welfare. Subsidy reforms might require additional federal spending to meaningfully affect the welfare of current and potential enrollees.

Secondly, whereas a high deductible plan pays for catastrophic medical care, a lower deductible plan facilitates routine medical consumption. If the standard plan could become more generous, lowering the standard deductible might yield more gains in individual welfare than lowering the standard limit on out of pocket spending.

Finally, extending the threshold for Medicaid eligibility could universally cover low-income adults with fewer public resources than subsidizing private insurance. The public savings would have to be weighed against potential problems with beneficiaries’ access to physicians, and might require an increase in Medicaid reimbursement rates.

17 Inflating total medical reimbursements from the analysis above ($1,193) by the relative average rate of private reimbursements yields an average cost of $1,808 (=1,193*(1/ .66)) per beneficiary. The net program cost would come to an additional $2.60 billion, rather than a savings of $605 million.
The next chapter concludes this thesis. I use my analyses from this and the preceding chapter to evaluate existing proposals for reforms to the ACA, and relate my findings to the existing health economics literature. I end by discussing limitations to the analysis and point to areas of future research.
6.5: References: Additional Results: Simulations of Reforms


6.6: Tables and Figures: Additional Results: Simulations of Reforms

Simulation 1: Redistribution of Subsidies for Private Insurance Premiums

Figure 6.1: Average ACA Premium Subsidies by Income

Note: This table presents the average federal subsidy provided to previously uninsured adults who enroll in a private insurance policy in an exchange marketplace.

The amount of federal subsidy an individual receives is the difference between the income-based premium cap, established by the Affordable Care Act, and the premium charged for a standard, silver tier plan.

I use income as reported by sample members in the 2008-2012 Medical Expenditure Panel Survey, and average 2014 silver plan premiums by state as reported by Kaiser (The Henry J. Kaiser Family Foundation, 2015).
Table 6.1: Redistribute Premium Subsidies from 250% FPL and Above

<table>
<thead>
<tr>
<th>Income %FPL</th>
<th>Average Subsidy°</th>
<th>Count⁺ (Millions)</th>
<th>Total subsidy* (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-300</td>
<td>$124</td>
<td>2.6</td>
<td>$315</td>
</tr>
<tr>
<td>300-400</td>
<td>$10</td>
<td>3.2</td>
<td>$31</td>
</tr>
<tr>
<td>400+</td>
<td>$0</td>
<td>4.6</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$346</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: This table presents the average and total federal private insurance premium subsidies allotted to previously uninsured adults with incomes above 250% FPL.

° Difference between premium for standard, silver private insurance policy through marketplace exchange by state and income-based premium cap established by the Affordable Care Act

⁺ Total number of previously uninsured adults with incomes above 250% FPL

* Average Subsidy multiplied by Count
Table 6.2: Redistribute Premium Subsidies to 200-250% FPL

<table>
<thead>
<tr>
<th>Income %FPL</th>
<th>Count*</th>
<th>Average Addl. Sub+</th>
<th>Mean welfare</th>
<th>Median Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACA Welfare Δ</td>
<td>+ Addl. Subsidy</td>
</tr>
<tr>
<td>200-250</td>
<td>1,116,475</td>
<td>$310</td>
<td>-$1,321</td>
<td>-$2,358</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ Addl. Subsidy</td>
<td>-$2,048</td>
</tr>
</tbody>
</table>

Note: This table presents the welfare effects of redistributing federal subsidies for private insurance premiums purchased through the ACA marketplace exchange from individuals in households earning above 250% FPL to those earning between 200% and 250% FPL. The left panel presents the average additional subsidy generated from redistribution. The middle and right panels present the welfare effects of enrolling in a standard exchange plan under the ACA, and the welfare effects of enrollment with the additional subsidy generated by redistribution, for the average and median individual, respectively.

* Projected number of previously uninsured adults enrolled in private insurance through ACA exchange with income between 200% and 250% FPL

+ Average additional subsidy divides total premium subsidy redistributed from adults in households earning above 250% FPL ($346 million, Table 6.1) by Count of previously uninsured current enrollees.
### Simulation 2: Individual Welfare Effects of Low Deductible Exchange Plan

#### Table 6.3: Low Deductible Plan Characteristics

<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>ACA Standard Plan</th>
<th>Low Deductible Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deductible</td>
<td>OOP max</td>
</tr>
<tr>
<td>Population Mean</td>
<td>$1,325</td>
<td>$3,481</td>
</tr>
<tr>
<td>&lt;100</td>
<td>$3,453</td>
<td>$6,350</td>
</tr>
<tr>
<td>100-150</td>
<td>$159</td>
<td>$2,250</td>
</tr>
<tr>
<td>150-200</td>
<td>$659</td>
<td>$2,250</td>
</tr>
<tr>
<td>200-250</td>
<td>$2,763</td>
<td>$5,200</td>
</tr>
<tr>
<td>250+</td>
<td>$3,453</td>
<td>$6,350</td>
</tr>
</tbody>
</table>

Note: This table presents the cost sharing parameters and expected out of pocket medical spending by previously uninsured adult enrollees of the standard ACA exchange plan, and an alternative, lower deductible (*LD) plan with approximately equal actuarial values.

