

AN EXAMINATION OF HOUSEHOLD HEALTH SPENDING AND MEDICAL-FINANCIAL
EXPERIENCE CIRCA ENACTMENT OF THE AFFORDABLE CARE ACT OF 2010

by

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DEDICATION

In Memory of my mother, Joyce and my grandmother, Beryl
Your wisdom, strength, and instinct for compassion are gifts
I try to emulate every day

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ABSTRACT

AN EXAMINATION OF HOUSEHOLD HEALTH SPENDING AND MEDICAL-FINANCIAL EXPERIENCE CIRCA ENACTMENT OF THE AFFORDABLE CARE ACT OF 2010

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This dissertation uses an expansive definition of medical-financial experience (MFE) to describe the benefits health insurance, at the outset of the Affordable Care Act (ACA). Publicly-insured families generally had greater access to medical care, with lower burden and risk of catastrophic spending than uninsured families. Privately-insured families had greater access to care and better predictability of overall costs than uninsured families, but these benefits were achieved along with greater overall burden and exposure to extreme spending. Many risk-averse families with low- and middle-income attracted to the benefits of insurance were still poised to face untenable tradeoffs even after the first wave of ACA reforms. This dissertation argues for an increased focus on specific policy remedies that better align spending exposure to income for all families and that recognize the additional capabilities needed to manage the stochastic, multidimensional character of MFE.

I. INTRODUCTION

A. Growing and Shifting Threat of Health Care Spending

Exploding medical care costs and eroding insurance coverage have positioned health care at “the epicenter of economic insecurity in the United States”, according to political scientist Jacob Hacker¹. Changes in population and disease incidence, more inclusive public health insurance programs, subsidies and incentives through the tax code, new technology, pharmaceutical innovations, and changes in standards of medical care have all contributed to a growth rate in national spending on health that has far outpaced inflation^{2,3}. One study estimated that in 2004, families in the lowest income quintile spent an average of 22.7% of their income on health care, defined as out-of-pocket spending, insurance premiums, and federal and state tax contributions to public health care spending⁴. For families in the middle and highest quintiles, the estimates were 15.1% and 15.3% respectively. Another study estimated that growth in health care costs has virtually consumed income gains for the typical family between 1999 and 2009⁵. Several more studies have validated

¹ Hacker, Jacob. “The New Economic Insecurity --And What Can Be Done About It.” *The Harvard Law & Policy Review* 1, no. 1 (2007): 111-126.

² Keehan, Sean P., Andrea M. Sisko, Christopher J. Truffer, John A. Poisal, Gigi A. Cuckler, Andrew J. Madison, Joseph M. Lizonitz, and Sheila D. Smith. “National Health Spending Projections Through 2020: Economic Recovery and Reform Drive Faster Spending Growth.” *Health Affairs* 30, no. 8 (August 1, 2011): 1594–1605.

³ Sisko, Andrea M., Sean P. Keehan, Gigi A. Cuckler, Andrew J. Madison, Sheila D. Smith, Christian J. Wolfe, Devin A. Stone, Joseph M. Lizonitz, and John A. Poisal. “National Health Expenditure Projections, 2013–23: Faster Growth Expected with Expanded Coverage and Improving Economy.” *Health Affairs* 33, no. 10 (October 1, 2014): 1841–1850.

⁴ Ketsche, Patricia, E. Kathleen Adams, Sally Wallace, Viji Diane Kannan, and Harini Kannan. “Lower-Income Families Pay a Higher Share of Income Toward National Health Care Spending than Higher-Income Families Do.” *Health Affairs* 30, no. 9 (September 1, 2011): 1637–1646.

⁵ Auerbach, David I., and Arthur L. Kellermann. “A Decade of Health Care Cost Growth has Wiped Out Real Income Gains for an Average US Family.” *Health Affairs* 30, no. 9 (September 1, 2011): 1630–1636.

households, employers, and policymakers increasing concerns about the risks from the costs of illness and injury to financial and physical well-being in the United States^{6,7,8,9,10}.

The risks have resulted in real, and often devastating consequences. In 2012, the Commonwealth Fund found 84 million non-elderly American adults had no health insurance coverage or were underinsured, 75 million reported problems paying medical bills, and 80 million reported financial barriers to access getting medical care¹¹. Twenty-nine per cent of personal bankruptcies in 2007 were triggered by costs related to illness or injury¹².

Concurrent with the Great Recession of 2007-2009, growth in spending on health has slowed somewhat, but the overall trend towards higher costs persists¹³. For some families, increased investment in healthcare reflects a beneficial trend towards greater access to needed medical care. For others, including for government and corporate entities, the prevailing trend of ever-increasing costs is

⁶ Himmelstein, David U., Elizabeth Warren, Deborah Thorne, and Steffie J. Woolhandler. "Illness and Injury as Contributors to Bankruptcy." *Health Affairs* Web exclusive (February 2, 2005): w5–w63v1.

⁷ Dranove, David, and Michael L. Millenson. "Medical Bankruptcy: Myth Versus Fact." *Health Affairs* 25, no. 2 (March 1, 2006): w74–w83.

⁸ Cook, Keziah, David Dranove, and Andrew Sfeka. "Does Major Illness Cause Financial Catastrophe?" *Health Services Research* 45, no. 2 (April 2010): 418–436.

⁹ Hacker, Jacob, Philipp Rehm, and Mark Schlesinger. "Standing on Shaky Ground: Americans' Experiences with Economic Insecurity." The Rockefeller Foundation, December 2010..

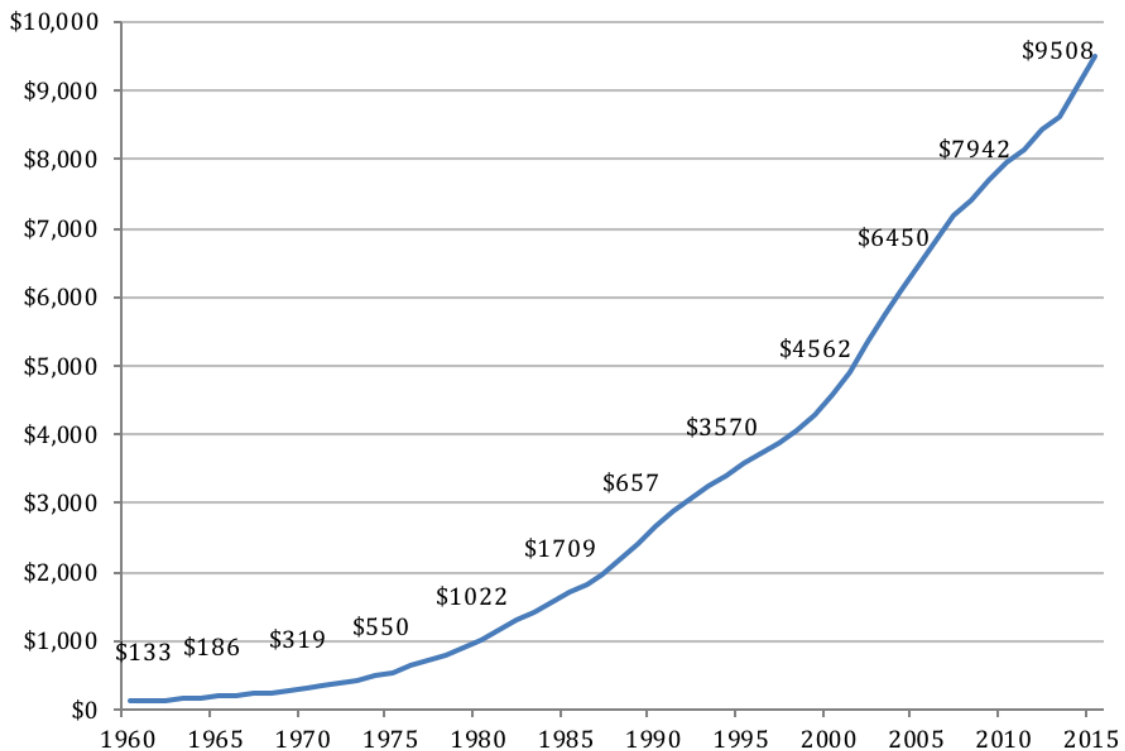
¹⁰ Daly, Hugh F., Leslie M. Oblak, Robert W. Seifert, and Kimberly Shellenberger. "Into the Red to Stay in the Pink: The Hidden Cost of Being Uninsured." *Health Matrix* 12, no. 1 (2002): 39–61.

¹¹ Collins, Sara R., Ruth Robertson, Tracy Garber, and Michelle M. Doty. Insuring the Future: Current Trends in Health Coverage and the Effects of Implementing the Affordable Care Act. Commonwealth Fund, April 2013.

¹² Himmelstein, David U., Deborah Thorne, Elizabeth Warren, and Steffie Woolhandler. "Medical Bankruptcy in the United States, 2007: Results of a National Study." *The American Journal of Medicine* 122, no. 8 (August 2009): 741–746.

¹³ Martin, Anne B., Micah Hartman, Lekha Whittle, and Aaron Catlin. "National Health Spending in 2012: Rate of Health Spending Growth Remained Low for the Fourth Consecutive Year." *Health Affairs* 33, no. 1 (January 1, 2014): 67–77.

worrisome, threatening to other essential expenditures, and threatening to overall economic security.



Source: Author's presentation of Table 1 National Health Expenditures: Aggregate and Per Capita Amounts published by Centers for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics [Group](#); U.S. Department of Commerce, Bureau of Economic Analysis; and U.S. Bureau of the Census. NHE15_Summary.xls

Figure 1: U.S. Health Consumption Expenses Per Capita Annually 1960-2015

The high and growing level of U.S. health spending is only part of the story of how healthcare and health insurance costs are affecting American families. The increases in America's medical bills over the past 50 years have been accompanied by shifts in the patterns and the incidence of spending. In 1960, almost half of

healthcare spending was paid directly by consumers, out-of-pocket. Public payments directly to health care providers represented 15.6% of health spending in 1960, before the inception of Medicare and Medicaid. Since then, there have been important changes resulting in the current mix of financing. Out-of-pocket spending as a percentage of health care spending has been reduced to a fraction of 1960 levels, from 47.7% in 1960 to 11.6% in 2010¹⁴. The long-term trend from 1960 to 2010 is towards greater reliance on third-party payment for health care through government or private insurance. By 2010, public spending on healthcare had risen to 46.1%, and private insurance was funding 43.3%¹⁵. More recently, there has been a contraction or redesign of employer-sponsored insurance shifting an increasing proportion of costs back to the consumer. Some studies attribute some of the decline in employer-sponsored insurance to the expansion of public insurance^{16,17}.

Projections are that the trend towards an increasing share of the U.S. gross domestic product (GDP) for to healthcare will continue for the foreseeable future^{18,19}. Estimates from the National Health Interview Survey for 2010²⁰

¹⁴ Author's analysis of data from <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>

¹⁵ Author's analysis of data from <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>

¹⁶ Gruber, Jonathan, and Kosali Simon. *Crowd-Out Ten Years Later: Have Recent Public Insurance Expansions Crowded Out Private Health Insurance?* Working Paper. National Bureau of Economic Research, January 2007.

¹⁷ Chernew, Michael, David Cutler, and Patricia Seliger Keenan. "Charity Care, Risk Pooling, and the Decline in Private Health Insurance." *The American Economic Review* 95, no. 2 (May 1, 2005): 209–213.

¹⁸ Keehan et al., "National Health Spending Projections," 2011.

¹⁹ Martin, Anne B., Micah Hartman, Benjamin Washington, Aaron Catlin, and the National Health Expenditure Accounts Team. "National Health Spending: Faster Growth in 2015 as Coverage Expands and Utilization Increases." *Health Affairs*, December 2, 2016.

²⁰ Ward, Brian W., and Jeannine S. Schiller. "Prevalence of Multiple Chronic Conditions Among US Adults: Estimates from the National Health Interview Survey, 2010." *Preventing Chronic Disease* 10 (April 25, 2013).

suggest that more than 25% of Americans have multiple chronic diseases²¹, a statistically significant increase since 2001. As health care costs continue to rise, albeit more slowly in the 2010 decade than in decades before, and while chronic illness such as obesity, diabetes, hypertension, depression are prevalent, the numbers of families that devote an increasing share of their resources to health spending will likely grow. It is not apparent from a simple review of health care costs whether or when high spending reflects increases in beneficial care versus more discretionary or wasteful use of medical services. Many families will experience severe adverse financial consequences as a result of the increased spending, regardless of the medical benefit. If expectations materialize, the threats of financial insecurity and income inequality worsened by health spending will remain recurrent themes in discussions of the economic well-being of American households.

B. Medical-Financial Security as a Public Policy Objective

Financial security in health is one of the central goals for public policy in health care. For families, the goals includes both the absence of financial barriers to funding needed medical care, and protection from medical care costs imposing current or future deprivation of other essential needs by depleting assets or current income. Public policy toward financial security in health has included a variety of initiatives: additional public benefits to "deserving populations," expanded

²¹ Paez, Kathryn Anne, Lan Zhao, and Wenke Hwang. "Rising Out-of-Pocket Spending for Chronic Conditions: A Ten-Year Trend." *Health Affairs* 28, no. 1 (2009): 15–25.

generosity of services or benefits available within the protection of health insurance policies, and subsidies or preferential tax treatment for income used to pay for qualified health insurance or medical care. Often, the policy imperatives for financial protection for health spending are isolated to limiting a household's visible spending on their own health care and insurance. Looking more broadly, the obligation of public spending for social insurance or health care benefits is also relevant to taxpaying households.

Initiatives to provide support to families through regulation or expanding health insurance benefits often conflict with conservative policy interests in shrinking the size and role of the federal government to provide basic household needs. There have been efforts to encourage more efficient use of services, but the impact of these policies towards efficiency and cost control have been eclipsed by the influences that have increased per capita health care spending.

Selected U.S. Federal Health Insurance Legislation

1942: Tax Deduction for extraordinary medical expenses
1954: Employer-sponsored insurance premiums excluded from taxable income
1965: Medicare Parts A & B, (Hospital Insurance and Medical Insurance) Medicaid enacted
1972: Medicaid benefits extended to disabled residents; Medicare covers end-stage renal disease
1973: Health Maintenance Organization Act
1974: Employee Retirement Income Security Act
1982: Medicaid coverage mandatory for poor families; 50th state joins the program
1983: Medicare prospective payment system launched
1985: The Consolidated Omnibus Budget Reconciliation Act (COBRA) provides for temporary continuation of medical insurance after employee termination
1986: Emergency Medical Treatment and Labor Act
1989: Medicare Catastrophic Coverage Act enacted (repealed one year later)
1996: Medicaid Reforms, Health Insurance Portability and Accountability Act sets standards regarding continuation of coverage and privacy of medical information
1997: Balanced Budget Act reduces Reimbursements for Medicare and Medicaid; State Children's Health Insurance Program created
2003: Health Savings Accounts; Medicare Part D (Prescription Drugs) enacted
2010: Affordable Care Act (ACA) enacted
2011: New ACA regulations restrict insurers ability to deny coverage, charge higher premiums, or cap benefits due to individuals' medical history
2013: ACA Health Insurance Exchanges open for purchase of non-group insurance
2014: ACA optional Medicaid expansion scheduled in 26 states
2017: Replacement legislation passes in the House of Representatives to reverse or revise several ACA provisions

Source: Author's analysis of Kaiser Family Foundation History of Health Reform; U.S. Department of Labor

America's recent policy history evinces this perpetual pull and tug between forces pushing to advance universal medical insurance coverage and the forces seeking to restrain federal involvement and federal financial obligations in health

care^{22,23}. Since the election of President Barack Obama in 2008, the competing goals for America's health care system has been a leading policy debate in Washington and in the public dialogue about policy priorities.

C. Affordable Care Act of 2010

The Patient Protection and Affordable Care Act of 2010 (ACA) is America's most recent major health policy initiative. The Affordable Care Act includes several provisions likely to directly impact the breadth and level of financial protection Americans enjoy from health insurance. Components of the new law were originally scheduled to phase in between 2010 and 2017, with priority on expanding health insurance coverage and controlling the growth of household-paid health insurance premiums²⁴.

ACA prioritized reducing increasing insurance coverage through mandates and limits on the costs of household-paid premiums. Expanded Medicaid eligibility and new marketplaces for non-group insurance were created to provide for those without access to employer-sponsored health insurance. The major provisions directly affecting insurance coverage include: i) an optional expansion of Medicaid to all non-elderly adults with income at or below 133% Federal Poverty Level (FPL), ii) a higher (more generous) family income eligibility threshold for the Children's

²² Starr, Paul. *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry*. Basic Books, 1984.

²³ Oberlander, Jonathan. "Unfinished Journey — A Century of Health Care Reform in the United States." *New England Journal of Medicine* 367, no. 7 (2012): 585–590.

²⁴ Author's analysis of Kaiser Family Foundation's Summary of The Affordable Care Act (Last modified: April 23, 2013). accessed December 20, 2013 at kff.org/health-reform/fact-sheet/summary-of--the-new-health-reform-law/

Health Insurance Program (CHIP), iii) a requirement for most individuals to carry health insurance, and iv) new non-group insurance marketplaces ("health exchanges") for individuals with income between 100% and 400% FPL along with tax credits and subsidies to get health insurance premiums within 8-9.5% of income²⁵.