*Expected value of out of pocket spending for each individual, averaged across population of previously uninsured exchange plan enrollees. Out of pocket spending estimates are obtained by applying standardized cost sharing rules to simulated medical consumption distributions. See Table A1 for a summary of ACA private insurance subsidies.
<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>Low Deductible</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bankruptcy as OOP Ceiling</td>
<td>No OOP Ceiling</td>
</tr>
<tr>
<td>Population Mean</td>
<td>$601</td>
<td>$875</td>
</tr>
<tr>
<td>&lt;100</td>
<td>$913</td>
<td>$1,314</td>
</tr>
<tr>
<td>100-150</td>
<td>$341</td>
<td>$546</td>
</tr>
<tr>
<td>150-200</td>
<td>$527</td>
<td>$764</td>
</tr>
<tr>
<td>200-250</td>
<td>$897</td>
<td>$1,278</td>
</tr>
<tr>
<td>250+</td>
<td>$995</td>
<td>$1,369</td>
</tr>
</tbody>
</table>

Note: This table presents the average out of pocket spending for an enrollee of the standard ACA plan, and of an alternative plan that has a low deductible and high out of pocket spending maximum. Spending is roughly equivalent between the Low Deductible and Standard plans without the OOP spending ceiling. With the OOP ceiling, expected spending is lower in the low deductible plan.

* OOP spending ceiling defined as household financial cost of bankruptcy
Table 6.5: Welfare Effect Difference-in-Difference Between No Insurance, Low Deductible, and Standard ACA Plans

<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>Low Deductible Plan (1)</th>
<th>Standard Plan (2)</th>
<th>Difference-in-Difference (1) - (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>Population Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>-$191</td>
<td>-$748</td>
<td>-$193</td>
</tr>
<tr>
<td>100-150</td>
<td>-$2,226</td>
<td>-$2,831</td>
<td>-$2,040</td>
</tr>
<tr>
<td>150-200</td>
<td>$881</td>
<td>-$49</td>
<td>$843</td>
</tr>
<tr>
<td>200-250</td>
<td>-$131</td>
<td>-$1,039</td>
<td>-$175</td>
</tr>
<tr>
<td>250+</td>
<td>-$1,460</td>
<td>-$2,257</td>
<td>-$1,405</td>
</tr>
</tbody>
</table>

Note: This table presents welfare gains and losses realized in a low deductible health plan and the ACA standard health plan, relative to remaining uninsured.

The vertical panel (1) presents welfare gains and losses for enrollees in a low deductible plan relative to remaining uninsured, panel (2) presents welfare gains and losses for enrollees in the standard plan relative to remaining uninsured, and the final, right-most panel presents a difference in difference estimate between the two plans.
Table 6.6: Analysis of Welfare Measure Sensitivity to Risk Aversion Parameter

<table>
<thead>
<tr>
<th>Income % FPL</th>
<th>Low deductible (1)</th>
<th>Standard Plan (2)</th>
<th>Difference (1) - (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>Population Mean</td>
<td>-$210</td>
<td>-$700</td>
<td>-$196</td>
</tr>
<tr>
<td>&lt;100</td>
<td>-$2,330</td>
<td>-$2,901</td>
<td>-$2,106</td>
</tr>
<tr>
<td>100-150</td>
<td>$776</td>
<td>-$90</td>
<td>$760</td>
</tr>
<tr>
<td>150-200</td>
<td>-$145</td>
<td>-$1,051</td>
<td>-$173</td>
</tr>
<tr>
<td>200-250</td>
<td>-$1,465</td>
<td>-$2,267</td>
<td>-$1,400</td>
</tr>
<tr>
<td>250+</td>
<td>-$1,649</td>
<td>-$2,892</td>
<td>-$1,542</td>
</tr>
</tbody>
</table>

Note: This table presents welfare gains and losses realized in a low deductible health plan and the ACA standard health plan, relative to remaining uninsured, assuming that individuals have a high aversion to consumption uncertainty.

The CARA risk aversion parameter assumed here is equal to the 95th percentile of the weighted population distribution of CARA preference parameter values, where $\gamma = 7.2129 \times 10^{-4}$.
Simulation 3: Medicaid Eligibility Extension

Table 6.7: Minnesota State Basic Health Plan Premiums

<table>
<thead>
<tr>
<th>Federal Poverty Guidelines (%Below)</th>
<th>Family Size</th>
<th>Monthly Premium Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>35%</td>
<td>4,065</td>
<td>5,506</td>
</tr>
<tr>
<td>55%</td>
<td>6,419</td>
<td>8,652</td>
</tr>
<tr>
<td>80%</td>
<td>9,336</td>
<td>12,584</td>
</tr>
<tr>
<td>90%</td>
<td>10,503</td>
<td>14,157</td>
</tr>
<tr>
<td>100%</td>
<td>11,670</td>
<td>15,730</td>
</tr>
<tr>
<td>110%</td>
<td>12,837</td>
<td>17,303</td>
</tr>
<tr>
<td>120%</td>
<td>14,004</td>
<td>18,876</td>
</tr>
<tr>
<td>130%</td>
<td>15,171</td>
<td>20,449</td>
</tr>
<tr>
<td>140%</td>
<td>16,338</td>
<td>22,022</td>
</tr>
<tr>
<td>150%</td>
<td>17,505</td>
<td>23,595</td>
</tr>
<tr>
<td>160%</td>
<td>18,672</td>
<td>25,168</td>
</tr>
<tr>
<td>170%</td>
<td>19,839</td>
<td>26,741</td>
</tr>
<tr>
<td>180%</td>
<td>21,006</td>
<td>28,314</td>
</tr>
<tr>
<td>190%</td>
<td>22,173</td>
<td>29,887</td>
</tr>
<tr>
<td>200%</td>
<td>23,340</td>
<td>31,460</td>
</tr>
<tr>
<td>Exactly 200%</td>
<td>23,340</td>
<td>31,460</td>
</tr>
</tbody>
</table>

Note: This table shows the premium contribution required for enrollees of the State Basic Health Plan of Minnesota, as presented in the Minnesota Basic Health Plan Blueprint (Single State Medicaid Agency, 2015, p. 30)
Table 6.8: Medicaid Expansion Costs and Savings

<table>
<thead>
<tr>
<th>Expansion Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Expected Value of Medical Costs*</td>
<td>$1,193</td>
</tr>
<tr>
<td>Avg. Premium Contribution*</td>
<td>($389)</td>
</tr>
<tr>
<td>Avg. cost</td>
<td>$804</td>
</tr>
<tr>
<td>Number of new enrollees</td>
<td>× 5.21 million</td>
</tr>
<tr>
<td>Total Program Cost</td>
<td>$4.19 billion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Redirected Private Funds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Expected OOP Subsidy*</td>
<td>$326</td>
</tr>
<tr>
<td>Avg. Premium Subsidy</td>
<td>+ $1,913</td>
</tr>
<tr>
<td>Avg. Cost savings</td>
<td>$2,240</td>
</tr>
<tr>
<td>Number privately insured</td>
<td>× 2.14 million</td>
</tr>
<tr>
<td>Total Savings</td>
<td>$4.79 billion</td>
</tr>
</tbody>
</table>

Net Expansion Cost (605 million)

Note: this table presents the net public cost of extending the Medicaid eligibility threshold from 138% FPL to 200% FPL.

*Expected value of federal OOP cost sharing subsidy for each individual, averaged across the population of previously uninsured exchange plan enrollees. See Table A1 for summary of ACA subsidies. OOP spending estimates are obtained by applying standardized cost sharing rules to simulated medical consumption distributions.

*Premium contributions are defined by income according to the Minnesota State Basic Health Plan premium schedule (Table 6.7).
Chapter 7: Conclusion

In this thesis I investigated the individual welfare effects of the Affordable Care Act for formerly uninsured adults. The ACA primarily targets the 37 million American adults under the age of 65 who were uninsured before its implementation by allocating federal funds to expand access to public and private insurance. The ACA addresses the heightened risk of medical debt and under-utilization of health care observed in this population prior to the law’s implementation.

I conducted the investigation from an ex-ante perspective, evaluating the uncertain spread of medical consumption scenarios and the corresponding spread of financial scenarios that each individual faces with and without the ACA. By adopting this perspective, I credit the ACA’s expansion of insurance with reducing the risk of potential medical spending independently of the eventual medical outcomes that individuals might incur. The ex-ante perspective is especially important for evaluating the benefit of private insurance, because in most scenarios enrollees pay more in premiums than they receive in paid claims, but may still have improvements in welfare from protection against potential scenarios with catastrophic medical spending.

In this concluding chapter, I will first provide a brief summary of the empirical findings and then relate my findings to recent literature on the evaluation of ex-ante medical risk and the individual welfare effects of insurance expansions. Next, I will explore the implications of these findings for the analysis and development of reforms to the Affordable Care Act. I will conclude the thesis by discussing limitations of the study that should be kept in mind when drawing policy implications, as well as directions for future research.

I found that the ACA generates a small, but positive, net improvement in the individual welfare of previously uninsured adults on average ($29). The most important determinants of the ACA’s welfare effects include individual health status, household income, and post-ACA
insurance status. Health status shapes the medical and financial benefits an individual realizes from insurance, as well as the individual’s vulnerability to the risk of large medical costs in a world without health care reform. Household income determines eligibility for free public coverage through Medicaid and eligibility for varying premium or cost sharing subsidies through the private insurance market. Finally, after implementation of the ACA previously uninsured individual might obtain private or public insurance or remain uninsured.

More than three in five previously uninsured adults remain uninsured after the ACA and thus do not realize any medical or financial benefits. Medicaid expansion generates substantial welfare gains for enrollees (+$1,637 on average) but fewer than one in five previously uninsured individuals enroll, due in part to the program’s means-tested eligibility as well as state decisions about whether to expand Medicaid. The remaining uninsured adults (approximately one in five of those uninsured before the ACA) enroll in private insurance, mostly through the exchange marketplaces for private insurance established by the ACA.