Longer-term efforts were launched to develop payment systems that would encourage reforms to the delivery of medical care with the ultimate aim of reducing the overall cost as a share of GDP and household health spending. The law also included new taxes and fees on higher income families in order to fund the increased investment towards health care.

The impact on insurance coverage and health spending at the household level of the ACA was the subject of much speculation and educated guessing. Increased rates of insurance coverage and greater limits on cost-sharing provisions under the ACA will result in a greater reliance on pre-payment for medical care. This shift, along with changes to health care funding through taxes, is likely to decrease, reallocate, and in some cases, increase costs across population groups in ways that are difficult to predict precisely.

Actual implementation of reforms deviated from the original statute, due to legal challenges to the expansion of Medicaid, postponements, and some technical problems with the online marketplaces. At the same time, the political fight over

²⁵ Author's analysis of Kaiser Family Foundation's Summary of The Affordable Care Act (Last modified: April 23, 2013). accessed December 20, 2013 at kff.org/health-reform/fact-sheet/summary-of--the-new-health-reform-law/

health reform continued unabated by the passage of the ACA. After dozens of unsuccessful votes in Congress, the house passed legislation to replace the ACA early in 2017. The replacement legislation would limit the growth of public spending on health care, loosen the ACA restrictions on insurers, likely reversing the gains in insurance coverage seen since 2010. The final outcome of that effort remains to be seen. Consequently, it is appropriate to credit the trajectory of health spending in 2010 and beyond to ACA proponents, ACA opponents, and the uncertainty created by the fighting between them.

The starting point of changes in the financing of health care resulting from the implementation of the Patient Protection and Affordable Care Act of 2010 mark an important point in time to study medical-financial security. Recognition of the complexity of medical-financial experience will challenge researchers and policy makers to design and implement data collection, monitoring and reporting schemes that accurately reflect the efficiency and equity of America's health care financing systems, in terms of the multiple aspects of medical-financial security. Ultimately, securing Americans' medical-financial well-being will require a combination of well-designed policy reforms and a better-informed, better equipped citizenry in order to manage health and to do so within a sustainable budget.

II. THEORY AND RESEARCH ON INSURANCE, PUBLIC POLICY AND MEDICAL-FINANCIAL EXPERIENCE

Numerous writings of policy and economic research over the past 60 years have resulted in the current thinking and approach to health policy and health care financing in the U.S. As a precursor to operationalizing medical-financial experience and comparing insured to uninsured families in this study, a review of health policy goals, the value and purpose of health insurance, and the prevailing evidence and narrative around medical-financial experience is presented in Chapter II. The perspectives included span the disciplines of constitutional law, economics, sociology, and political science. These varied perspectives are manifest in the realm of America's unsettled approach to public policy in health care, as well as how it is discussed and analyzed.

A. Insurance and Financial Protection in Health

With the vast majority of health care paid for with insurance, it may be tempting to treat the benefits of health care and the benefits of health insurance as synonymous, but they are not. The utility of medical care comes largely from the improvement or restoration of health. The utility of medical insurance is derived from the need for protection from the financial losses that could occur following medical care. Traditionally, insurance is purchased by risk-averse consumers who want protection against certain qualified financial losses. In the U.S., the vast

majority of personal medical care expenses are paid for through health insurance²⁶. Effective insurance must facilitate health and protect wealth, therefore examination of the benefits and utility of insurance must be conducted with both broad goals in mind.

Medical care has several characteristics that make insurance a valuable vehicle for payment. Costs are largely unpredictable in terms of timing and amount, subjecting consumers to considerable uncertainty in the event of illness. Severe acute illness may require treatment well in excess of an individual's liquid assets, and capital markets are not a widely available option for unsecured debt such as for medical care. In this way, the contingent need for health care drives the demand for health insurance. At the same time, by lowering the marginal cost at the time of service, the availability of insurance enables and expands the market for health care. Because of this reciprocal influence, the market for health care products and services is inextricably linked to the market for health insurance.

Earlier understanding of the motives for purchasing health insurance assumed that rational risk-averse consumers sought financial protection analogous to other types of insurance. Considering the particular complexities of health care, this early understanding became increasingly unsatisfactory over time. Modern economic theories of health insurance have evolved to better describe the demand for insurance by incorporating characteristics and assumptions that better reflect the

²⁶ In 2011, 73% of the US expenditures on health care were paid via health insurance (private insurance, and public insurance through Medicare, Medicaid, or other third-party payers). Out-of-pocket payments accounted for 11%. Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

complexity and collective features of the way health insurance interacts with the demand for health care and protection from the associated financial costs.

Economic scholars from Kenneth Arrow to John Nyman have contemplated explanations for the demand for health insurance from the perspective of the individual householder. The seminal works on the topic span from Arrow's landmark "Uncertainty and the Welfare Economics of Medical Care" (1963) through to Nyman's *The Theory of Demand for Health Insurance* (2002). These writings trace the theoretical evolution and empirical support regarding health insurance demand and establish a basis for analysis of public policy and financial protection from the financial burden of health care and illness. The resulting economic theories are foundational to health policy objectives that gave rise to America's major social insurance programs, regulations and subsidies for health.

John Nyman suggests that a key driver of the aforementioned evolution of expected utility in health insurance theory has been increased attention to two factors: 1) the unique value of health care as a determinant of the value of health insurance, and 2) the differential utility of income used for health care vs. other consumption, when the health state (healthy vs. ill) is taken into account. Additional theoretical works stem from pivotal contributions that were motivated or were influenced by those of Arrow and Nyman.

1. Early Theories: Value from Pooling Risk of Financial Loss

In 1963, the essay that many claim ignited the modern discipline of health economics was published on the eve of the Medicare debate. Kenneth Arrow's

“Uncertainty and the Welfare Economics of Medical Care”²⁷ invigorated a scholarly examination of health care by supporting and extending earlier theories of health insurance based on risk avoidance, and a resultant welfare gain. Arrow’s article catalogs the several aspects of risk and uncertainty involved in medical care provision, namely asymmetric information between consumers and insurers, stochastic costs of medical care, stochastic benefits from treatment, and complicating agency relationship between doctors and their patients. All these features combine to create the risk of permanent market failure or incomplete markets for health insurance. The evolution of the principal-agent relationship between physician and patient represents a partial market response to the information asymmetry but is inadequate as a remedy that can restore the opportunity for complete markets financing medical care. Accordingly, Arrow suggested that absent intervention, the market for health insurance would be severely suboptimal in delivering social welfare. Arrow concludes that government intervention is necessary to facilitate social welfare in the market for medical care.

2. Utility of Medical Care and Incentives to Purchase More with Insurance

In 1968, Mark Pauly challenged Arrow's conclusion in another highly influential work, "The Economics of Moral Hazard"²⁸. Pauly doubted the efficiency gain from government intervention to complete insurance markets via taxation or compulsion.

²⁷ Arrow, Kenneth J. “Uncertainty and the Welfare Economics of Medical Care.” *The American Economic Review* 53, no. 5 (December 1, 1963): 941–973.

²⁸ Pauly, Mark V. “The Economics of Moral Hazard: Comment.” *The American Economic Review* 58, no. 3 (June 1, 1968): 531–537.

The doubt, he argued, is due to moral hazard, the increase in demand for health care that results from health insurance that pays the entire costs of care. Using classical economic theories of welfare loss from subsidy policies, he argues that the change in social welfare from government interventions could easily be negative, by encouraging consumption of health care that costs more (to society) than it delivers in utility. Pauly's analysis rests on several critical assumptions. He explicitly assumes price elasticity of demand for health care, and the absence of income elasticity of demand for health care. He implicitly assumes that the unregulated demand for health care is the equilibrium, optimal level above which further consumption is inefficient. In the evolution of insurance theory, this article by Pauly adds the variable of utility of health care (as opposed to utility of money income) to the theory of insurance. For the public policy community, the influential contribution of Pauly's concepts has been a focus on the inflated (and by implication wasteful) demand for medical care precipitated by effective price distortion from insurance²⁹.

Other authors further developed the concepts of moral hazard and welfare loss, reinforcing with empirical and conceptual analyses³⁰. Martin Feldstein develops the notion of containing welfare loss from overly generous insurance in a 1973 article,

²⁹ Nyman, John A. "The Economics of Moral Hazard Revisited." *Journal of Health Economics* 18, no. 6 (December 1999): 811–824; Stone, Deborah. "Moral Hazard." *Journal of Health Politics, Policy and Law* 36, no. 5 (October 1, 2011): 887–896.

³⁰ Feldstein, Martin S. "The Welfare Loss of Excess Health Insurance." *Journal of Political Economy* 81, no. 2 (March 1, 1973): 251–280; Feldman, Roger, and Bryan Dowd. "A New Estimate of the Welfare Loss of Excess Health Insurance." *The American Economic Review* 81, no. 1 (March 1, 1991): 297–301.

“The Welfare Loss of Excess Insurance”³¹. He develops a conceptual framework to calculate estimates of the reciprocal “inflation” between insurance and medical care. Insurance decreases the price of medical care perceived by the insured at the time of service, thereby increasing the quantity of care demanded. The increase in demand then increases the sophistication and total price of medical care (measured by total cost across the insured pool including premiums), which increases the demand for insurance.

3. Mitigating Financial Risk While Maintaining Incentives for Efficiency

The notion of utility of health care varying by health state is incorporated by Richard Zeckhauser³² in 1970. He conceptualizes that the key tradeoff in designing optimal³³ health insurance between risk spreading and appropriate incentives, capturing the concepts offered by Friedman and Savage³⁴ as well as von Neumann and Morgenstern,³⁵ Arrow, and Pauly. In so doing, Zeckhauser offers a model of insurance that recognizes multiple utility functions for health care, contingent on when the insured person is healthy versus when they are severely ill and in immediate need of life-saving medical care. An important limiting assumption in the paper is that all citizens are identical in terms of health risk and assets, and

³¹ Feldstein, “The Welfare Loss,” 1973.

³² Zeckhauser, Richard. “Medical Insurance: A Case Study of the Tradeoff between Risk Spreading and Appropriate Incentives.” *Journal of Economic Theory* 2, no. 1 (2012): 10–26.

³³ Optimal health insurance refers to a plan with the ideal balance between actuarial value of insurance vs. cost-sharing provisions

³⁴ Friedman, Milton, and L. J. Savage. “The Utility Analysis of Choices Involving Risk.” *Journal of Political Economy* 56, no. 4 (1948): 279–304.

³⁵ Von Neumann, John, and Oskar Morgenstern. *Theory of Games and Economic Behavior*. Princeton: Princeton University Press, 1953..

therefore only differ in the incidence of illness. As a result, Zeckhauser's model does not capture any effects of income transfer between citizens of low or high initial endowment or income, or between citizens of differing underlying health status.

4. Further Refinements: Additional Aspects of Utility Gained from Insurance

Despite the influence of the theories of wasteful excess consumption of medical care due to insurance, a dissenting line of thinking also emerged. One group of articles emphasized more nuanced explanations of the value of the transferred income used for medical care in the event of illness. David DeMeza's 1982 article "Health Insurance and the Demand for Medical Care"³⁶ is one important example. DeMeza's contribution was to question whether the additional (and inefficient or welfare-reducing) utilization of health care when people are insured is indeed attributable entirely to moral hazard. By adding the possibility of financing health care with savings or borrowing, DeMeza estimates a model that compares demand for medical care funded by insurance with that funded by foregone consumption from the prior period (savings) or future period (borrowing). His analysis concludes that even compared to medical care funded only by current income, consumption would be higher whether funded by insurance or by savings or borrowing. DeMeza concludes that estimates that attribute all the difference to moral hazard overestimate the effect of income transferred by insurance. Some of the additional consumption should be recognized as a result of the heightened

³⁶ De Meza, David. "Health Insurance and the Demand for Medical Care." *Journal of Health Economics* 2, no. 1 (1983): 47–54.

utility of medical care when a person is ill and therefore increased utility of income used for medical care in the event of serious illness³⁷.

Another group argued against the presumption that the additional medical care enabled by insurance is likely inefficient simply because the quantity is greater than the uninsured quantity consumed would otherwise be. For example, in 2009, Kevin Frick and Michael Chernew³⁸ challenged the notion of welfare loss from moral hazard-induced consumption by the insured. They applied a theory of the Second Best³⁹ to suggest three reasons that the additional consumption of medical care enabled by insurance can be welfare-enhancing. In the real world, they argue insurance can counter monopoly power of medical care providers, address externalities, and mitigate the underutilization of beneficial medical care. Their analysis highlights the shortcomings of classical economic modeling on the real market for insurance where the essential requirements for efficient markets do not exist.

John Nyman (1998) offers a persuasive theory of demand for health insurance that recognizes the access value from the additional income, not just in the event of illness, but also at the time of purchasing insurance. Using data from 1987, he conservatively estimated that the value of insurance in making otherwise

³⁷ De Meza, "Health Insurance and the Demand," 1983.

³⁸ Frick, Kevin D., and Michael E. Chernew. "Beneficial Moral Hazard and the Theory of the Second Best." *Inquiry* 46, no. 2 (July 1, 2009): 229–240.

³⁹ The Theory of Second Best states that if one or more of the conditions for Pareto optimality cannot be achieved in a particular market or situation, the next best solution may require relaxing all the Pareto conditions. Lipsey, R. G., and Kelvin Lancaster. "The General Theory of Second Best." *The Review of Economic Studies* 24, no. 1 (January 1, 1956): 11–32.

unaffordable care accessible, greatly exceeds the risk-pooling value of insurance. This access value differs from risk-pooling because “there is no financial risk for unaffordable healthcare purchases because the purchases cannot privately occur”⁴⁰.

As medical care costs outpace inflation of other goods and services, this access value becomes ever more important. For low-income households, not only is medical care financially inaccessible, but even insurance premiums paid with non-taxable monies may be beyond their reach. Several studies estimate the penetration of insurance among households at various income levels, showing that the rate of insurance coverage is positively associated with income⁴¹. Related studies track the level of financial protection (as measured by actuarial value or medical out-of-pocket expenses) offered by insurance plans.

5. From Theories of Insurance to Empirical Research

There is extensive empirical research on the relationship between insurance, consumption of medical care, and medical or financial outcomes. These studies are inspired by one or more of the theories described above. Without a clear way to measure “individual utility” of medical care, it is impossible to definitively model and empirically study the demand for insurance as outlined in the articles by

⁴⁰ Nyman, John A. *The Theory of Demand for Health Insurance*. Stanford University Press, 2002. p.42.

⁴¹ Jacobs, Paul D, and Gary Claxton. “Comparing the Assets of Uninsured Households to Cost Sharing Under High-deductible Health Plans.” *Health Affairs (Project Hope)* 27, no. 3 (June 2008): w214–221; Cohen, Robin A., Diane M. Makuc, Amy B. Bernstein, Linda T. Bilheimer, and Eve Powell-Griner. *Health Insurance Coverage Trends, 1959-2007: Estimates from the National Health Interview Survey*. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, July 2009; Levy, Helen, and Thomas DeLeire. “What Do People Buy When They Don’t Buy Health Insurance and What Does That Say About Why They Are Uninsured?” *Inquiry: A Journal Of Medical Care Organization, Provision And Financing* 45, no. 4 (Winter 2008/2009): 365–379.

Feldstein, Pauly, or Zeckhauser. Instead, empirical studies measure the size of the association between insurance, medical care utilization, and medical or physical outcomes in a variety of circumstances.

RAND conducted an experiment to estimate the impact of cost-sharing on utilization of medical care. By doing so, this experiment offers evidence of the extent of price elasticity of demand and of Pauly's theory of moral hazard caused by insurance. Results of the RAND Health Insurance Experiment (HIE) were published in 1987, and many consider it the premier study on the effect of insurance on utilization of medical care⁴². The study employed the powerful randomized, controlled experimental design to measure the differences over the two-and-a-half-year period between November 1974 and February 1977 in medical care utilization and health outcomes for 5,800 subjects split between insurance plans. The insurance plans of primary interest in the experiment were fee-for-service plans with varying coinsurance rates of 0%, 25%, 50%, or 95% and varying annual out-of-pocket maximums of 15%, 10%, or 5% of annual income up to \$1,000.

The RAND HIE confirmed the existence of elasticity of demand in health care, and therefore that the level of cost-sharing impacts utilization of medical services. The response varied by type of medical service (inpatient services, outpatient services)⁴³. What cannot be discerned from the HIE, or from many subsequent studies that explored related questions, is whether the increased consumption was

⁴² Manning, Willard G. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment." *American Economic Review* 77, no. 3 (1987): 251–277.

⁴³ Manning, "Health Insurance and the Demand," 1987.

welfare increasing or decreasing. If the unsubsidized level of demand is taken as “optimal”, then the effective price reduction from insurance would be evidence of inducement to purchase services for which the total cost (paid mostly by insurance plan) is less than the value. The HIE did not find a measurable advantage in health status resulting from the additional 40% of care by participants with the free care (0% coinsurance) plan vs. the 95% coinsurance plan. Exceptions were that participants who were sick and poor did have selective improvements in health from being assigned to the free care plan⁴⁴.