On average, enrollees in the standard exchange plan (the policy that defines ACA subsidies), are worse off than they would be without the ACA (-$223). Like the average welfare effects of the ACA on the entire target population, the individual welfare effects of private insurance vary according to income and health status. The privately insured with chronic medical needs or lower incomes gain from enrollment on average. The chronically ill are likely to require more intensive treatment, while low-income enrollees are eligible for federal subsidies that lower their insurance policies’ premiums, deductibles, and out of pocket limits. Both groups are more likely to benefit from receiving paid claims by exceeding their deductibles and are more likely to receive net transfers from the insurance pool than the average enrollee.
I extended the ACA analysis to evaluate whether reforms to the law would generate additional individual welfare without requiring any additional public spending. Even under liberal assumptions about the potential welfare gains from redistributing federal premium subsidies more progressively, I found that the small average subsidy ($310) that would be redistributed from higher income enrollees did not offset the substantial welfare loss otherwise realized by moderate-income enrollees on average (-$1,321). Premium subsidies appear to be structured progressively enough under the ACA; from the perspective of individual consumers, the central weakness of the ACA’s reform of private insurance is that the total amount of premium subsidies is too small.

Second, I found that most privately insured enrollees were better off in an insurance policy with a greater emphasis on non-catastrophic care. Under a hypothetical plan with a low-deductible and high out of pocket (OOP) maximum, exchange enrollees consume more medical care because they are more likely to exceed the low deductible and pay less out-of-pocket for care that they are likely to use. At the same time, enrollees can expect to pay less out of pocket than suggested by the out-of-pocket limit, because they fall back on alternative sources of financial relief in catastrophic scenarios that include charity care, bad debt, and bankruptcy.

Finally I considered extending Medicaid eligibility to twice the Federal Poverty Level (FPL) within states that have already expanded Medicaid under the ACA. I found that fewer public dollars would be required to provide Medicaid to all 5.21 million previously uninsured adults with either private insurance or no insurance below 200% FPL, than to provide private insurance subsidies to the subset of 2.14 million people below that income threshold with private insurance from exchanges. In light of Medicaid’s tendency to limited networks, I considered raising Medicaid reimbursement rates to equal those of Medicare. With higher Medicaid
reimbursement rates, the money allotted for private insurance subsidies for previously uninsured adults below 200% FPL was not enough to cover everyone below 200% FPL. Nevertheless, good quality coverage costs less per beneficiary when the coverage is administered through Medicaid at Medicare reimbursement rates relative to subsidies for private insurance.

7.1 Theoretical and Methodological Implications

This thesis informs the ongoing development of a standardized, formal measure of medical care economic risk, which would serve as an ex-ante complement to a retrospective measure of medical expenditure burden. About five years ago in 2011-2012, experts appointed by the National Research Council explored the methodological and conceptual features of such a measure and produced recommendations for future researchers (National Research Council, 2012). The panel proposed an empirical approach that would evaluate the likelihood of an individual or household being in poverty (or below a multiple of the poverty threshold) after purchasing medical care. While I employed several of the panel’s recommendations for simulating ex-ante medical consumption and measuring financial resources, I also found opportunities for improving on the recommendations.

The panel provided a set of recommendations for simulating ex-ante medical consumption that include using the population distribution of medical consumption observed in the Medical Expenditure Panel Survey (MEPS) to proxy for the ex-ante distribution of individuals’ potential medical consumption. In her doctoral dissertation, Meier (herself a contributor to the panel’s published text) implemented a generalized gamma approach to simulating ex-ante medical consumption that was among the methodological approaches recommended by the panel and further developed in this thesis (Meier, 2015). Additionally, the panel noted that the simulation approach would ideally reflect the tradeoff that consumers face
between up-front spending through premiums, and potential out-of-pocket spending through cost sharing.

To assess financial resources the panel recommended combining household income with a share of readily accessible, liquid and near-liquid assets. The panel suggested assessing either a fixed share of assets (such as 5%, similar to asset depletion recommended to retirees by financial planners) or an annuitized share based on the individual’s life expectancy. Assessing only a share of assets, rather than the total value, was intended to acknowledge the hardship of rapidly paying out the entirety of a household’s accumulated savings.

In keeping with the panel’s recommendations, my empirical analysis simulated ex-ante medical consumption as a function of insurance status using a three-parameter gamma model. The approach in this thesis builds on that of Meier (2015). In this thesis I estimate each of the three parameters at the individual-level, simulating the ex-ante distribution to vary with a change in an individual’s insurance status. Insurance indicators for each of the three parameters project a distinct expected value, shape, and spread of the previously uninsured adult’s ex-ante medical care according to his or her projected enrollment in a standardized private plan, Medicaid, or no insurance. Moreover, the method can be used to assess the effect of specific cost sharing parameters on burden and risk, as illustrated in Section 6.2.

I measured the financial resources that a household uses to pay for medical care as the sum of income and assets not seizable under bankruptcy. In keeping with the panel’s recommendations, non-seizable assets typically include financial assets and some share of non-financial assets. Rather than using an arbitrarily determined share of assets, bankruptcy legislation offers a politically determined framework for assessing the share of household wealth that should be protected under catastrophic circumstances. Moreover, because of the major role
that bankruptcy and charity care play in the collection and payment of catastrophic medical debt, the value of non-seizable assets is a valid instrument for measuring wealth at risk.