More recently, a review of studies on utilization, insurance, and outcomes identified 14 studies that measured the causal effects of insurance⁴⁵. These studies both reinforced and challenged the findings of the RAND experiment. People who were continuously insured got more medical care, more often from a consistent provider, with less waiting to seek care. Increased utilization appears more pronounced in the number of physician appointments, the use of ambulatory services, preventive care, and prescription medications. Analysis of hospitalization revealed mixed results-- the number of admissions was not consistently different, but the insured tended to have longer stays and higher facility charges. Studies that followed participants longer than five years found benefits from being insured in maintaining health status (as opposed to experiencing a decline). The Freeman

⁴⁴ Newhouse, Joseph P. *Free for All? Lessons from the RAND Health Insurance Experiment*. Harvard University Press, 1993.

⁴⁵ Freeman, Joseph D., Srikanth Kadiyala, Janice F. Bell, and Diane P. Martin. “The Causal Effect of Health Insurance on Utilization and Outcomes in Adults.” *Medical Care* 46, no. 10 (October 2008): 1023–1032.

literature review reinforces the caution that there are several difficulties in interpreting causality from the results of these studies. Insurance status, health status, and health care utilization are dynamic and interrelated. Varying constructs of utilization (visits, total expenditures, resource units consumed), health insurance status (continuously insured, newly insured, newly uninsured, intermittently insured), and health outcomes (self-reported health status, self-reported change in health status, mortality at year x, unmet healthcare needs) make cross study comparisons on any large scale very difficult. Perhaps the least well-specified variable that certainly has an impact on the utility of insurance is an objective assessment of health status with and without insurance and before or after any adverse health or illness experience. Even with the advent of comparative effectiveness research, causal interpretations of the benefits of any specific medical treatment for any specific patient are impossible when there is no counterfactual against which to compare⁴⁶.

In 2011, a team of researchers from Harvard and MIT (The Oregon Study Group) used Oregon Medicaid expansion by lottery for a quasi-experimental study to evaluate the effect of Medicaid coverage on health and financial outcomes after one year. The Oregon study confirmed increased utilization by Medicaid enrollees compared to uninsured applicants. Participants reported improvements in health, but there was no convincing clinical evidence of health improvements at the end of

⁴⁶ Freeman et al., "The Causal Effect," 2008.

one year. Not surprisingly, Medicaid enrollees reported better financial outcomes (reduced borrowing for medical care, lower out-of-pocket expenses) than their uninsured counterparts who were not selected from the expansion lottery pool⁴⁷.

As described below, several lessons emerge from reviewing literature on the benefits from insurance.

- 1) People with insurance use more health care.
- 2) People respond to the incentives from the effective reduction of the prices of medical care created by the design of their insurance plan⁴⁸.
- 3) The response, evidence of the elasticity of demand, varies by type of service, but not necessarily based on clinical benefits. The effects of interest are financial and physical.
- 4) Insurance is directly related to financial protection. It is only indirectly related to physical well-being.
- 5) The value of insurance is derived from the value of medical care it allows the consumer to purchase when needed, so to the extent that the impact of medical care on health is variable and often difficult to discern, so too will be the derivative value of the insurance that paid for it. Without an assessment of the impact on health, mortality, or other health outcomes using some objective

⁴⁷ Baicker, Katherine, and Amy Finkelstein. "The Effects of Medicaid Coverage — Learning from the Oregon Experiment." *New England Journal of Medicine* 365, no. 8 (August 25, 2011): 683–685.

⁴⁸ Manning, "Health Insurance and the Demand," 1987; Newhouse, *Free for All?* 1993; Freeman, et al., "The Causal Effect," 2008; Finkelstein, Amy. "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare." *The Quarterly Journal of Economics* 122, no. 1 (February 1, 2007): 1–37.

clinical standard, conclusions about relative efficiency of the various plans must be interpreted very cautiously.

With respect to financial outcomes, the outcomes are easier to measure, but there are still a variety of indicators used by researchers and policymakers. Recent studies demonstrate that the level of financial protection, as defined by actuarial value (percentage of medical expenses paid) varies by source of insurance (public, private- large employer, private-small employer, private-non-group). Babiarz et al. (2012) used data from 1998 to 2008 to study the extent of borrowing in the aftermath of a major health event, finding a 10% increase in the levels of unsecured debt in the 2-year period following an illness⁴⁹. Families with very low assets were 23% more likely to take on additional debt⁵⁰. Uninsured households' use of debt was very responsive to adverse health events, increasing 39% compared to insured households. Source of insurance also mattered. The authors concluded that Medicare recipients were more likely to increase borrowing after a health event than Medicaid recipients or people with employer-sponsored insurance.

The question of the net impact on individual or societal welfare of the varying insurance designs, and therefore the "optimal" level of cost-sharing, remains open, despite the vast body of literature exploring the topic.

Economic theory provides elements of a general framework to analyze the value of medical insurance, if not to precisely define "optimal insurance arrangements".

⁴⁹ Babiarz, Patryk, Richard Widdows, and Tansel Yilmazer. "Borrowing to Cope with Adverse Health Events: Liquidity Constraints, Insurance Coverage, and Unsecured Debt." *Health Economics* (2012).

⁵⁰ Babiarz, Patryk, et al., "Borrowing to Cope," 2012.

Despite these important insights, there are tremendous limitations in using the findings of stylized economic models to set parameters and features for insurance plans. Evolving and rising medical technology and costs strain traditional assessments of insurance for the purpose of quantitatively justifying the demand for insurance or for public policy-making. In *Who Shall Live?*, Victor Fuchs articulates the boundaries within which health economists can contribute to health policy decisions. “Economics,” he writes, “can help us to make choices more rationally and to use resources more efficiently, it cannot provide the ethics and the value judgments that must guide our decisions. In particular, economics cannot tell us how much equality or inequality we should have in our society”⁵¹. Once policy objectives are articulated, the economic models provide a means to estimate the gap between some current state and a desired state, as well as the cost to close that gap.

B. Public Policy and Financial Protection in Health

1. Purpose and Justification of U.S. Government’s Role in Health Insurance

The directives and guidance in the U.S. constitution offer a starting point for understanding the norms and values pertinent to public policy in health care. Fundamental constitutional law does not specify a federal government role in health care, but the Supreme Court has upheld that government intervention in the domain of health care and health insurance is in line with, or at least does not contradict, the authority to tax and spend and to promote the general welfare. The central

⁵¹ Fuchs, Victor R. *Who Shall Live?: Health, Economics, and Social Choice*. World Scientific, 1998.

government's role, including the ultimate intervention of national healthcare, while not required, is well consistent with constitutional dictates and constitutional culture, specifically by protecting equal opportunity and social mobility⁵². Other liberal interpretations of the U.S. constitutional intentions support a public policy role in fundamental human needs, of which health care is just one⁵³.

These interpretations favoring a substantial federal role in health care policy exist alongside constraining aspects of America's fundamental principles. Separation of powers and checks and balances designed into U.S. political/constitutional institutions invite competition of ideas and policy goals⁵⁴. The U.S. constitutional culture favoring individualism and distrust of government power suggests conceptual boundaries within which a uniquely American public policy in health insurance must take shape⁵⁵. Health policy watchers concerned with taxpayer rights and fiscal conservatism advocate limits on conferring unbounded rights to health care that have the potential to create unsustainable obligations for providers and for taxpayers⁵⁶. In addition to the uncertainty about constitutional or economic imperatives for why government should intervene in health care, there

⁵² Marshall, William. "National Healthcare and American Constitutional Culture." *Harvard Journal of Law and Public Policy* 35, no. 1 (January 2012): 131–152.

⁵³ Bodenheimer, Thomas. "The Political Divide In Health Care: A Liberal Perspective." *Health Affairs* 24, no. 6 (November 1, 2005): 1426–1435; Leonard, Elizabeth. *State Constitutionalism and the Right to Health Care*. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, June 18, 2009; Karlan, Pamela, Goodwin Liu, and Christopher Schroeder. *Keeping Faith with the Constitution*. Oxford University Press, USA, 2010.

⁵⁴ Immergut, Ellen. "Institutions, Veto Points, and Policy Results: A Comparative Analysis of Health Care." *Journal of Public Policy* 10, no. 4 (1990): 391–416; Hacker, "The New Economic Insecurity," 2007.

⁵⁵ Rabkin, Jeremy. "American Exceptionalism and The Healthcare Reform Debate." *Harvard Journal of Law & Public Policy* (January 1, 2012); Butler, S. M. "The Conservative Agenda for Incremental Reform." *Health Affairs* 14, no. 1 (February 1, 1995): 150–160; Schlesinger, Mark. "On Values and Democratic Policy Making: The Deceptively Fragile Consensus Around Market-Oriented Medical Care." *Journal of Health Politics Policy and Law* 27, no. 6 (December 2002): 889–925.

⁵⁶ Epstein, Richard. *Mortal Peril: Our Inalienable Right to Health Care?* 1st ed. Basic Books, 2000.

are characteristics of the modern health care industry that give rise to further disagreements about exactly what and how the federal government should intervene. The direct connection between immediate improved health and healthcare is often very limited or difficult to measure in dollar terms⁵⁷ that can provide clear guidance for allocating scarce public or household resources, or for spending on health in the face of other immediate needs. This is especially true for citizens who are living with other social and economic hardships, such as poverty or inadequate education. Professional healthcare extends beyond its scientific benefit, by providing compassion and caring functions that were once predominantly done by family or private charitable organizations or religious institutions⁵⁸. It becomes clear on close examination that the government's role in supporting the financing of health care goes beyond compensating for shortcomings in the efficient functioning of a voluntary, private market or even beyond advancing the cause of America's public health.

2. Exceptional America: A Brief Comparison to OECD Peers

American legislators and health policy architects have pursued the government's charge to intervene in health care evolving through a system of managed competition in American healthcare. Several authors document the rise of America's commitment to a market-based health care system even amidst the conversion in the rest of industrial societies to systems dominated by the dictates or

⁵⁷ Fuchs, Victor R. *Who Shall Live?* 1998.

⁵⁸ Aaron, Henry J. *Health Care Reform: The Clash of Goals, Facts, and Ideology*. NBER Chapters. National Bureau of Economic Research, Inc., 1996.

outright provision of central authority⁵⁹, . Other countries that have achieved universal access and financial protection for medical care have done so through a combination of compulsion and subsidization⁶⁰. The U.S. has thus far been unwilling to follow suit. The existence of the veto-points inherent in the U.S. checks and balances system and the absence of sustained political influence by progressive/left parties sufficient to overcome the dissenting professional interest groups have contributed to the U.S.' rejection of attempts to reach universal medical coverage as a right of citizenship⁶¹. However, the consensus around the U.S. market-based system is tenuous⁶², perhaps because of the agnostic (or even antagonistic) orientation private markets have to some of the expectations from the health system, and/or the performance of the U.S. approach, relative to our peers in other parts of the world.

⁵⁹ Starr, *The Social Transformation of American Medicine*, 1984; Schlesinger, "On Values and Democratic Policy," 2002.

⁶⁰ Graig, Laurene A. *Health of Nations: An International Perspective on U.S. Health Care Reform*. Washington, D.C: Congressional Quarterly, 1999.

⁶¹ Immergut, "Institutions, Veto Points, and Policy Results," 1990; Quadagno, Jill. *One Nation, Uninsured: Why the U.S. Has No National Health Insurance*. 1st ed. Oxford University Press, USA, 2006.

⁶² Schlesinger, "On Values and Democratic Policy," 2002.

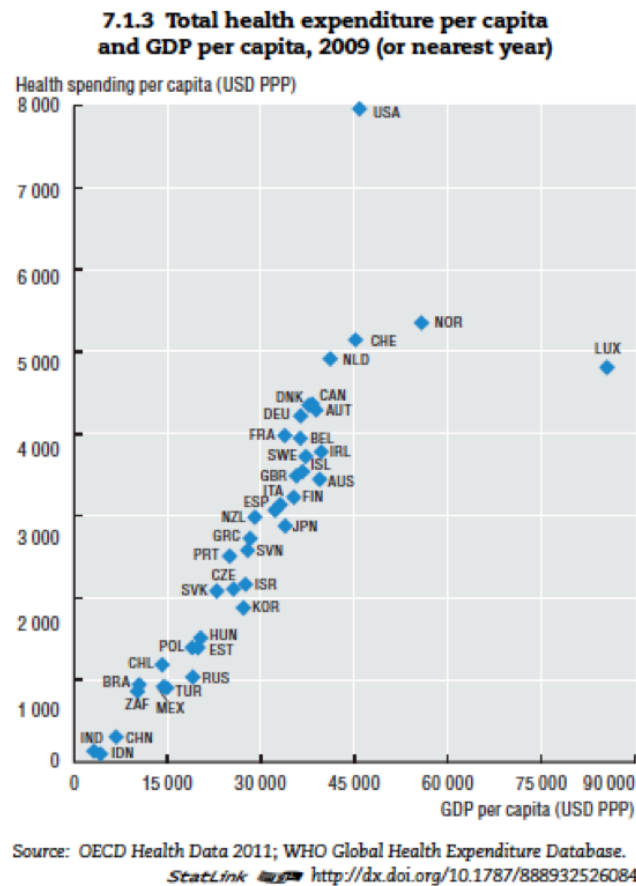


Figure 2: Health Care Expenditures Per Capita of 27 OECD Countries (2009)

In comparison to other industrialized nations, the U.S. is unique in several important ways. Whereas other countries have achieved universal insurance coverage using both compulsion and subsidization, the U.S. has used these policy tools only to a limited extent. Industrialized countries suggest that American's hybrid private-public system of health financing has tremendous room for improvement. However, that admission cannot be interpreted as a clear recommendation for America to follow her peers. A recent study of 27 nations in

the Organization for Economic Co-operation and Development (OECD) portrays the performance of America's exceptional health system policy in comparison to her industrialized peers. Data from the OECD sources and World Health Organization statistics from 2007 and 2008 was used to rate 27 high-income countries to evaluate and compare the resources, health status, and service levels of the respective health systems. America's was rated average on effectiveness, as measured by the overall health outcomes achieved. On the productivity and efficiency measures, the U.S. was assessed as low-performing, due to high spending and resource investment alongside the large percentage of the American population without access to insurance and a regular source of medical care⁶³. The U.S. is an outlier in terms of per capita spending among the countries in this OECD study.

3. Competing goals and visions of America's public policy in health insurance

Public policy regarding health care and health insurance is expected to achieve multiple, sometimes competing, goals. These policy objectives can be arrayed on the basis of whether the vision comports with a view of healthcare as a commercial good to be available for purchase in an imperfect market or with a view of healthcare as a right to be guaranteed and protected for all citizens. Even within the United States, there are multiple visions for the goals of the public policy intervention in the health care system. Six themes recur in writings about the goals

⁶³ Tchouaket, Éric N., Paul A. Lamarche, Lise Goulet, and André Pierre Contandriopoulos. "Health Care System Performance of 27 OECD Countries." *The International Journal of Health Planning and Management* 27, no. 2 (April 2012): 104–129.

for government role in health care/health insurance. These goals overlap and conflict at the same time. The six themes are Market Correction, Brute Luck, Redistribution, Health Promotion, Social Justice and Financial Security. The goal of Market Correction proceeds from the conception that health care is a commodity bought and sold within markets, with price as the basis of transactions. The goal of Protection from Brute Luck takes a more complex view of health care as an essential commodity, requiring government support, but only for losses beyond the individual's control and beyond their ability to pay. The third goal, Redistribution for Equity, departs from the notion of Pareto optimal efficiency in the market, towards a notion of efficiency that legitimizes imposing costs on some for the greater benefit of others to reduce glaring disparities in essential consumption of medical care or when the net effect on overall welfare of such a transfer is positive. The remaining three goals, Health Promotion, Social Justice, and Financial Security approach government intervention in health care and health insurance markets from visions of fundamental rights to be protected or as elements of a social contract.

Consequently, vigorous ideological debate about the role of government in health care policy is not surprising. The vague imperatives in fundamental law, and the broad interpretations thereof, tug in conflicting directions. Even for congruent goals, strong arguments can be advanced for very disparate approaches to promoting the general welfare through health. Competing influences set the context within which the American people and leaders work through complicated terrain

deciding social policy for health care and health insurance that promotes equal opportunity in a class-free society and doing so without excessive government intrusion or fiscal obligation. It is a daunting challenge as the national health policy effort of recent decades bears out.

4. The Health Policy Goal of Financial Security

The health policy goal of financial security requires that policies providing or regulating health insurance should limit households suffering a financial burden, deprivation, and disruption due to illness and medical care costs⁶⁴. The idea is that the function of insurance is to pool the risks of unpredictable medical expenses and to redistribute costs of necessary medical care that would cause the insured to incur excessive debt or to forego other essential consumption. Public policies that promote access to medical care by reducing the costs of medical care relative to citizens' income would be consistent with this vision, but the principal emphasis is to avoid harms to wealth or cash flow.

There are several challenges with implementing this vision of health insurance. One challenge is to establish the threshold levels of health spending that should be considered excessive. A second conceptual challenge is similar to that in other forms of insurance—offering financial protection while maintaining incentives for efficient consumption. Empirically, distinguishing avoidable or discretionary consumption expenditures (which many would not consider a legitimate obligation

⁶⁴ Arrow, “Uncertainty and Welfare Economics,” 1963; Graetz, Michael J., and Jerry L. Mashaw. *True Security: Rethinking American Social Insurance*. Yale University Press, 1999; Hacker et al., “Standing on Shaky Ground,” 2010; Hoffman, “Health Care Spending,” 2014.

for society to assume) from involuntary demand for medical care may be highly subjective.