An important component of medical care economic risk for uninsured adults is the risk of unmet need, the language typically used in public health to describe what economists might describe as foregoing medical consumption that has a high marginal benefit. However the panel’s recommended approach does not address the issue (National Research Council, 2012, p. 84). With the panel’s recommended approach, measuring medical expenditure risk as the likelihood of entering poverty rules out the possibility of medical expenditure risk measurement for individuals who are already very near or below the poverty threshold before purchasing medical care. Furthermore, as evidenced in the existing literature and supported by my own findings, by virtue of their low incomes and lack of insurance, uninsured adults tend to spend very little on medical care in most states of health, especially the healthy majority of individuals without chronic illnesses. In other words, uninsured adults face a low ex-ante risk of spending much of anything on medical care. At the same time, they face a greater risk of forgoing or delaying highly beneficial treatment as a result of its cost. Although an earlier NAS panel recognized two sides to medical care economic risk (the risk of being in poverty due to medical spending and the risk of forgoing needed care), the 2012 panel tasked with further development of the measure did not incorporate unmet need (National Research Council, 2012, pp. 17, 84).

An empirical approach such as the one I utilized in this thesis could facilitate an ex-ante measure of the risk of unmet need. The three-parameter gamma model can simulate an ex-ante distribution of unmet need for each individual by finding the difference between the distribution of medical consumption with and without insurance over the different states of health. For
example, one could evaluate a ratio involving the expected value of ex-ante medical consumption with and without insurance as a measure of ex-ante unmet need.

Two recent analyses of Medicaid expansion and the ACA’s private insurance reforms, respectively, found that the welfare gain from obtaining insurance was undermined by the availability of alternative sources of financial relief to the uninsured in catastrophic medical scenarios. One study found that sixty cents of every Medicaid dollar was a transfer to the providers of implicit insurance (Finkelstein, Hendren, & Luttmer, 2015). The other predicted that enrolling in the standard ACA plan would reduce the welfare of a majority of previously uninsured adults (Pauly, Leive, & Harrington, 2015). Pauly and colleagues noted that their finding was similar to that of the Medicaid evaluation from Finkelstein and colleagues, in that both studies concluded that low-income, uninsured consumers were no better off with reforms that implicitly channeled public spending to the providers of uncompensated care.

Similarly, I found in my empirical analysis of the ACA that the availability of implicit insurance and uncompensated care for previously uninsured adults undermines their welfare gains from obtaining insurance. By modeling and describing individualized probability distributions of medical consumption in detail, this thesis further elucidates the relationships and logic behind a general proposition that is emerging in the literature about the individual welfare effects of insurance expansions for previously uninsured individuals. Namely, a large share of total medical spending occurs in catastrophic medical scenarios, and an analogously large share of insurance claims and premiums go to pay for catastrophic care. Because previously uninsured consumers paid only a fraction of the cost of catastrophic care directly out of their pockets, a large share of any new funding to expand insurance will not benefit the previously uninsured. Instead, a large portion of the funding will be transferred to those who were previously financing
uncompensated care for the uninsured, which includes some combination of federal, state, and local governments; health care providers; and privately insured consumers with employer-sponsored coverage. As a consequence, many of the previously uninsured would often be better off with a cash transfer that divided the cost of the expansion among themselves, rather than an insurance policy of equivalent cost.

However if a cash transfer replaced insurance assistance, catastrophic medical care would remain uncompensated. Insurance reforms that expand coverage for the previously uninsured establish an explicit channel for funding uncompensated care. Additionally (perhaps secondarily according to these findings), insurance expansions improve the individual welfare of enrollees by improving access to routine medical care and protecting consumption.

7.2 Policy Implications

When signing the Affordable Care Act into law, President Obama remarked that he was “[enshrining]... the core principle that everybody should have some basic security when it comes to their health care” (Obama, 2010). In the two years since the ACA’s major coverage reforms took effect, more than 17 million American adults gained coverage, but an additional 29 million remained without the ‘basic security’ of health insurance (Collins, Rasmusen, Doty, & Beutel, 2015). A primary consideration moving forward is to increase rates of insurance for the remaining uninsured population. Insights gained from this thesis provide a framework for comparing potential reforms to the ACA in terms of their ability to increase rates of insurance coverage and improve access to medical care and financial protection for those who remain uninsured.

The health insurance reform enacted in Massachusetts serves as an important point of comparison to the ACA. While the Massachusetts reform served as a model for the ACA and
shares the same basic structure, the Massachusetts reform has been relatively more successful. Massachusetts has kept the share of uninsured nonelderly adults around five percent since implementation of its reform in 2009, while the share nationwide remains at thirteen percent (Skopec, Long, Sherr, Dutwin, & Langdale, 2015).

There are three key differences between the Massachusetts reform and the ACA that my analysis suggests are likely to explain the disparate rates of insurance coverage. Firstly, Massachusetts extends Medicaid eligibility up to 300% FPL, which is much higher than the threshold under the ACA’s expansion (138% FPL). Broader access to the free Medicaid coverage explains a portion of the difference in coverage. Secondly, Massachusetts extends eligibility for subsidized premiums in the private insurance market to higher income individuals than the ACA (500% FPL vs. 400% FPL). Rates of participation in ACA exchanges are highly sensitive to subsidy eligibility.

Finally, relative to private insurance policies in ACA exchanges, policies in Massachusetts’ exchanges provide greater coverage for routine care, with similar coverage for catastrophic care. While a majority of standard ACA plans have deductibles over $2,000, very few (10%) of the standard Massachusetts policies have deductibles over $1,000 (Long & Dimmock, 2014). At the same time, out of pocket maximums in the standard Massachusetts policies are similar to those in the rest of the nation, pointing to the importance of coverage for routine care in motivating purchasing of private insurance.

The Urban Institute recently proposed a plan for reforming the ACA that shares some features with the Massachusetts legislation (Blumberg & Holahan, 2015). For the private insurance market, the Urban Institute recommended lowering the cost and increasing the generosity of the standard policy. The proposal reduces the maximum premium that enrollees
pay for a standard policy and introduces a premium cap for individuals above 400% FPL who are not currently eligible for ACA subsidies (see Table 7.1). Additionally, the Urban Institute proposed subsidizing the cost of private insurance for individuals below the poverty level in states that do not expand Medicaid. Poor enrollees would pay no premium for a private policy that has a 94% actuarial value. In the current ACA exchanges, similar policies with the 94% actuarial value proposed by the Urban Institute have deductibles averaging $159 and out-of-pocket limits averaging $2,250 (Claxton & Panchal, 2015).

Finally, the Urban Institute recommended that the federal government offer states the option of a limited Medicaid expansion, up to 100% FPL rather than 138% FPL. The proposal argued that a limited expansion would offer a politically feasible way to increase Medicaid coverage. More states might be willing to enact a limited expansion that covers fewer beneficiaries, reduces potential increases in the states’ financial liability, shifts the burden of covering near-poor individuals (100% to 138%) to federally subsidized exchanges.

Under the Urban Institute’s proposed reforms, previously uninsured adults with middle and higher incomes would be unambiguously better off relative to the ACA currently. Whereas the ACA caps private insurance premiums for enrollees up to 400% FPL (and Massachusetts up to 500% FPL), the Urban Institute recommended capping premiums as a percentage of income at all income levels. At the same time, the Urban Institute recommended improving the generosity of exchange policies. Because the proposal ties its recommendation for increased generosity to the policies’ actuarial values, enrollees would be free to choose between more catastrophic coverage (with a lower out of pocket maximum) and more routine coverage (with a lower deductible). The proposed changes would improve the welfare of current enrollees and
encourage additional enrollment among middle and higher income groups where participation is currently low.

Poor and near-poor adults are not likely to be better off with the Urban Institute’s recommended reform. While some non-expansion states might be convinced to enact a limited Medicaid expansion, current expansion states might be similarly convinced to lower their eligibility thresholds. My empirical analysis showed substantial welfare gains from Medicaid enrollment that might be lost under this proposal.

Moreover, Medicaid cannot be adequately replaced by private insurance, even with the Urban Institute’s substantial proposed subsidies. Private insurance primarily pays for medical care in catastrophic scenarios (Chapter 5, Figure 5.5). The policies are designed to provide financial protection in catastrophic scenarios while limiting coverage of non-catastrophic care. For poor uninsured adults who earn less than $1,000 per month\textsuperscript{18}, a $159 deductible might deter necessary treatment. Moreover a $2,250 out of pocket spending maximum is a large and largely irrelevant amount of money in this context. Rather than offering limited Medicaid expansion and subsidizing private insurance as a political compromise, the federal government should develop a financially and politically appealing way to expand Medicaid nationally.

Lastly, I will evaluate a collection of proposals by four members of Congress that would repeal and replace the ACA (McDonough & Fletcher, 2015). Each would remove the ACA’s individual mandate, guaranteed-issue requirements (which prohibit insurers from denying coverage for pre-existing conditions or to individuals with such conditions), community-rating (which prohibit insurers from setting premiums based on the enrollee’s health-status), essential

\textsuperscript{18} For a single adult in 2014
health benefit requirements (which require all insurance policies to cover or not cover any range of illnesses as stipulated in each specific contract), and federal subsidies for private insurance.

For the most part, these repeal and replace proposals would cause the individual insurance market to revert back to its pre-ACA form. As explicitly quantified in this study, the proposals would generate welfare gains relative to the ACA in some respects. The proposals would improve the welfare of individuals penalized by the ACA for being uninsured. The proposals would also improve the welfare of healthy enrollees paying community-rated premiums, who effectively subsidize ill enrollees.

On the other hand, the repeal and replace proposals would prevent welfare gains realized by previously uninsured adults who are ill or become ill and do not have public or employer-related coverage. The proposals would not generate additional welfare gains by improving financial protection or access to medical care. Moreover the repeal and replace laws do nothing to improve the well-documented inadequacies of the pre-ACA individual market, including high premiums and poor quality of coverage (Institute of Medicine, 2009). Finally, the proposals would not establish any alternative mechanism for funding the uncompensated medical care of uninsured consumers.