C. Empirical Research on Medical-Financial Experience

Measurement of household health spending involves both art and science, given the convoluted structure within which health care and health insurance is financed. Based on the literature in this review, the typical American family spends approximately 20% of their annual income on health care through insurance premiums, out-of-pocket spending, and through the tax system. Each of these three components is subject to closer examination for its unique patterns because the variation around the 20% estimate can be quite substantial.

Empirical studies of medical-financial experience are important to motivate and to evaluate public policy interventions. The research findings offer insight into whether the cost of financing each family's own health care plus their contribution to the collective spending on health enhances or erodes medical-financial security. There is an extensive body of health economics and health policy literature examining various components and characteristics of health spending as well as the consequences that result from household spending on health care.

What cannot reliably be inferred from the estimates is the level of spending that should be considered as an ideal or a practicable public policy target. Despite the far-reaching body of research, questions about the equity, efficiency and effectiveness of spending on health care remain. The connection between spending and actual financial protection in health remains an important topic for future study.

The specter of excessive, unplanned spending that vexes many families is another topic that begs for much deeper understanding through research.

The myriad of indicators of medical-financial experience that appear in scholarly literature can be grouped into broad categories. One popular topic for researchers is to measure **access to medical coverage**. This approach is most commonly observed in measures of participation in or affordability of adequate insurance. A second category of empirical research **examines the proportion of household income devoted to paying for health care**. This approach is exemplified internationally by measures of actual health care expenditures as a percentage of income. Within this group, there are also studies regarding the frequency that the burden of healthcare spending reaches levels considered catastrophic or impoverishing. When the results of these studies are expressed as hazard ratios or in otherwise probabilistic terms, they overlap the third category among health service researchers. This third category **evaluates medical-financial experience by cataloging the adverse experiences that result from excessive medical spending**, irrespective of the actual amount of a family's medical bills. Each of these categories of research helps illuminate an important part of the story regarding household spending on healthcare.

1. *Insurance Coverage*

- a. Uninsured and Underinsured?

Almost universally, research studies on access to healthcare include an implicit or explicit assumption that health insurance is a practical requirement for the vast

majority of households in the U.S. if they are to have access to medical care when needed and be adequately protected from the total cost and unpredictability of medical expenses. Accordingly, the percentage of persons who lack medical insurance for all or part of the year is a frequently reported indicator of medical-financial security. For example, the Commonwealth Fund conducts a Biennial Health Insurance Survey to investigate the trends in insurance participation and the corresponding frequency of foregone medical care due to costs. The survey includes a nationally representative sample of 3,393 adults aged 19-64, weighted to represent the 189.3 million Americans between the ages of 19 and 64. The survey has a margin of error of +/- 2.3 percentage points. The report for 2012 showed the percentage of Americans aged 19-64 who were uninsured for some part of the year was 30% (55 million people). Thirty million Americans aged 19-64 (16%) were uninsured the entire year⁶⁵. This estimate is in line with the Census Bureau Report that shows 47.1 million Americans (17.7%) under the age of 65 lacked health insurance in 2012⁶⁶. The Census Bureau estimates are based on findings of the Current Population Survey Annual Social and Economic Supplements.

The same Commonwealth Fund report includes an estimate of people who were insured, but inadequately protected. The level of 10% of annual income is a common threshold for determining how much a family should be able to spend on medical

⁶⁵ Collins, Sara R., Ruth Robertson, Tracy Garber, and Michelle M. Doty. "Insuring the Future: Current Trends in Health Coverage and the Effects of Implementing the Affordable Care Act." Commonwealth Fund, April 2013.

⁶⁶ DeNavas-Walt, Carmen, Bernadette D. Proctor, and Jessica C. Smith. Income, Poverty, and Health Insurance Coverage in the United States: 2012. U.S. Census Bureau, Current Population Reports, U.S. Government Printing Office, 2013, pp. 60-245.

expenditures among other household needs, but there is no consensus among researchers⁶⁷. This underinsured group who had insurance coverage that left them liable for health spending in excess of 10% of their annual income added 29 million to the number of non-elderly adults lacking adequate insurance protection.

The Commonwealth Fund Study and the Census Bureau findings establish that approximately 16-17% of non-elderly adults (30-47 million people) were medically-financially insecure in 2012, using uninsurance as a measure of access to coverage. The same research also illustrates that more nuanced calculations would expand the estimate up to 84 million people, or 46% of non-elderly adults⁶⁸, a staggering level. Considered all together, studies on lack of insurance or underinsurance illustrate that simply having health insurance coverage is a necessary, but not sufficient, condition for most families to be medically-financially secure.

b. Affordability of Health Insurance

Estimation of the affordability of insurance is an indirect way to investigate access to insurance coverage. Research describes two approaches to defining affordable insurance. In the first approach, insurance is considered affordable if a household can purchase insurance as well as other necessities with the financial resources they have available. This is the budget-based approach to assessing affordability, and it involves establishing a standard of spending required for necessities and comparing the cost of health insurance (usually premiums only) to

⁶⁷ Abraham, Jean Marie, Thomas DeLeire, and Anne Beeson Royalty. "Moral Hazard Matters: Measuring Relative Rates of Underinsurance Using Threshold Measures." *Health Services Research* 45, no. 3 (2010): 806–824.

⁶⁸ Collins, et al. "Insuring the Future," 2013.

the household income. The most limited definition of necessities assesses whether the household can purchase insurance and food. More generous definitions of necessities include other expenditures such as housing, transportation, and childcare as part of a basic household budget.

In the absence of geography-specific budgets, affordability can be defined based on whether insurance premiums are within a certain percentage of income⁶⁹. For example, using a budget-based approach, Jonathan Gruber used data from the Consumer Expenditure Survey (2005-2007) to analyze household spending patterns by income level. The analysis found that, for the typical family between 100-150% of the poverty level, 27% of their income was available after non-healthcare necessities⁷⁰. The finding led Gruber to the implication that some portion of the annual earnings of low-income families could be used to purchase insurance, albeit with assistance or subsidy⁷¹.

A second method to determine whether insurance is affordable simply states that an insurance plan is affordable if the majority of people who have access to it choose to purchase and to enroll. Using data from the Medical Expenditure Panel Survey and data from the Kaiser Family Foundation with the Health Research & Education Trust, the aforementioned study by Jon Gruber offered a second assessment of whether insurance was affordable by looking at the percentage of

⁶⁹ For example, the Affordable Care Act defines insurance as affordable if premiums do not exceed 9.5% of income for individual coverage. For low-income earners, the threshold is 5% of income.

⁷⁰ In Gruber's analysis, the "Family Economic Self-Sufficiency Standard" (www.sixstrategies.org) was used to represent necessities. The components include childcare, food, housing, taxes, transportation, plus an allowance for miscellaneous costing an additional 10% of the costs of the other essentials.

⁷¹ Gruber, Jonathan. *Public Finance and Public Policy*. Third Edition. Worth Publishers, 2009.

employees who elected to enroll in their employer's health insurance plan as a function of the employee's required contribution to the premium. In the sample, overall enrollment was at 83.2%. For low-wage firms, where 35% of employees had earnings below \$20,000 per year, take-up rates were 76%. From this, Gruber concluded that even households with very low income could contribute towards the purchase of medical insurance.

There are limitations to applying either approach to estimate affordability of health insurance. The budget-based approach depends on arbitrary estimates of a family's necessities, and is difficult to apply to variable costs such as co-payments or other cost-sharing expenditures for medical care. The enrollment-based approach is silent on any resulting deprivation families incur after allocating a portion of their wages to health insurance. The enrollment-based approach also ignores that fact that some families that purchase insurance may have foregone necessities to do so, and other families that did not purchase insurance may have not done so because they did not perceive adequate value in the plans that were offered. Analysis of the binary decision to enroll or not in an employer's discrete set of health insurance offerings provides very limited insight into the price elasticity of demand for health insurance. Lastly, measures of affordability focused on income, without considering the importance of wealth or other liquid assets, may mischaracterize a particular family's true purchasing power or their ability to withstand sizeable unplanned expenses when they occur.

2. Financial Burden of Health and Catastrophic Spending

The share of family income allocated to health spending is another commonly-measured characteristic of medical-financial security. This is often described as the financial burden of health care. There are a variety of measures that aim to define and estimate the prevalence of high financial burden from spending on medical care and insurance. One study estimated that in 2004, families in the lowest income quintile spent an average of 22.7% of their income on health care, defined as out-of-pocket spending, insurance premiums, and federal and state tax contributions to public health care spending. For families in the middle and highest quintiles, the estimates were 15.1% and 15.3% respectively⁷². A study of medical burden in 2009 estimated that the average family spent 8.9% of their income on health insurance premiums and out-of-pocket payments. Another study of the same year estimated direct spending along with tax payments for health and calculated the burden for a typical family with employer-sponsored insurance at 17.2% of their income. When federal deficit spending was considered, the burden increased to 21.9% of income. There is not a standard definition of the inclusion of insurance premiums in addition to out-of-pocket payments in the numerator for such estimates, nor on whether annual income or a modified representation of "capacity to pay" should be used. Generally, thresholds for burdensome or catastrophic spending range from 10% of a

⁷² Ketsche, Patricia, E., et al., "Lower-Income Families," September 1, 2011.

family's capacity to pay in domestic studies⁷³ and up to 40% in international studies⁷⁴. Some researchers have set the threshold for excessive medical burden as low as 5% for low-income households.

Using the 40%-of-income standard, Ke Xu and a team from the World Bank Development Research Group published a report in 2003 on financial protection in health in 89 countries. Health spending included individual payments for insurance, out-of-pocket payments for medical care or medicine, and contributions to public spending on health. That study reported the incidence of catastrophic spending by country ranging from upwards of 10% of the population in Brazil and Vietnam, to less than .05% in Germany, United Kingdom and Czech Republic⁷⁵. In the study, catastrophic spending was associated with poverty and absence of a robust social insurance system. Catastrophic health spending was rare among countries with well-developed systems of social insurance. The U.S. was among the very few such countries with more than .5% of the population with catastrophic health spending⁷⁶.

⁷³ Blumberg, Linda J., Timothy A Waidmann, Fredric Blavin, and Jeremy Roth. "Trends in Health Care Financial Burdens, 2001 to 2009." *The Milbank Quarterly* 92, no. 1 (March 1, 2014): 88–113; Collins, et al., "Insuring the Future," April 2013.

⁷⁴ Wagstaff, Adam. *Measuring Financial Protection in Health*. Policy Research Working Paper. World Bank, March 2008; Nowak, Sarah A., Christine Eibner, David M. Adamson, and Evan Saltzman. *Effects of the Affordable Care Act on Consumer Health Care Spending and Risk of Catastrophic Health Costs*, 2013; Waters, Hugh R., Gerard F. Anderson, and Jim Mays. "Measuring Financial Protection in Health in the United States." *Health Policy* 69, no. 3 (September 2004): 339–349; Xu, Ke, David B. Evans, Guido Carrin, Ana Mylena Aguilar-Rivera, Philip Musgrove, and Timothy Evans. "Protecting Households From Catastrophic Health Spending." *Health Affairs* 26, no. 4 (July 1, 2007): 972–983.

⁷⁵ Xu, Ke, David B. Evans, Kei Kawabata, Riadh Zeramdini, Jan Klavus, and Christopher JL Murray. "Household Catastrophic Health Expenditure: A Multicountry Analysis." *The Lancet* 362, no. 9378 (2003): 111–117.

⁷⁶ Xu et al., "Household Catastrophic Health Expenditure," 2003.

The following year, Waters, Anderson, and Mays applied the WHO approach and extended the analysis to examine lack of financial protection within the U.S. health system. Analyzing data from the 1996 Medical Expenditure Panel Survey, the team used multiple indicators to measure lack of financial protection. The study demonstrated that lack of financial protection is a serious problem, especially for low-income families with one or more chronic conditions. In the Waters et al. study, an estimated 7.5% of U.S. families had health spending in excess of 10% of their capacity to pay. For families with at least one member with a chronic condition, 10.7% of families exceeded the 10% threshold. The likelihood of exceeding the 10% spending threshold was highest for families with incomes below 125% of the federal poverty level, in which at least one family member had a chronic illness⁷⁷. More than one fourth of families with those characteristics had health spending in excess of 10%. An important aspect of the measure of health spending in both the Waters and Xu studies is the inclusion of contributions to public spending on health care. Even though the U.S. health care safety net is far from universal, the financial obligation to finance social insurance and tax subsidies for healthcare is substantial. The obligation includes payroll taxes at 6.25% for Medicare⁷⁸, additional federal taxes from general revenues that support Medicare and Medicaid and Tricare, plus state taxes to support Medicaid and other health care facilities.

⁷⁷ Waters et al., "Measuring Financial Protection," 2004.

⁷⁸ IRS form instructions at www.irs.gov

Describing medical-financial securing using the burden of health spending as a percentage of family income also has limitations that are important to recognize. The calculation implicitly assumes that expenses incurred will be paid using current income. In reality, savings or other assets and access to borrowing are very relevant to a family's true purchasing power and their ability to meet fluctuating and unpredictable expenses. Low-income, low-asset families may endure severe hardship after very modest unplanned spending on medical care. The share of health spending that is tolerable to one family may be burdensome to another. The range of medical-financial burden across families is a reflection of income disparity as much as it is a measure of disparities in health coverage, medical care requirements or issues directly related to health policy.

The methodology for estimating financial burden of health treats all medical spending as involuntary⁷⁹. Typically, the data in large-scale research studies cannot segregate high-value from low value care, or distinguish life-saving treatment from elective or discretionary services. In the absence of other information, the measure of financial burden cannot highlight when a family's low health spending is evidence that they consumed less medical care than they actually needed.

3. Adverse Consequences of Medical Expenses

Estimating the actual consequences of health spending is another way that researchers study lack of financial protection in health. Studies that look at rates of

⁷⁹ Wagstaff, *Measuring Financial Protection*, 2008.

impoverishment measure the proportion of the population of whose income, net of health spending, is below a defined poverty level^{80,81}. Single country studies devoted exclusively to impoverishment from health spending are more commonly focused on developing countries. As part of an assessment of factors associated with poverty, and using an experimental poverty measure, the U.S. Census Bureau published a report that shows medical out-of-pocket spending (MOOP) responsible for a 3.3% increase in the Supplemental Poverty Rate for 2009 and 2010⁸². According to the 2012 Health Insurance Survey conducted by the Commonwealth Fund, 75 million non-elderly adults had problems resulting from medical bills⁸³.

In the U.S., attention to personal bankruptcy after burdensome health spending is another variation on the estimates of financial ruin due to medical expenses. A 2005 study by Dr. David Himmelstein et al. sparked a vigorous scholarly conversation about the frequency with which medical spending results in a very specific form of financial distress--personal bankruptcy. Analyzing a sample of 1,700 personal bankruptcy filings from 2001, the study concluded that as many as 54% of personal bankruptcies had a medical component, and 28% of filers identified

⁸⁰ Murray, Christopher J., Ke Xu, Jan Klavus, Kei Kawabata, Piya Hanvoravongchai, Riadh Zeramdini, Ana Mylena Aguilar-Rivera, and David Evans. "Assessing the Distribution of Household Financial Contributions to the Health System: Concepts and Empirical Application." In *Health Systems Performance Assessment: Debates, Methods and Empiricism*, edited by Christopher J. Murray and David B. Evans, Chapter 38. Geneva: World Health Organization, 2003.

⁸¹ Wagstaff, *Measuring Financial Protection*, 2008.

⁸² The supplementary poverty rate is an attempt to modernize the measure of poverty levels with an estimate that recognizes the impact of government policies that directly affect disposable income and poverty status. The measure estimates disposable income after adjustments such as earned income tax credits, energy assistance, nutrition assistance, housing subsidy, FICA, Medical expenses, Federal income tax; Short, Kathleen. *The Research Supplemental Poverty Measure: 2010*. Current Population Reports. United States Census Bureau, 2011

⁸³ In the Commonwealth Fund Survey, respondents were considered to have medical bill problems if "they had bills they were unable to pay, had been contacted by a collection agency for unpaid medical bills, had to change their way of life in order to pay medical bills, or were paying off medical bills over time" (Collins et al., 2013).

medical expenses as a principal cause of the bankruptcy⁸⁴. Critics of the study methods published alternate estimates that revised the analysis down to indict medical expenses as a principal cause in 17% of personal bankruptcies⁸⁵. Either way, researchers acknowledged that the number of families for whom medical expenses have negative, life-altering after-effects far exceeds the number of families that pursue the legal route of bankruptcy protection⁸⁶.

D. An Analytical Challenge for Health Service Researchers and Analysts

The aforementioned research contributes to the understanding of medical-financial experience in important, yet incomplete, ways. Numerous researchers have identified shortcomings in the traditional measures of insurance affordability, and in measures of catastrophic or impoverishing health spending. Consequently, the quest for improved measures of financial protection in health continues. Three conceptual proposals are described below.

In 2009, Carla Saenz reflected on the operating definitions of affordability, as then applied in Massachusetts as part of the state's health reform requirement mandating all residents to enroll in insurance if it were affordable. Her principal criticism of the approach was that the definition of affordability "led to excessive burden on some Massachusetts residents", by requiring families to contribute towards health insurance at the expense of other essential consumption. She

⁸⁴ Himmelstein, David U., et al., "Illness and Injury," February 2, 2005.

⁸⁵ Dranove and Millenson, "Medical Bankruptcy," March 1, 2006.

⁸⁶ Daly, Hugh F., Leslie M. Oblak, Robert W. Seifert, and Kimberly Shellenberger. "Into the Red to Stay in the Pink: The Hidden Cost of Being Uninsured." *Health Matrix* 12, no. 1 (2002): 39–61; Seifert, Robert W, and Mark Rukavina. "Bankruptcy is the Tip of a Medical-Debt Iceberg." *Health Affairs* 25, no. 2 (March 1, 2006): w89–w92.

proposed the "reasonable tradeoff" approach. Conceptually, the idea would be more generous in the determination of essential non-health consumption, striving for a standard "in which needs are defined more expansively so as to include goods and benefits that are necessary for a moderately fulfilling life and not just for survival"⁸⁷.

In 2011, Rodrigo Moreno-Serra, Christopher Millett, and Peter Smith continued to make the case for improved measurement of financial protection in health. Their article highlighted another misleading aspect of traditional measures of financial protection that use actual expenditures on health care, independent of any assessment of medical need. They advocate development of a remedy that would supplement traditional measures of "with information provided by de facto coverage indicators" in order to distinguish low expenditures due to unmet needs from low expenditures appropriate to a person's demand for care⁸⁸.

In 2012, Jennifer Prah Ruger offered another contribution to the search for measures of financial protection in health that can better guide policymakers. She proposed a concept of a "multidimensional financial protection profile" that portrays access to care and the impacts of health spending on current and future household consumption⁸⁹. Prah Ruger's profile of inpatient spending is illustrated in the article by four (4) exhibits: inpatient costs by poverty level, inpatient costs/coping strategy (source of self-payment), household allocation to

⁸⁷ Saenz, Carla. "What Is Affordable Health Insurance?: The Reasonable Tradeoff Account of Affordability." *Kennedy Institute of Ethics Journal* 19, no. 4 (2009): 401–414.

⁸⁸ Moreno-Serra, Rodrigo, Christopher Millett, and Peter C. Smith. "Towards Improved Measurement of Financial Protection in Health." *PLoS Med* 8, no. 9 (September 6, 2011): e1001087.

⁸⁹ Ruger, Jennifer Prah. "An Alternative Framework for Analyzing Financial Protection in Health." *PLoS Med* 9, no. 8 (August 21, 2012): e1001294.

consumption (budget), and inpatient costs by insurance status. Prah Ruger's suggestion of a more nuanced representation of insurance status (un-, under-, insured) is directionally persuasive. Overall, the approach takes the quantity of care as an involuntary expenditure. The contribution of the profiles is to better inform policy makers by illuminating the impact of health spending on other essential goods, to highlight differences across income levels. That said, the concept still needs further refinement to be an efficient measurement tool for policymakers seeking to define or monitor the impact of health spending, especially on lower income households.

Saenz, Moreno-Serra et al., and Prah Ruger all acknowledge practical challenges to implementing the conceptual improvements they recommend. Conventional surveys used to evaluate affordability, catastrophic spending, or impoverishing spending would have to go much further to empirically estimate the holistic profile of financial protection in health. More detailed data on individual health status, financial or even cultural barriers to accessing medical care, insurance coverage features, non-health spending patterns, and broader information on the use of debt, credit, or liquidation of assets precipitated by health spending would be required.

E. Projections at the Start of the Affordable Care Act

1. Affordable Care Act Marks a Period of Change

At the outset of the ACA came a spate of projections regarding changes in medical-financial security as the various provisions of the health reform law took effect. There were predictions about what the new law would do to improve

financial security in health. There were also predictions about what the ACA would not do.

Anticipating the effects of the ACA would be a dicey proposition. The terms and timing of implementation of the provisions varied from the original statute, as individual states have made decisions about whether and how to implement aspects of health reform under their discretion. Similarly, in the early years of the new law private insurers have experimented with prices and benefits designed to comply with regulations and to participate in new markets intended to extend the protection of medical insurance coverage to millions of formerly uninsured Americans. As a result, it will be difficult to untangle the changes in health spending purely attributable to the ACA from changes attributable to reversals of ACA provisions, state-level policy decisions, business decisions by providers and payors, and consumer reactions. Yet still, the understanding of the ACA's impact on the health and financial security of American families depends on this research.

2. Projected Changes in Insurance Coverage

Several themes dominated the attention of researchers and policy watchers interested in financial security in health, namely changes in insurance coverage, changes in financial burden, and changes in out-of-pocket spending attributable to the ACA reforms. In summary, ACA reforms were predicted to increase insurance coverage, to slow the rate of growth of overall health spending, and to reduce the risk of catastrophic spending by any single individual or family. The hope was that per capita health spending eventually would be successfully contained while delivery

system reform experiments were tested and disseminated nationwide. In the near term, however, the upward trend in health care spending was projected to continue for the foreseeable future. The Centers for Medicare and Medicaid Services projects that by 2025, total expenditures for health care will reach \$5.6 trillion or 20.1% of GDP ⁹⁰.

The first recurrent theme of ACA prognostication regarded how much the ACA would increase the percentage of Americans with health insurance coverage. Eighty-percent of the non-elderly population in the U.S. had health insurance in the year the ACA was enacted, according to Census Bureau reports⁹¹. Studies projected the potential of Medicaid expansion, coverage mandates, and premium subsidies in the non-group market to add millions of Americans to the insurance rolls. The ACA included provisions intended to prevent growth in the non-group market from eroding the employer-sponsored coverage that has been the mainstay of health insurance for American workers. Testifying before Congress in 2011, the director of the Congressional Budget Office reported the prediction that the ACA would add 32 million non-elderly Americans to the ranks of the insured⁹². According to the

⁹⁰ Keehan, Sean P., John A. Poisal, Gigi A. Cuckler, Andrea M. Sisko, Sheila D. Smith, Andrew J. Madison, Devin A. Stone, Christian J. Wolfe, and Joseph M. Lizonitz. "National Health Expenditure Projections, 2015–25: Economy, Prices, And Aging Expected To Shape Spending And Enrollment." *Health Affairs*, July 13, 2016.

⁹¹ O'Hara, Brett and Kyle Caswell. *Health Status, Health Insurance, and Medical Services Utilization: 2010*, United States Census Bureau, October 2012.

⁹² Elmendorf, Douglas. CBO's Analysis of the Major Health Care Legislation Enacted in March 2010. Statement before the Subcommittee on Health, Committee on Energy and Commerce, U.S. House of Representatives, March 30, 2011.

Commonwealth Fund, cost-sharing limits would reduce the number of people who were underinsured by up to 70%, or would leave 20 million fewer American adults vulnerable to spending 10% or more of their income on out-of-pocket medical costs.

By 2016, the percentage of non-elderly Americans with insurance had grown to 89.9%. ACA reforms during the six years after ACA enactment are credited with 70% of that growth, or 20 million newly-insured Americans. Medicaid enrollment grew from 53 million in 2010⁹³ to over 62 million in 2016⁹⁴, as 26 states and the District of Columbia expanded Medicaid eligibility with federal-funding under the ACA. Starting in 2014, millions more purchased non-group insurance coverage via newly-created health insurance exchanges under the ACA. According to the Commonwealth Fund Biennial Insurance Survey, the individual market for healthcare had more than doubled between 2010 and 2016⁹⁵, up to 29 million people from 12 million in 2010. These gains were most evident for people with family incomes at 200% FPL or lower, who were eligible for the biggest premium subsidies such that their outlay would remain below statutory affordability limits of 9.5% of income.

An additional 2.3 million gained insurance coverage due to ACA provisions allowing young adults up to age 26 to remain on their parents' plans⁹⁶ or through a

⁹³ O'Hara and Caswell, *Health Status*, 2012.

⁹⁴ Barnett, Jessica C. and Edward R. Berchick. *Health Insurance Coverage in the United States: 2016*, United States Census Bureau. September 2017.

⁹⁵ Collins, Sarah R., Munira Z. Gunja, Michelle M. Doty, and Sophie Beutel. *How the Affordable Care Act Has Improved Americans' Ability to Buy Health Insurance on Their Own*, The Commonwealth Fund. February 2017.

⁹⁶ Uberoi, N., K. Finegold, E. Gee. "Health Insurance Coverage and the Affordable Care Act, 2010-2016". Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services, 2016.

new requirement that insurers extend coverage to non-group purchasers despite pre-existing medical conditions (a policy also known as guaranteed issue). A mandate that individuals (with selected exceptions) hold insurance coverage may have also contributed to the additional enrollments. The impact of the individual mandate is unclear since the associated penalty for not carrying insurance was not enforced for the first several years of the ACA.

Predictions were mixed about whether the ACA would motivate a net increase in employer-sponsored health plans or if it would lead to the reduction of some full-time, benefits-eligible jobs as employers sought to avoid the requirement to offer healthcare. More than half of Americans were insured through an employer-sponsored insurance (ESI) plan at the outset of ACA. That remained true through the first several years since the ACA. The rate of employer-sponsored coverage held steady at 55.7% of the population between 2013 and 2016⁹⁷ as the major ACA provisions went into effect.

3. Projected Changes in Household Health Spending

The upward trend in the total health spending after ACA implementation was projected to continue, albeit slower than before ACA implementation. Research has verified that to be true. Since the ACA defined “affordability” primarily in terms of employee-share of premiums, the new law put limits on how much employers could impose cost increases on the employee’s share of insurance premiums. It did not,

⁹⁷ Barnett and Berchick. *Health Insurance Coverage*, September 2017; DeNavas -Walt, et al., *Income Poverty, and Health Insurance*, 2013.

however, forestall growth in patient liability for out-of-pocket medical costs. By 2016, employees did indeed bear a greater proportion of the costs than in 2010. According to the Milliman Medical Index (MMI), a typical family of four spent an average of \$25,826 in 2016⁹⁸ on healthcare, compared to the 2010 level of \$18,074⁹⁹. The MMI study further showed growth in employee's share of health spending over that period. Over that six year period, the proportion paid by employees either out-of-pocket or as contributions to insurance premiums increased from 40.6 % to 42.9%.¹⁰⁰ This shift amplifies the need to examine both the overall costs as well as the cost at time-of-service that health care consumers and patients pay, as these expenditures directly affect employee decisions on health-insurance take-up and when and whether to pursue medical treatment.

Two microsimulations studies published in 2011 and 2013, before the major ACA provisions took effect, projected the potential impact of the ACA on health spending at the household level. The first, by Peter Long and Johnathan Gruber used data from the state of California to demonstrate the range of impact across household income levels to be expected from the new law¹⁰¹. They predicted the biggest financial benefit, \$2,000 per household, would be to families between 133 and 199% of FPL. Families between 400 and 999% would experience very modest increases, an average of \$150 per household. Households with incomes above

⁹⁸ Girod, Chris, Sue Hart, and Scott Wetz. *2017 Milliman Medical Index*, Milliman. May 2017.

⁹⁹ Milliman, Inc. *2010 Milliman Medical Index*, Milliman. May 2010.

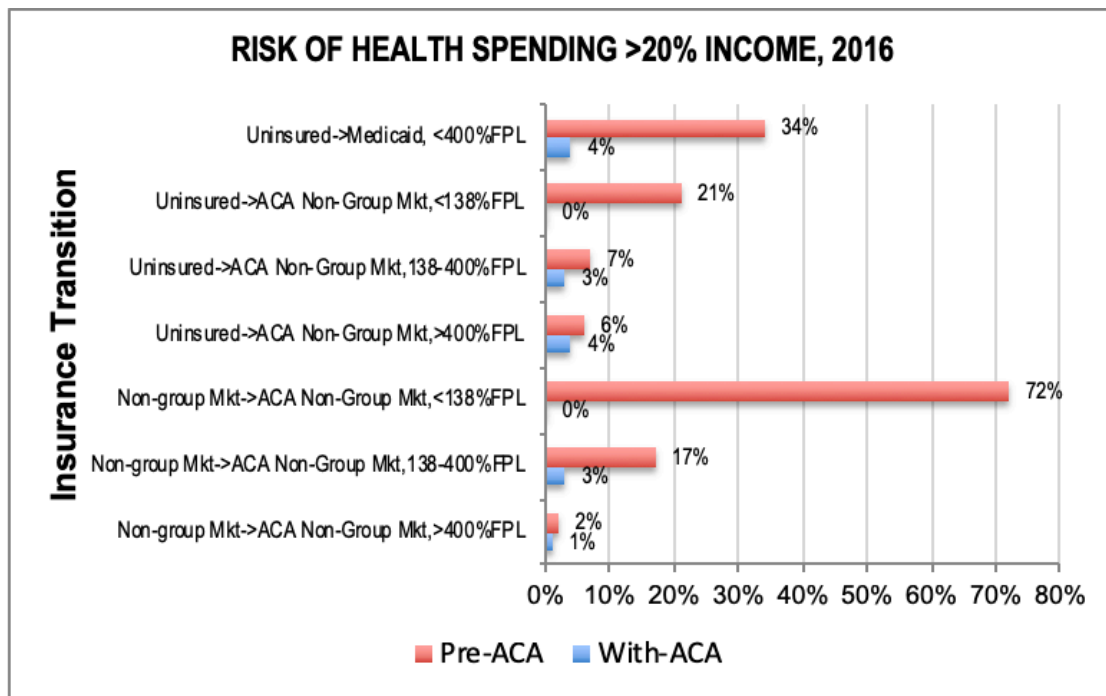
¹⁰⁰ Girod, et al., *2017 Milliman Medical Index*, May 2017.

¹⁰¹ Long, Peter, and Jonathan Gruber. "Projecting the Impact of the Affordable Care Act on California." *Health Affairs* 30, no. 1 (January 1, 2011): 63–70.

1000% FPL would face additional health care costs averaging \$3,000, less than 1% of their annual income.

RAND Corporation took a different approach to microsimulation of the impact of ACA on excessive consumer health spending¹⁰². The analysis focused on the change in the risk of catastrophic health spending (insurance premium plus out-of-pocket greater than 20% and less than 40% of income), for consumers for whom the ACA triggered a change in their insurance status. The study predicted a reduction in the risk of catastrophic spending for low-income consumers newly-insured through Medicaid, as well as for consumers across the income spectrum who either would become newly-insured or newly-subsidized through the non-group market. The biggest decline in risk of catastrophic health spending was predicted for the consumers below 400% FPL eligible for the greatest subsidies to purchase insurance, followed by new Medicaid recipients. The study does not simulate effects on employer premiums or based on family characteristics, such as health but Figure 3 illustrates the projected reduction in risk of catastrophic spending based on insurance transitions and income, such as from uninsured to insured through the ACA non-group (health exchange) market. In 2019, data will be available to evaluate the RAND study predictions.

¹⁰² This study adopted a definition of catastrophic spending, or "high medical cost burden" as medical out-of-pocket plus insurance premiums in excess of 10% of income. While this definition appears in several other studies (insert), other researchers have set the threshold for catastrophic spending (especially in the international context) as high as 40% of income less spending for essential needs. The authors also estimate the likelihood of high medical spending with 20% of income as the threshold.



Source: Author's Presentation of Table 2.4 from Nowak et al 2013.

Figure 3: Predicted Risk of Health Spending >20% of Income, 2016

Even with the expansion of public insurance through Medicaid and a potentially dramatic reduction in the risk of excessive health spending for people who were formerly uninsured or insured in the non-group market, specific gaps in financial protection remain even after implementation of the new law. The gaps include disability coverage (including disability coverage for non-working spouses) and

special protection from medical debt judgments for selected personal assets, such as primary residences, college funds, or an overall limit to depletion of wealth¹⁰³.

F. An Impetus to Look Beyond Measures of Access, Burden and Risk

Each of the aforementioned conceptual approaches to measuring financial protection contributes to understanding, but none can tell the complete story in isolation. An insurance plan with premiums within the threshold of affordability can be inadequate if it exposes families to oppressive cost-sharing through deductibles, co-payments, and non-covered services. Some families may be able to endure a year of spending 20% of the household's annual income on healthcare while another family of more modest means may be forced into severe deprivation after incurring medical expenses of 5% of annual income. Families that prepay their healthcare through insurance with high actuarial value may experience health spending that is similar to another family that pays a much higher percentage of their care out-of-pocket. Measures of health spending relative to income that do not link to health status or health events cannot distinguish unmet medical needs from cost-effective or subsidized care. Studies that isolate one population subgroup by reporting shifting patterns in their health spending without showing any corresponding or offsetting patterns experienced by other subgroups can hide the distributive effects of health insurance policies or insurance reforms. A challenge for policy makers, researchers, and policy analysts is to identify a group of indicators which, when

¹⁰³ Sudgen, Ryan. "Sick and (Still) Broke: Why the Affordable Care Act Won't End Medical Bankruptcy." *Washington University Journal of Law and Policy* 38, no. 1 (2012).

reported together, can portray the status and progress towards medical-financial security for America's most vulnerable populations, and do so with visibility to the effect on incentives for high quality medical treatment and responsible stewardship of the nation's resources collected through the tax system.