While I found that the ACA produced only a small net improvement in individual welfare on average, my framework did not account for the long run benefits of improved access to affordable coverage. In the following section, I conclude by discussing limitations of my study that should be taken into account when interpreting the results for policymaking and by identifying promising directions for future research.
7.3 Limitations and Future Research

One of the limitations of my study is its one-year time frame, which ignores long-run benefits of the ACA. One of these long-run benefits is the near elimination of “re-classification risk,” the risk that a healthy enrollee with affordable coverage might become ‘unhealthy’ as the result of an incurable illness and, before the ACA, might have subsequently been denied coverage or faced exorbitantly high premiums. After implementation of the ACA, insurers are required to cover everyone and charge community-rated premiums that do not vary with health status. In the post-ACA market, although healthy enrollees subsidize their less healthy counterparts in the short run, and they are guaranteed the same protection if they should become ill in the long run. Research suggests that the long-run, expected benefit to healthy individuals of guaranteed access to affordable coverage- unaffected by future changes in health status- dwarfs the short run cost of subsidizing coverage for less healthy enrollees (Handel, Hendel, & Whinston, 2015). By the same token, my analysis does not specifically take account of the long-run health benefits of high-quality primary care facilitated by health insurance. As a result, I have likely underestimated the long run benefit of the ACA’s reforms for individuals acquiring private health insurance19.

Nevertheless, the short run time frame that I employed has its virtues, too. For one thing, it is particularly relevant for evaluating changes to the law that might encourage additional enrollment through the exchanges. Consumers make decisions about enrolling in private insurance mainly by comparing costs and benefits with and without insurance over the year covered by the contract.

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19 In theory, there might also be a long run benefit to the expansion of Medicaid as a safety net even for individuals whose incomes are above the eligibility threshold.
I restricted my study to the population of previously uninsured adults and did not evaluate the costs and benefits for society as a whole. The ACA funds insurance subsidies in part by imposing taxes on businesses and individuals, including medical device manufacturers and previously insured enrollees in generous “Cadillac,” insurance policies. The law diverts federal funding away from the disproportionate share hospital program, which subsidizes hospitals that provide high levels of uncompensated care. Finally, the ACA benefits some members of society outside of the individuals in this study, including owners of for-profit hospitals and employers whose works might become healthier and more productive.

A comprehensive social welfare analysis would provide context for the change in previously uninsured individuals’ welfare. Future research should examine the ultimate incidence and magnitude of the costs and benefits realized from the ACA’s public and private insurance subsidies. Moreover a social welfare analysis must weigh the relative social importance of taxation and health insurance in order to comprehensively assess the overall welfare implications, making it outside the scope of this study.

For convenience I assumed the additive separability of the utility of health and consumption. This separation implies that the marginal utility of consumption is independent of a consumer’s state of health, and vice-versa. However, in reality, consumption has less utility in a state of poor health. Absent any relationship with health, the marginal utility of consumption is higher when consumption is low. This basic tenant of insurance theory describes the value of high-deductible coverage, which primarily pays claims in low-consumption states. These low-consumption states are also states of poor health for the enrollee, which diminishes the marginal utility of consumption.

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20 Amartya Sen illustrates the idea by referencing a poem titled “To His Coy Mistress” written by Andrew Marvel in 1681: “The grave’s a fine and private place/ But none, I think, do there embrace” (Sen, 2002).
utility of paid claims in catastrophic circumstances. One study found that relative to a state-independent framework, the optimal share of claims paid by insurance is 20 to 45 percentage points lower (Finkelstein, Luttmer, & Notowidigdo, 2012). If the marginal utility of consumption is substantially lower in states of poor health, then I overestimated the benefit of catastrophic coverage. On the other hand, the risk aversion parameter I employed was estimated from health care and insurance data, which might adequately reflect the value that consumers place on protecting their consumption in states of poor health.

Another potential study limitation is the assumption that a smooth probability distribution, in particular the gamma distribution, could approximate ex-ante medical consumption. The assumption implies a strictly increasing cumulative probability distribution of medical consumption, with no “flat spots” in the curve. Additionally, the gamma distribution does not accommodate $0 of medical consumption. The resulting ex-ante cumulative distribution begins just above $0 and increases continually into infinity. In reality, after implementation of the ACA, the distribution of medical consumption of exchange enrollees might follow a different pattern, for example, with a large mass of observations at $0 or at the cost of the one no-cost-sharing preventive check-up. Policy design will benefit from additional research into the medical consumption of exchange enrollees in order to draw conclusions about the optimal design of cost sharing in exchange policies.

Because of the limited availability of post-ACA data, I assumed that health affects Medicaid take-up while ignoring health and adverse selection as a predictor of exchange enrollment. Micro-data that links perceived health with income might reveal that individuals are likely to enroll if their health is poor, especially at income levels where they are required to pay
all or most of the premiums. If enrollees are significantly less healthy than group members who remained uninsured, then I underestimated the average benefit of enrollment for that group.

While self-rated health presumably plays a role in the decision to purchase private insurance, household income is the single most important predictor of exchange enrollment according to currently available data (Avalere Health, 2015; Pauly, Leive, & Harrington, 2015). Exchange enrollees spend less on prescription drugs than their employer-sponsored counterparts on average, an indicator of better health, and were no more likely than the general population to rate their health as fair or poor (Donahue, et al., 2015; Hamel, Norton, Levitt, Claxton, & Brodie, 2015).

Finally, my simulation of post-ACA insurance status does not reflect new empirical evidence of a net increase in Medicaid enrollment among individuals already eligible before implementation of the law. Enactment of the ACA has caused an increase in Medicaid participation by previously eligible (but uninsured) adults, apparently because of new outreach programs and streamlined, unified applications for public and private insurance rolled out in conjunction with the law. Emerging evidence supports the plausibility of my assumed participation rate among the newly eligible. Increased participation among existing eligibility groups has added, by my calculation, about 300,000 previously uninsured adults to Medicaid after implementation of the ACA in addition to the 4.5 million newly eligible enrollees that I have simulated. The difference is not substantial in magnitude and is not directly caused by a

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21 My estimated average take-up rate is similar to that of the Urban Institute (UI) (70% vs. 73%). According to a Commonwealth Fund report, the UI simulation produced population-based estimates that are similar to the ACA outcomes eventually realized for the net increase in Medicaid enrollment (7 million predicted vs. 8 million realized), net change in number uninsured (-13 million vs. -12 million), and number remaining uninsured (43 million vs. 42 million) (Glied, Arora, & Solis-Roman, 2015).
component of the ACA’s insurance coverage provisions. With more Medicaid enrollment, and fewer uninsured, accounting for the increased participation by people already eligible for Medicaid would increase average welfare gains for the previously uninsured compared to what I estimated here.

Future research should develop preference models about Medicaid and exchange insurance to predict the effects of policy changes for the remaining uninsured. For example, a model of the costs of obtaining Medicaid, including informational and time costs, would better predict changes in participation caused by Medicaid policies. Additionally, future research should evaluate the actual (as opposed to simulated) outcomes in insurance, medical care, health, and consumption experienced by previously uninsured individuals after implementation of the Affordable Care Act. Future waves of the Medical Expenditure Panel Survey will reveal whether the standard exchange plan adequately protects enrollees’ finances, and whether exchange plans and Medicaid programs improve access to routine medical consumption for previously uninsured adults. While MEPS collects uniquely detailed medical expenditure data, the survey will include only one panel of previously uninsured consumers over the period in which in the ACA’s major reforms of coverage took effect in 2014. These data alone will not reveal the law’s ongoing effects, including a continuing decline in the uninsured rate. These data should be supplemented with longer panel studies to form a more complete picture of changes in the wellbeing of previously uninsured consumers.
7.4 References: Conclusion


7.5 Tables and Figures: Conclusion

Table 7.1: Urban Institute Proposed Reforms to ACA Exchange Subsidies

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Note: Table adapted from Urban Institute Policy Proposal (Blumberg & Holahan, 2015, p. XI).

*Under the ACA, the federal government subsidizes the premium of a standard plan with a 70% Actuarial Value. The Urban Institute proposes lowering the caps, and thus the cost of enrollment, while also increasing the generosity of the standard plan from 70% Actuarial Value to an 80% Actuarial Value.
EDUCATION

PhD candidate Dept. of Health Policy and Administration, Penn State 2016
M.P.H., Health Systems Management, Emory University, Atlanta, GA 2011
B.A. Anthropology, Minor: Global Health Emory University, Atlanta, GA 2010
Study Abroad University of Cape Town, Cape Town, South Africa 2009

RESEARCH AND TEACHING EXPERIENCE

Junior Fellow, Division of Research and Modeling, Agency for Healthcare Research and Quality 2016
Graduate Assistant, Dept. of Health Policy & Administration, Penn State 2011-2014
Financial Services Intern, TX Health & Human Services, Houston, TX 2010
Program Assistant, Career Epidemiology Field Officer, CDC, Atlanta, GA 2010
Partnership Team Intern, Agency for Toxic Substances and Disease Registry, CDC 2009
Graduate Student Tutor, Morgan Academic Support Center, Penn State 2013-2014

PRESENTATIONS

Are Previously Uninsured Exchange Enrollees Paying Premiums for Otherwise Free Care? 2016. Invited speaker at the Association for Public Policy Analysis and Management annual Regional Student Conference in Arlington, Virginia.
Measuring Medical Expenditure Risk: An Ex-Ante Simulation of the ACA. 2015. Poster presented at the annual meeting of Academy Health in Minneapolis, Minnesota.

AWARDS

Alice S. Hersh Student Scholarship, Academy Health 2015
Student Paper Contest Finalist Applied Public Health Statistics, APHA 2014
Bunton-Waller Fellowship, Graduate School, Penn State 2011 - present
Beta Monologues Scholarship Award for performance of original poetry 2012
Youth Cultural Ambassador to the City of Houston, by Mayor Lee Brown 2005
Penn State Travel Grants: Office of Graduate Educational Equity Programs, College of Health and Human Development, Dept. of Health Policy & Administration 2014, 2015

PROFESSIONAL, ACADEMIC, & COMMUNITY ACTIVITIES

Sub-committee Co-Chair Student Health Insurance Task Force, Penn State 2014
Academy Health Student Chapter, Penn State 2011 - present
Graduate Student Council, Co-President, Health & Human Development 2013 - 2015
Graduate Women in Sciences, Brown Bag Co-Chair, Penn State 2013 - 2014
Board of Trustees Selection Committee, Penn State 2014
Weekly disc jockey, The Lion 90.7 FM, State College, PA 2013 - 2014
Shawko: Masikulisi, Job skills trainer, Cape Town, South Africa 2009
Social Action Chair, Delta Sigma Theta Sorority, Inc. Emory University 2009
Literacy and fire safety skills tutor, Refugee Family Services, Decatur, GA 2007