Medical-financial experience is multi-dimensional. It is difficult to comprehensively summarize all its aspects with any single indicator. A challenge for policy makers, researchers, and policy watchers is to identify a set of indicators that can demonstrate policy imperatives, progress on each specific goal, and indicators sensitive to the impact on the other goals.

The existing research on medical-financial experience at the outset of the ACA emphasizes three themes: insurance coverage, financial burden, and risk of excessive health spending. The findings verify consequential trends in the years preceding ACA enactment. The U.S. Census Bureau reported growing numbers of Americans without health insurance in the years preceding ACA enactment with the share of the non-elderly population lacking health insurance increasing from 17.2 % in 2002 to 18.4 %¹⁰⁴ in 2010. Also, a sizeable and growing number of families received less protection from the insurance they had. The burden of premiums and cost-sharing claimed a distressing 20% proportion of household incomes for the typical family with employer-sponsored insurance, and the number of families who

¹⁰⁴ DeNavas-Walt, Carmen, Bernadette Proctor, and Robert Mills. *Income Poverty, and Health Insurance Coverage in the United States: 2003*. U.S. Census Bureau, Current Population Reports. U.S. Government Printing Office, August 2004, p .15; Author's analysis of numbers of uninsured by age in 2002. DeNavas-Walt, Carmen, et al., *Income Poverty, and Health Insurance*, September 2013, p. 26.

suffered severe problems due to medical bills was a top worry for families and a policy priority for lawmakers. These findings reinforced the case for major reform of the healthcare system. At the same time, gaps remain in the common language and tools for discussing medical-financial experience in the United States.

The literature on aspects of financial burden in health is vast, yet there are important gaps in research on the comprehensive impact to households. Efforts by families and the policymakers working on their behalf to improve medical-financial experience can be enabled by illuminating the true magnitude and incidence of health care spending. A reexamination of household spending on healthcare and the relationship between medical-financial experience and health insurance is in order. The occasion of the passage of major health insurance reforms in 2010 offers a compelling point in time from which to establish an updated baseline understanding and a reference point from which to monitor and improve reform efforts from 2010 and beyond.

III. RESEARCH DESIGN & METHODS

A. Research Purpose and Contribution

. The Affordable Care Act prioritized expanding insurance coverage through a variety of initiatives. This dissertation research examines family health spending in 2010 of families with differing health and income characteristics and with or without insurance health insurance. The purpose is to evaluate whether the medical-financial experience (MFE) of insured families was significantly better than uninsured families at the outset of the reform law. This research advances the understanding of family medical-financial experience (MFE) by extending the traditional set of indicators used to describe family spending on health care. The primary unit of analysis in this study is the non-elderly family.

Table 1: Categorization of Family Types

HEALTH	VERY GOOD 0 chronic conditions	GOOD 1-2 chronic conditions	BELOW AVG 3+ chronic conditions
INCOME			
LO <138%FPL	VG/L	G/L	BA/L
MID 138%FPL – 400%	VG/M	G/M	BA/M
UPPER ≥ 400%	VG/U	G/U	BA/U

Families in this study are categorized by income and by health, resulting in nine categories (family types) as illustrated in the figure above. For example, a family with no chronic medical conditions and income at 100% FPL is categorized as Low Income—Very Good Health in this study. A family with 3 chronic conditions and income of 250%FPL would be Middle Income–Below Average Health in this study. Most of this study’s results are distinguished according to these family types that describe durable family characteristics that are inherently linked to their demand for health care. Family types are further segmented by source of insurance.

Estimates of spending are compared to the dollar value of medical services received and to spending by other types of families. The analysis portrays important structural variations in the magnitude and nature of risks to financial security faced by different types of American families at a pivotal time in the long march towards securing the medical and financial well-being for all American families. The analysis is conducted on data from working-age families. Study data are from the 2010 Medical Expenditure Panel Survey (MEPS) along with several additional sources to model family spending on healthcare.

The study explores the association between MFE and insurance status, controlling for health, income, and, on a limited basis, characteristics of state of residence. The results represent a baseline from which to understand the character and magnitude of the financial burden on the health of non-elderly families in the year ACA insurance reforms were announced. The findings are discussed in the context of continuing health policy and health insurance reforms. Implications for

understanding the effects of the ACA, or subsequent health care legislation, are explored in the discussion and conclusion of this report.

This study is organized into sub-questions pertinent to understanding the elements of medical-financial experience of non-elderly families at the beginning of what continues to be a protracted health policy reform cycle. Specifically, this study is intended to inform the analysis of current and future reform efforts in two ways:

- 1) Applying a more comprehensive profile of the medical-financial experience of non-elderly American families, distinguished by family type and comparing the results of uninsured families to the results for families with insurance; and,
- 2) Analyzing the relative influence of insurance status, family type (as defined by levels of health and income), and geography on family health spending.

B. A Vision for Describing Medical -Financial Experience

Ideally, the several specific objectives of medical-financial security would be reflected in a commonly measured profile of family medical-financial experience. I can envision such a profile, ultimately with seven components, summarized below. Four of the seven indicators are parameters describing family spending on healthcare and are the main subject of this research study. Rates of insurance coverage are reported directly from the study data. These measures describe the experience of paying for healthcare and how it may constrain or destabilize a family, with the intention to portray both the magnitude and the manageability of the financial burden of health. These indicators are envisioned with an assumption that

there are structural differences in the patterns of paying for health care, such that any benchmarks for spending must be developed for each relevant segment of the population. Finally, these indicators, when reported simultaneously and for the different population groups, allow for assessment and monitoring of shifts in the incidence of the total costs of personal health care.

The absence of financial barriers to seeking or receiving necessary, high-value medical care remains a first requirement for medical-financial security. Having insurance coverage reflects the first and simplest indication of whether a family has such nominal access to participate in America's medical care system. Measures of access to care or insurance coverage speak to this requirement. **Coverage**, therefore, is a first component in the vision for describing medical-financial experience.

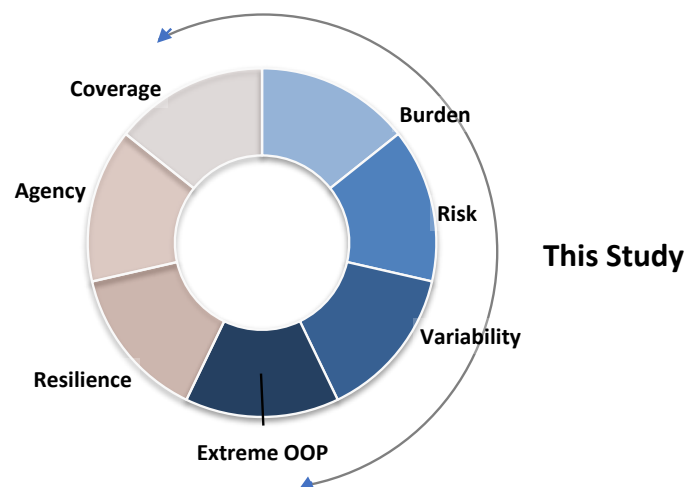


Figure 4: Future Vision Medical-Financial Profile

Second, families need the ability to pay medical bills incurred within a reasonable allocation of family resources, without extreme deprivation or impoverishment during or following the period of illness. Measures of **burden** and **catastrophic risk** partially speak to this by establishing empirical benchmarks of spending relative to income.

The stochastic nature of annual spending is also of interest to families trying to manage their healthcare among all the needs and financial demands they face each year. Accordingly, **variability** of family health spending is included in the recommended profile. The wider the swing between costs from one year to the next, the greater the amount of reserves needed to prepare for medical spending possibilities or the greater the uncertainty health spending imposes on a family's budget.

Table 2: Description of Elements in an Envisioned Medical-Financial Profile

	Profile Element	Description
Access & Participation	Coverage	The importance of full participation in the system, regardless of ability to pay, or personal predilection towards the purchase of insurance or medical care.
Spending Relative to Income	Burden	Total Spending relative to family income. Considers the cost of the family's own care and contributions to the public funding of health care.
	Catastrophic Risk	Risk that annual health spending reaches an excessive level of annual income (20 - 40% or higher) to result in long term financial deprivation or to push the family into poverty levels.
	Variability	The range of possibilities for annual spending, within a predictable and manageable range.
	Extreme Out-Of Pocket	High unplanned spending relative to expectations for a comparable family based on income, health, and insurance status. Can be a function of geography, treatment patterns, insurance design, or medical care prices.
Other Patient Capabilities	Resilience	The ability to restore essential income, lifestyle, and assets after financial loss from illness. Requires savings, borrowing and/or the ability to distinguish vital from discretionary budgetary needs.
	Agency	The ability, necessary information, authority, and social determinants required for a family to make prudent decisions and choices regarding the financial aspects of healthcare (such as selection of an appropriate health plan, plans for access to adequate funds for routine or unplanned medical needs, treatment alternatives and efficacy, treatment costs, and cost-effective, high-value treatment) to have such choices favorably connected to the family's MFE.

Other important aspects of medical-financial experience that derive from the level of health care spending are not captured by measures of coverage, burden, or catastrophic risk. There is also benefit to establishing a type of benchmark for spending relative to health and insurance status, reflecting the obvious connection between health, insurance, and the demand for medical care¹⁰⁵. When a family's annual health spending greatly exceeds such an expectation, it could be described as an occasion of **shock** to be noted as an adverse medical-financial event. This “shock” of sudden or excessive unplanned expenditures would likely appear as **extreme out-of-pocket** expenditures, in response to an adverse health event or hospitalization. Patterns of shock for certain populations or in certain locations can draw the attention of policy makers or market watchers on system weaknesses that warrant intervention.

Two final assessments of family capacity would contribute to enhancing the understanding of family medical-financial experience. The first is **resilience**-- the extent to which families have the ability to recover, either by accessing additional resources, or by adjusting their discretionary spending subsequent to a major medical spending event. This could be a function of a family's financial assets but could also reflect other resources or support networks (help from extended family, friends or neighbors) that serve to minimize the long-term financial impact of a severe medical event. Lastly, families need a reasonable level of **agency** and control

¹⁰⁵ As cost and spending data becomes more sophisticated and more closely linked to actual medical outcomes, this benchmark could evolve to reflect a measure of value.

over their expenditures. Successfully managing a family's health, health care and medical spending can require sophisticated decision-making and self-advocacy supported by the essential scaffolding of social determinants of health.

The monitoring of indicators describing progress against the aforementioned goals would also illuminate promising policy interventions at the federal or state level. With medical-financial security a central concern of families and the subject of a major public policy initiatives, there is urgency for the health services research community to evolve approaches for information and interpretation to monitor and evaluate ongoing reforms. Additionally, there is urgent need to make information available to consumers and patients, so they can better understand what will be required to plan financially and manage their health while protecting their medical-financial security at the same time.

This research aims to advance understanding of medical-financial experience applied to a pivotal time period. Before detailing the research project, I offer the following conceptual vision for a comprehensive description of family medical-financial experience. This vision is informed by prior research on the financial burden of health and also by literature on economic security, personal finance, and patient activation and behavioral economics. In this original portrayal of medical-financial security, there are seven elements deemed important for a family to enjoy the benefits of participation in health care without making unreasonable tradeoffs in routine needs and without fear of financial ruin or deprivation in the event of illness.

This study will focus on the four indicators developed from estimates of family health spending that can be calculated using currently available survey data sources commonly used to study health spending in the U.S. They are 1) the percentage of family income allocated to healthcare (burden), 2) the predictability of the range of spending relative to income (variability), 3) the likelihood of catastrophic or impoverishing spending (risk), and 4) the very high group average out-of-pocket spending relative to predicted out-of-pocket spending (extreme out-of-pocket) by state. A fifth element, coverage, is directly reported in the source data. Analysis of the final two indicators, resilience and agency, are beyond the scope of the data available for this study and would likely be best assessed as part of a mixed methods analysis or in-depth case study with individual respondents.

C. Research Hypotheses

The first research objective in this study is to compare the medical-financial experience (MFE) of insured and uninsured non-elderly families considering their health and income characteristics. The analysis in this research uses a comprehensive profile of MFE, with traditional and original indicators to describe the financial burden of health. My hypothesis is that the financial burden of health experienced by family types is predictably different in structure as well as in magnitude, based on characteristics of health, income, and insurance status. I further anticipate that these structural differences are substantial enough to render nation-wide average measures of MFE largely unhelpful as descriptions about the experience of different types of families. Considering the model used in this analysis,

which includes insurance payments, taxes and out-of-pocket spending, I anticipate that middle class families are positioned within a distinct pattern of financial exposure from taxes and from insurance premiums relative to their income that may make that group most exposed to financial loss from unplanned medical costs. To test that hypothesis, the first part of this study analysis addresses the questions: "What is the medical-financial profile by non-elderly families in 2010 using traditional and original measures? More specifically, in 2010, what was the burden, risk, variability, shock of family health spending by for each family type? How do they compare? Do the profile indicators exhibit similar patterns, or does the family type framework and the additional indicators enhance the understanding of family medical-financial experience by highlighting different vulnerable groups than does the evidence for burden and catastrophic spending?"

The second part of this study analyzes the relative effects of income, health, insurance, and geographic location on family spending on healthcare. Using the family type framework, "is health the most prominent determinant of family health spending?" The suspicion is that a family's spending on health care is dominated by characteristics other than their inherent demand for medical care, based on the current financing system in the U.S. Multiple regression will be used to estimate the marginal effects of health, insurance, income, and characteristics of the respondent's state of residence on family health spending.

Table 3: Research Questions and Hypotheses

Sub-Questions	Hypotheses
1.0 In 2010, was the level of total family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?	In 2010, for all family types, health spending among non-elderly families with public insurance was lower than that of families without insurance. Conversely, across all family types, families with private insurance spent more on healthcare than uninsured families.
1.1 In 2010, was the burden of family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?	Burden of family health spending was lower for all family types with some public insurance than for families who were uninsured. Across all family types, the burden of family health spending with private insurance increases with private insurance compared to families without insurance.
1.2 In 2010, was the variability of family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?	Variability of family health spending was lower for all family types with some public insurance than for families who were uninsured. Across all family types, variability decreases with both private insurance and with public insurance, when compared to families who are uninsured.
1.3 In 2010, was the risk of catastrophic levels of family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?	Across all family types, the risk of catastrophic health spending was lowest for families with public insurance and highest for uninsured families.
1.4 Are there states where families experience Extreme Out-of-Pocket expenditures that are double the level predicted for their family type and insurance status?	The combination of family type, insurance, and relevant state-level characteristics results in widely divergent levels of health spending. At the extreme, there will be locations where average spending is double that which would be expected for families with similar characteristics nationwide.
2.0 Is the effect of insurance status on family health spending greater than the effect of family type (as defined by health and income)?	The effect of insurance status is significant across the entire study population. The association between family type and health spending will be greater in magnitude and in statistical significance than the association between insurance status and health spending.

D. Relevance to Public Policy

The research study proposed herein is expected to illuminate vulnerabilities both in character and in degree of financial consequences of health spending between different segments of the U.S. population immediately before the ACA. Specifically, the work explores the extent to which privately-insured families were simultaneously better protected and at the same time still vulnerable in the face of medical spending, compared to their uninsured peers. The MFE profile proposed in this study is likely to reveal how families, classified by income and health, face distinctly different vulnerabilities in the experience of paying for healthcare. This study is expected to suggest whether insurance and state characteristics interact differently on the MFE of the various family types, and to put those effects into context with the inherent drivers of the demand for healthcare--health and income. The insights from this research can suggest opportunities for state or federal policymakers to further the efficiency and equity of insurance reform and financial protection in health for all types of American families.

This study is not intended to quantify the impact of the ACA or be a prediction of any subsequent health reform legislation currently being considered. To be effective, such assessments would require more specific information about insurance premium payments in both employer-sponsored and individual markets for health insurance. However, looking at the directional changes of health policy on family health spending using the MFE profile framework can help focus attention on

where medical-financial vulnerability might be lessened or worsened by policies under consideration.

Together, these analyses will provide a more granular understanding of the state of American families' MFE and the extent to which demographics, health status, financial status, insurance status, and state of residence along with implementation of new health reform laws are poised to affect MFE for various groups within the working-age population. The process of calculating this comprehensive description of medical-financial experience will also reveal limitations in using currently available data sources for quantitative insights on spending on health care.

E. Data and Methods

1. Sample Data

Data on families' demographics, income, health status, insurance coverage, medical out-of-pocket expenditures, and total medical expenses, was developed using data from the Medical Expenditure Panel Survey (MEPS) 2010 Consolidated File, Household Component. MEPS is a nationally-representative survey of the annual health expenditures and insurance coverage for the civilian, non-institutionalized U.S. population. The required data for this study are almost all publicly available, with notable exceptions of the variable for state of residence, for selected variables describing financial status, and for insurance plan data for MEPS respondents. Due to the need for some non-public variables, much of the analysis for this project was conducted on-site and under supervision of the Agency for

Healthcare Research and Quality (AHRQ) Data Center, after receiving permission and approval of the project. No data identifying respondents was removed from the Data Center or reported in this study. This project was reviewed by George Mason University's Institutional Review Board and deemed exempt from IRB review¹⁰⁶.

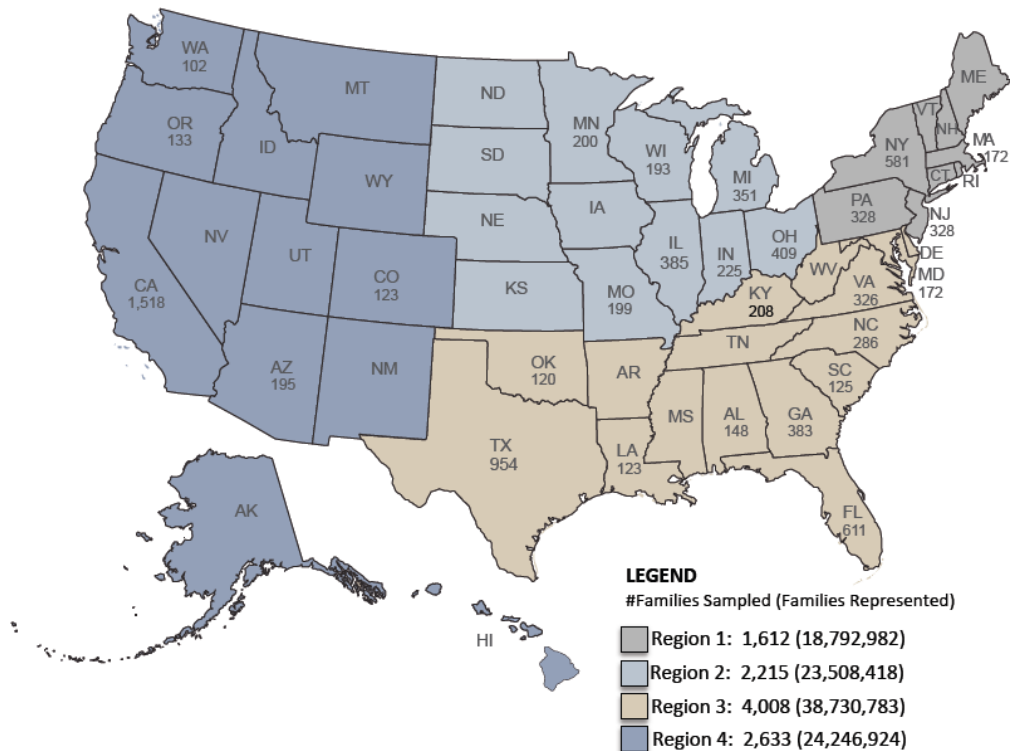
The unit of analysis for this study is the family. A MEPS family usually includes "persons living together related by blood or marriage, adoption or foster care status". Persons not present at the time of the interview, who would typically be considered part of the family, such as college students, are also included in the family definition¹⁰⁷. It also assigns a family identifier to unmarried persons who describe themselves as a family and single persons residing alone. Survey responses were formatted according to the design of this study: families led by a survey reference person -aged 65 or below were included. For this study, reference persons were used as heads of family. The age, race, and level of education of the reference person are used for summary descriptions of each family. Individual family members over the age of 65 were retained in the dataset, provided they were associated with a reference person aged 65 or under. The 2010 MEPS-family consolidated file includes over 32,000 respondents. Approximately 29,000 of those persons, aggregated into over 10,500 family units were ultimately included in this research study.

¹⁰⁶ Project 664405-1 Examination of Household Medical-Financial Experience Before and Since the Affordable Care Act. Ruling received October 3, 2014: Not Research and Exempt from George Mason University IRB review.

¹⁰⁷ MEPS HC-138 2010 Full Year Consolidated Data File Codebook, page C-119

Families in the sample were divided into nine categories based on health and income for analytical purposes. These nine family types form the basic framework within which to describe the magnitude and impact of medical costs and family health spending. Many analyses also consider differences in medical care usage and expenditures based on insurance status.

Additional sources were used for the data needed to model variables not reported through MEPS-HC. Private insurance premiums are represented by the median premium cost of employer-sponsored health insurance by state and level of coverage (employee only, employee plus one, or family coverage). These data were found in the MEPS Insurance Component. Tax tables from the Internal Revenue Service and historical tables of federal spending and reporting from the Tax Foundation on state level tax burden were used to estimate family contributions to public spending on healthcare through tax payments. A full list of data sources appears in Appendix B.



Source: Author's analysis of MEPS 2010 Consolidated File, Household Component
 Note: Unweighted sample size within each state is labeled on the map for the 29 states with representative samples in MEPS-HC.

Figure 5: Sample Size by Region (And Selected States)

2. Study Variables

a. Health Status

Several variables describing the health of individual respondents is included in MEPS. For this study, family health status was defined by the number of chronic conditions reported by all the members of each family. Families were assigned to one of three categories: **Very Good**, **Good** or **Below Average**, based on whether they reported 0, 1-2, or 3 or more of the chronic illnesses specified in the survey.

The number of families in each category for 2010 is shown in Table 4: Descriptive Statistics.

b. Income and Consumption/Adjusted Income

Measurement of family income is a pivotal component of the analysis in this study. Poverty level, defined as family income as a percentage of Federal Poverty Levels (FPL), is reported in MEPS for each individual. Accordingly, the reported poverty level for each family reference person is used as the family poverty level.

Income Category. For this study, these poverty levels were categorized into three levels¹⁰⁸. Below 100% FPL, and 100-138% were considered Poor; >138-250% and >250%- 400% were considered Middle income, and >400% was considered upper income. The principle analysis in this study used the Poor (Low), Middle, Upper income construct.

Taxable income. In addition to the income level as a function of FPL, two important variables were defined from the individual and family income data in MEPS. The first is income used to estimate federal and state tax payments. This estimated taxable income for each individual was calculated as the sum of wages, business income, dividends, interest payments, individual retirement account distributions, pension payments, social security benefits, and supplementary security income payments¹⁰⁹.

¹⁰⁸ Source: RESULTS_3F.log, lines 131-165
¹⁰⁹ Source: RESULTS_3F.log, lines 1857-1867

Federal tax for each individual was estimated using the individual's filing status and formulas from IRS tax tables reporting the marginal income tax rates¹¹⁰. Payroll taxes and self-employment taxes were also estimated from IRS reported rates applied to estimated taxable income for each individual. Data from the Office of Management and Budget (OMB)¹¹¹ on the share of annual federal outlays used for personal health care was the basis for allocating each family's federal tax to health spending. For example, in 2010, 26.5% of federal outlays were devoted to personal health care, and accordingly, 26.5% of the federal tax estimated in this study for each family was considered part of the family's spending on health¹¹².

State taxes were estimated using the state tax burden reported by the Tax Foundation. For each state, the Tax Foundation totals the value of state and local taxes paid by state residents to both their own and other governments and then divides these totals by each state's total income¹¹³. Estimated state taxes were allocated to health spending in proportion to the share of each state's general fund that goes to Medicaid, recognizing that Medicaid spending constitutes a major source of demand for state level spending on health care. Annual state spending on Medicaid as a percentage of state general funds was calculated with data from the National Association of State Budget Officers¹¹⁴.

¹¹⁰ Source: RESULTS_3F.log, lines 1911 - 2028

¹¹¹ Office of Management and Budget. Historical Tables, Budget of the U.S. Government

¹¹² Source: RESULTS_3F.log, line 2023 - 2028

¹¹³ Source: <http://tax.foundation.org/article/annual-state-local-tax-burden>, RESULTS_3F.log, lines 2036-2046

¹¹⁴ Source: Author's analysis of National Association of State Budget Officers, State Expenditure Report, 2010,

An **adjusted income and consumption** estimate was used as the denominator for the calculation of the burden of family health spending. This consumption estimate added estimated taxable income to the value of employer-paid health insurance premiums, the value of food stamps, and public assistance.

The model also does not adjust taxable income for itemized deductions, which would tend to overestimate the federal tax paid by higher income families that claim deductions on their tax returns. This may somewhat offset the underestimate in the state tax calculations.

c. Insurance Status

MEPS Full Year Consolidated file collects data for each respondent describing their insurance coverage. Variables include source(s) of their insurance (private, public, none), the months of the year during which the respondent had coverage and whether the insurance coverage was employer sponsored or non-group coverage. Coverage information for each respondent was aggregated at the family level to classify each family as **Uninsured** (No source of insurance for anyone in the family), **Public Insurance Only** (if the only insurance held was from a public source whether the family was fully insured or just some members had insurance for at least part of the year), **Some Private Insurance** (if there was a mix of public and privately insured members of the family, and **Full Private Insurance** (if the family reported coverage levels for all members for the entire year). The actual amounts paid in premiums by the respondent and/or by their employer are not included in the records of individual respondents. MEPS' Insurance Component data were used

to estimate premiums paid by and on behalf of each family with Private Insurance Coverage. The MEPS-IC surveys employers by state and reports data on annual insurance premiums. Consequently, the analysis in this study cannot evaluate differences in family health spending that result from specific insurance products. The median private insurance premium paid by employers and employees by state was used to estimate spending on insurance by respondents in this study.

For this study, several variables were modeled to describe each family's insurance status, using the MEPS variables described above. Each family was classified as having None, Public Only, Some Private or Full Private insurance and based on the percentage of member-months covered during the year.

d. Medical Expenses

MEPS includes a value for each individual respondent's out-of-pocket medical expenses reported in 2010. These amounts represent payments made directly by patients for their medical care, pharmaceuticals, or medical equipment. These person-level expenses were aggregated across family units to estimate the family-level of out-of-pocket healthcare expenditures¹¹⁵.

¹¹⁵ Source: RESULTS_3F.log, line 2052

Table 4: Descriptive Statistics, 2010 Sample

	Observations	Weighted Sample	Weighted %
Total individuals in working-age families	29,015	269,249,316	
Number of working age families	10,522	105,983,450	
Age (of reference person)			
≤ 25	1,012	11,115,281	10%
>25 to ≤ 35	2,364	23,488,656	22%
>35 to ≤ 45	2,492	23,115,110	22%
>45 to ≤ 55	2,573	26,223,788	25%
>55 to ≤ 65	2,027	21,336,272	20%
Race (of reference person)			
White	7,224	84,702,774	80%
Black	2,313	13,926,149	13%
Asian	681	4,453,332	4%
Other/Multiracial	304	2,901,195	3%
Years of Education (of reference person)			
Less than 6	232	1,141,854	2%
6-12	4,890	34,435,821	46%
13-16	4,320	51,961,493	41%
>16	1,019	13,124,448	10%
Marital Status (of reference person)			
Married	4,759	49,335,432	47%
Not Married	5,763	56,648,018	53%
Family Size			
1	2,776	34,361,708	26%
2	2,637	28,123,630	25%
3-4	3,584	32,349,211	34%
5-8	1,488	10,975,274	14%
>8	46	173,627	<1%

Source: August 4.log lines 10-1860

Table 5: More Descriptive Statistics, 2010 Sample

	Observations	Weighted Sample	Weighted Percentage
Total individuals in working-age families	29,015	269,249,316	
Number of working age families	10,522	105,983,450	100%
By Family Income Category			
Poor <100%FPL (Group average income: \$8,058)	2,220	18,087,983	30%
Near Poor 100-<138%FPL (\$19,602)	973	7,112,990	21%
Low Middle 138-200%FPL (\$32,015)	2,302	20,112,990	16%
Middle 200-<400%FPL (\$52,916)	2,152	21,854,627	11%
Upper >=400%FPL (\$113,722)	2,875	38,439,765	21%
Family Health Status (respondents aged >17) ¹¹⁶			
No reported conditions per family	3,169	32,198,901	17%
One reported condition	2,234	22,395,763	7%
Two reported conditions	1,672	17,216,712	19%
Three reported conditions	1,174	11,798,887	21%
Four of more reported conditions	2,273	22,373,987	36%
Family Insurance Status			
Uninsured	1,084	10,171,833	10%
Public Insurance Only	2,620	18,351,017	17%
Some Private	1,691	17,933,471	17%
Fully Privately Insured	5,127	59,527,129	56%

Source: Author's analysis of MEPS 2010 Consolidated Household File

¹¹⁶ Source: Chronic conditions measured include arthritis, angina, coronary heart disease, other heart disease, cancer, diabetes, emphysema, hypertension, stroke and are reported only for adults in the MEPS survey

Table 6: Number of Non-Elderly Families by Family Type and Insurance Status

Family Types Health.Income	None	Public Only	Some Private	Full Private	Total Number
VeryGood.Lo	217	505	141	175	1,038
Good.Lo	160	623	137	164	1,084
BelowAvg.Lo	115	667	122	167	1,071
VeryGood.Mid	250	200	268	694	1,412
Good.Mid	166	248	362	895	1,671
BelowAvg.Mid	67	282	252	770	1,371
VeryGood.Upper	53	22	107	537	719
Good.Upper	41	30	156	924	1,151
BelowAvg.Good	15	43	146	801	1,005
Total	1,084	2,620	1,691	5,127	10,522

Source: Author's analysis of MEPS 2010 Consolidated Household File

Table 7: Percent of Non-Elderly Families by Family Type and Insurance Status

Family Types Health.Income	None	Public Only	Some Private	Full Private	Total Number
VeryGood.Lo	2%	5%	1%	2%	10%
Good.Lo	2%	6%	1%	2%	10%
BelowAvg.Lo	1%	6%	1%	2%	10%
VeryGood.Mid	2%	2%	3%	7%	13%
Good.Mid	2%	2%	3%	9%	16%
BelowAvg.Mid	1%	3%	2%	7%	16%
VeryGood.Upper	0.5%	0.2%	1%	5%	7%
Good.Upper	0.4%	0.3%	1%	9%	11%
BelowAvg.Good	0.1%	0.4%	1%	8%	10%
Total	10%	25%	16%	49%	100%

Source: Author's analysis of MEPS 2010 Consolidated Household File

Family Health Spending

Aggregate family health spending (FHSP) is the estimate from which all MFE indicators are developed. It includes five components. The first component is out-of-pocket medical expenses paid directly to providers by the family. The second component is health insurance premiums paid by the family. Insurance premiums paid by an employer comprise the third component. The final two components of FHSP are allocations of federal and state taxes paid that are proportionate to public spending on health care.

Out-of-Pocket Expenses (OOP) represent the first major component of family health spending. OOP includes the patient's share of medical bills, including deductibles, copayments, and payments for non-covered services paid by the family directly to health care providers. The payments are reported in MEPS for each individual in the sample, and for this study, these responses are aggregated for all members of a family to represent a family-level OOP spending.

MEPS survey respondents report their source of insurance and the months during the survey period that they had coverage, but the survey does not include the actual amount of the premiums paid. Family insurance premium contributions are estimated for this study using data from MEPS Insurance Component, a survey of employers/ insurance plan sponsors. For each family with members reporting private insurance coverage for all or part of the year, the median level of insurance

premium for individual, employee plus one, or family coverage for their state of residence was applied to the estimate of FHSP.

Equation 1: Family Health Spending

$$Y_{hhs} = Z_{oop} + Z_{eep} + Z_{erp} + Z_{sth} + Z_{fth}$$

where Y_{hhs} is Family Health Spending

Z_{oop} is family medical expenses paid directly to providers (out-of-pocket)

Z_{eep} is insurance premiums paid by the family (state median for ESI)

Z_{erp} is insurance premiums paid by employer (state median for ESI)

Z_{sth} is an allocation of estimated state taxes, proportionate to state spending on Medicaid

Z_{fth} is an allocation of estimated federal taxes, proportionate to federal spending on personal health care

This definition of FHSP extends beyond the out-of-pocket expenditures and employee-paid premiums, which are spending components that are clearly recognizable by a family. This study considers the employer contribution to health insurance as compensation in lieu of wages^{117, 118, 119}, even though most employee are not aware of the amount of these payments. As with the employee contributions, employer-paid insurance premiums were estimated using the median

¹¹⁷ Burtless, Gary, and Sveta Milusheva. "Effects of Employer-Sponsored Health Insurance Costs on Social Security Taxable Wages." *Soc. Sec. Bull.* 73 (2013): 83.

¹¹⁸ Baicker, Katherine, and Amitabh Chandra. "The Labor Market Effects of Rising Health Insurance Premiums." *Journal of Labor Economics* 24, no. 3 (July 1, 2006): 609–34.

¹¹⁹ Romer, Christina, and Mark Duggan. "Exploring the Link between Rising Health Insurance Premiums and Stagnant Wages | The White House." Accessed October 7, 2014. <http://www.whitehouse.gov/blog/2010/03/12/exploring-link-between-rising-health-insurance-premiums-and-stagnant-wages>.

of private insurance premiums contributed by employees and paid by employers by state, as reported in a survey of employers in the MEPS-insurance component. For the estimated 150 families in this sample who purchased private insurance on their own and held such insurance for the entire year¹²⁰, the entire insurance premium reported in MEPS was added to their FHSP as part of the insurance premiums paid directly by the family.

Public spending supports at least half of the personal health care expenditures in the U.S.^{121,122} Accordingly, the proportion of federal and state taxes that support spending care are also included in the estimate for family health spending. Federal taxes are estimated for each MEPS respondent using Internal Revenue Service 2010 Tax tables corresponding to each respondent's tax filing status, and applied to each taxpayers' income, both of which are reported in MEPS family survey responses. A calculation of payroll taxes for Medicare are also added for each taxpayer in the survey sample. Taxes are aggregated across all family members for an estimate of the family's federal taxes paid. In 2010, the White House OMB reported 26.5% of federal spending was devoted to paying for personal health care¹²³ through Medicare, Medicaid or other programs. Therefore, 26.5% of the estimated federal

¹²⁰ MEPS 2010 data formatted for this study, fewer than 200 of the 10,522 families in this sample that were fully privately insured had non-group insurance.

¹²¹ Himmelstein, David U., and Steffie Woolhandler. "The Current and Projected Taxpayer Shares of US Health Costs." *American Journal of Public Health* 106, no. 3 (January 21, 2016): 449–52.

¹²² Himmelstein, David U., and Steffie Woolhandler. "The Current and Projected Taxpayer Shares of US Health Costs." *American Journal of Public Health* 106, no. 3 (January 21, 2016): 449–52..

¹²³ Office of Management and Budget. "Historical Tables Budget of the U.S. Government - BUDGET-2012-TAB.Pdf." Accessed January 26, 2014.

taxes paid by each family are added to the estimate of FHSP. Taxes paid to support health spending at the state level are calculated for this study using the 2010 state-local tax burden published for each state in a study by the Tax Foundation¹²⁴. The proportion allocated to FHSP is based on the share of each state's general revenues spent on healthcare, principally Medicaid, as reported in the State Expenditures Report of the National Association of State Budget Officers¹²⁵.

3. Medical-Financial Experience Profile Variables

Table 8: Indicators Calculated In This Study

Burden:	The extent to which the financial demands of contributing to funding healthcare depletes resources that would otherwise be available for other consumption
Risk:	The likelihood that a family's FHSP will reach critical or catastrophic levels in a single year. Risk of FHSP exceeding 20% and 40% are reported in this study
Variability:	A measure of the unpredictability of annual spending, based on the ratio of the standard deviation/ average FHSP for each family type
Extreme-Out-of-Pocket	An indicator of which states exhibit systematic patterns of high spending for particular family types, when compared to expected levels. The expected level of spending for this study is determined by regression analysis that predicts spending based on insurance status, income, and family health. Actual spending in excess approximately double expectation triggers a positive designation of Extreme Out-of-Pocket .

¹²⁴ Tax Foundation, State and Local Tax Burdens, 2010. <https://taxfoundation.org/state-and-local-tax-burdens-historic-data/>

¹²⁵ National Association of State Budget Officers, 2010 Report on State Expenditures.

The calculations for the four MFE indicators described in this study are detailed below.

Equation 2: Burden of Family Health Spending

$$\text{Burden} = \frac{\text{Family Health Spending}}{\text{Income} + \text{Public Assistance} + \text{Employer Paid Premiums}}$$

Burden is the first indicator calculated in the MFE profile. It measures the proportion of a family's income resources that is devoted (directly or indirectly) to paying for healthcare. While the precise definitions of spending and capacity to pay vary across studies, this indicator is conceptually popular among researchers. For this study, it is defined as the ratio of Family Health Spending divided by Income plus public assistance¹²⁶. Since this study uses a broad definition of family health spending, the burden calculated here finds the allocation of family resources to healthcare that likely exceeds that which most families recognize. Beyond amplifying existing concerns about the level of healthcare spending, the burden calculated herein highlights the importance of spending components that are beyond a family's visibility or direct control.

Equation 3: Risk of Excessive Health Spending

¹²⁶ "Capacity to pay" represents an adjusted measure of family income net of other non-discretionary spending. Ideally, some adjustment for available liquid assets would also be included.

$$Risk_{20} = p\left(\frac{Family\ Health\ Spending}{Income+Public\ Assistance+Employer\ Paid\ Premium} > 20\%\right)$$

$$Risk_{40} = p\left(\frac{Family\ Health\ Spending}{Income+Public\ Assistance+Employer\ Paid\ Premium} > 40\%\right)$$

$$Visible\ Risk_{20} = p\left(\frac{Out-of-Pocket + Employee\ Premium}{Income+Public\ Assistance} > 20\%\right)$$

A second conceptually popular measure calculated for each family type is an indicator of the **Risk** of a family incurring excessive or catastrophic levels of healthcare spending. The thresholds level for such studies general hazard ratio measuring the probability of FHSP exceeding 20% or 40% of income. The level of 20% is commonly used to mark excessive healthcare spending in studies of U.S. family premiums plus out-of-pocket spending. For the expanded measure of spending used in this study, which includes tax payments and employer-paid premiums, the risk of FHSP reaching an even higher threshold of 40% of income was also calculated. The 40% level is sometimes used in multinational studies on catastrophic medical spending.

Equation 4: Variability of Family Health Spending

$$\text{Variability} = \left(\sigma / \mu \right)_{\text{Family Health Spending,}} \\ \text{for each family type}$$

Variability is the next indicator in the MFE profile. It is the Coefficient of Variation of the Burden of Family Health Spending. It is defined as σ_{Y1} / μ_{Y1} (for each subpopulation i , where i represents family type). Descriptive analyses estimating the burden of health spending may often report standard errors of the estimate, but usually, those are offered as evidence of the reliability of the estimated mean. In this study, the coefficient of variation is reported as a component of the MFE profile, as an indicator of the level of uncertainty associated with expenditures on health care. Larger standard deviations relative to the mean of spending suggest more difficulty for families in anticipating or preparing for possible medical expenses. It is understandable that this uncertainty is an important cause for worry and financial insecurity even for families that have yet to experience a costly medical event.

Equation 5: Shock of Extreme Out-of-Pocket Spending

$$\text{Extreme Out-of-Pocket} : \frac{\text{Out-of-Pocket}}{E(\text{Out-of-Pocket})} < 2$$

The final MFE indicator calculated in this study is **Shock**. It is the ratio of actual Out-of-Pocket Spending to Expected Out-of-Pocket Spending. It is calculated at the state level as the predicted value from the regression of $\ln(\text{OOP})$ on family type, insurance status, and family size. The extreme out-of-pocket indicator expands the analysis of financial security in health because it highlights a pattern of where (geographically) and which family types systematically exceed an expected level of spending by highlighting states where there appear to be “hotspots” for out-of-pocket spending by financially-vulnerable groups.

F. Regression Analysis

Regression analysis was used to estimate the above-described expected spending for families in the study sample. The regression was performed as a log-linear analysis, using the logarithm of FHSP as the dependent variable, to better fit the data as a linear regression model. The same regression model was also used to explore the relative strength and magnitude of the association between family health spending and several important study variables: health, income, and insurance status. The levels of income, health, and insurance status used as

independent variables in the regression are the same levels used to categorize families for the purpose of reporting MFE indicators.

In addition to the aforementioned independent variables, state-level characteristics were added as further controls in the regression model in the hope of boosting the explanatory power of the analysis. Several potential characteristics have explored in prior literature on Federalism in health policy or political economy research. For this study, variables such as medical cost index, Medicaid generosity, income inequality, provider market concentration, insurance market concentration, and state tax burden were explored as state-level regressors. These data were assembled from a variety of sources, such as the census bureau or Kaiser Family Foundation State Health Facts for 2010.

Equation 6: Regression Model Specification

The basic specification for the regression is as follows:

$$\ln \left(\begin{matrix} \text{Household Health} \\ \text{Spending} \end{matrix} \right) = \alpha + \beta_1 (\text{Health}) + \beta_2 (\text{Income}) + \beta_3 \left(\begin{matrix} \text{Family} \\ \text{Type} \end{matrix} \right) + \beta_4 \left(\begin{matrix} \text{Insurance} \\ \text{Status} \end{matrix} \right) + \sum_{i=1}^4 \beta_i (\text{Demographics}) + \sum_{j=1}^7 \beta_j (\text{State Characteristics}) + \varepsilon$$

Where,

Health = A variable reflecting either 0, 1-2, or 3 or more chronic conditions reported by the adults in the family

Income = A variable reflecting annual family income as a percent of Federal Poverty Level, categorically represented as 100% or less, >100 – 400%, or >400%

Family Type = A categorical variable with 9 levels defined by combinations of the aforementioned three levels of Health and Income, using the of each, for example: 0 chronic conditions and income at 200% FPL, would be Typed as Very Good (Health) & Middle (Income).

Insurance Status = A categorical variable with 4 levels representing whether the family's health insurance status is Uninsured (None), Public Insurance Only, Some Private Insurance, or Full Private Insurance

Demographic characteristics are represented by four variables in this study.

Family Size = An integer variable representing the number of individuals in the family, including dependent students who may reside elsewhere (such as on campus).

Age of Head of Family = A continuous variable representing the root-age of the head of family

Education of Head of Family = An integer variable representing the head of family's number of years of schooling

Race of Head of Family = A categorical variable representing the race of the head of family

State-Level Characteristics were also used to explore the effect of conditions at the state level affected family health spending

Income Inequality = The state-level Gini coefficient is a continuous variable, where Gini = 0 means everyone has the same income and Gini = 1 means that one resident has all the income in the state.

Disposable Income Per Capita = A continuous variable reported in \$000

Regional Price Parity = A continuous variable, between x and y which indexes overall prices within each state as a percentage of the national average (\$US = 100) cost of a representative bundle of goods and services

Number of Major Insurers = An integer variable that reports the number of insurance companies with at least 5% of the large group employer health care market share in the state

The following sections present the findings of the analysis performed to addressing the research questions described in this chapter.

IV. RESULTS

This dissertation study applies traditional and original measurement parameters to the subject of health spending in the United States as a matter of family economic security. The research asks whether the medical-financial experience (MFE) of families with health insurance was significantly better than that of uninsured families at the outset of the reform law. The answer to that question is an essential baseline for the future evaluation of the ACA and to the design of subsequent health reform policies for financial security in health.

The study is divided into several sub-questions, each comparing one aspect of MFE between insured and uninsured families with different health and income levels. Additionally, the study uses regression analysis to examine the magnitude and strength of the effects of health insurance on health spending, relative to income level, health, insurance status, and, on a limited basis, geographic characteristics (state of residence) in 2010.

Research Question 1: In 2010, the medical-financial experience of insured non-elderly families significantly better than that of uninsured families?

1.0 **Level** of Family Health Spending

1.1 **Burden** of Family Health Spending

1.2 **Variability** of Family Health Spending

1.3 **Risk** of Excessive or Catastrophic Health Spending

1.4 Geographic Concentration of **Extreme Out-of-Pocket** Spending

Research Question 2: What were the marginal effects of income, health, insurance status, and state-level characteristics on family spending on healthcare in 2010?

This Results chapter begins with an overview of the spending patterns of the families in the dataset (by income level). The overview is followed by a closer look at the quantity of services used compared to services paid for by families of different income levels and insurance categories. These observations provide useful context to reading the subsequent analytical results in this study. Following that, results are presented for the calculations and comparisons of family health spending and several quantitative elements of MFE that are the central concern of this study, as described in Chapter III. Two of the four indicators, Burden and Catastrophic Risk, are conceptually familiar to existing literature, with the ability to make comparisons of statistically significant differences between the share of family resources that are allocated to health spending, across family types and by insurance status. The remaining two of the four MFE indicators are original to this study, namely Variability and Extreme Out-of-Pocket. Both of these new indicators illuminate the destabilizing nature of the proportion of the nation's resources devoted to health spending and the associated scale of medical-financial uncertainty facing all but the highest-earning families. The findings amplify the urgency of major health reforms begun in 2010 and highlight aspects of reform that remain as a long-term project for the architects of America's health care system and its governing policies.

A. Medical-Financial Profile Overview by Family Income Level

1. Low-Income Families

The 3,193 families in this study with incomes at 138% FPL or below represent over 25,200,000 low-income families across the United States. Thirty-five per cent of the families reported zero chronic conditions, another 34% reported one or two chronic conditions, and the remaining 31% report three or more chronic health conditions. Nineteen percent of the low-income families reported no health insurance at any time in 2010, 47% had only public insurance, and 15% had some private insurance. Only 20% of the low-income families in this sample had private health insurance all year. Use of medical care by these families ranged from an average of less than \$500 for uninsured families in very good health to an average of over \$20,500 for families with below average health who had private health insurance for less than all family members or for less than the entire year.

Household health spending by low-income families exhibited very distinct structural patterns, also based on their insurance status. For uninsured families, out-of-pocket spending represented the overwhelming majority of out-of-pocket spending. For families with private insurance, employee contributions to insurance premiums generally exceeded out-of-pocket spending. The value of employer-paid insurance premiums was approximately half the total spending for the low-income families as a group, which is particularly remarkable given that only 35% of low-income families in this sample had any private health insurance during the year.

2. Middle Income Families

Over 42,342,700 middle-income families across the United States are represented by the 4,454 families with incomes at between 138% FPL and 400% FPL in this study. Thirty-two percent of sampled middle-income families reported very good health, another 38% reported one or two chronic conditions, and the remaining 30% reported 3 or more chronic health conditions. This distribution of overall family health is similar to that reported by the low-income families in this research study.

The insurance profiles were very different from the low-income group in this study. Seventy-seven percent of middle-income families had private insurance during 2010, and 60% were fully privately insured for the entire year. Eighteen percent only had public insurance. Five percent of middle-income families in this sample had no health insurance at all during 2010.

The middle-income group with the lowest medical expenses (consumption) were the uninsured families reporting no chronic illnesses. They reported average annual medical expenses of \$647. The highest average expenses at \$15,578 were for the families with below average health who had only some public insurance. This small number of middle-income families reporting public insurance would include elderly family members or members with eligible disabilities, which may explain their higher level of medical expenses, compared to middle-income families in other insurance categories. Within each health category in this sample, the middle-income families with public insurance incurred higher medical expenses than families with comparable health in all other insurance categories.

The lowest spending group was uninsured families with no chronic illnesses, with average family health spending of \$2,119. Uninsured middle-income families with three or more chronic conditions reported spending approximately 38% higher, an average of \$2,954. With private insurance, families with no chronic conditions averaged \$10,266 in spending. Three or more chronic conditions raised the average spending to \$13,467. Less predictably, even the out-of-pocket spending was higher for privately insured families (exclusive of employee-paid premiums) than their uninsured or publicly-insured counterparts.

3. Upper-Income Families

In this sample, 2,875 families with incomes above 400% FPL represented 38,439,765 families with an average income of \$113,732 in 2010. The distribution of chronic illnesses was very slightly higher for the 1-2 chronic conditions category, but overall, the upper income families in this sample were relatively evenly split across the three health status groups, as were the low- and middle- income families. Unlike the families in the lower income groups, 95% of upper income families had private-insurance during 2010. Eighty-one percent were fully insured all year. Uninsured families and families with only public insurance represented 3% and 2%, respectively.

Use of medical care, as measured by medical expenses by this group increased with private insurance, but less dramatically than was evident for families in the lower income categories. For example, upper-income families in this sample who had 3 or more chronic conditions reported medical expenses of \$13,452 with private insurance which is less than 20% higher than the expenses of uninsured

families with comparable health. The expenses of insured families with 3 or more chronic conditions in lower income categories were more than double that by the families without insurance.

Out-of-pocket spending comprised 10% of the family health spending by the upper-income families in this sample. Employee premiums represented another 12%. Together these "visible" payments represented an average of 2% of the income for these families. Seventy-eight percent of family health spending was in the less visible categories of tax payments and employer-paid premiums.

B. Coverage and Access

Usage of medical care is not a central analytical focus of this study, but an understanding of the differences in medical expenses provides some context against which to analyze and interpret differences in family health spending. Accordingly, the table that follows, presents the estimates of family medical expenses as an indicator of access to care observed across the different categories of families, by insurance status, in this study. (Table 9).

Table 9: Access to Care (Medical Expenses) by Family Type and Insurance

Status

	Uninsured	Public Only	Some Private	Full Private	Total
Low Income	Estimated Mean (95% Confidence Interval)				
Very Good Health	\$466 (\$237 - 694)	\$5,004*** (\$3,506 - 6,501)	\$3,774*** (\$2,125 - 5,424)	\$3,230*** (\$1,847 - 4,752)	\$3,237 (\$2,547 - 3927)
Good Health	\$1,840 (\$1,259 - 2,421)	\$8,351*** (\$6,519 - 10,183)	\$7,037*** (\$4,343 - 9,731)	\$5,527** (\$3,152 - 7,362)	\$6,419 (\$5,332 - 7,506)
Below Avg Health	\$4,700 (\$1,644 - 7,756)	\$13,866*** (\$12,162 - 15,570)	\$20,552** (\$9,406 - 31,697)	\$12,346** (\$8,781 - \$15,912)	\$13,569 (\$11,561 - 15,577)
Middle Income					
Very Good Health	\$646 (\$389 - 904)	\$5,010** (\$2,299 - 7,721)	\$3,820** (\$1,864 - 5,777)	\$2,813*** (\$2,402 - 3,223)	\$2,903 (\$2,354 - 3,451)
Good Health	\$1,154 (\$783 - 1,525)	\$8,420*** (\$6,311 - 10,528)	\$6,270*** (\$4,472 - 8,070)	\$5,913*** (\$4,951 - \$6,875)	\$5,837 (\$5,105 - 6,569)
Below Avg Health	\$6,304 (\$3,002 - 9,606)	\$15,578*** (\$12,498 - 18,658)	\$12,633** (\$10,101 - 15,166)	\$14,496*** (\$12,709 - 16,282)	\$13,964 (\$12,666 - 15,262)
Upper Income					
Very Good Health	\$904 (\$143 - 1,665)	\$3,362* (\$1,099 - 5,626)	\$5,544*** (\$3,801 - 7,287)	\$4,200*** (\$3,526 - 4,874)	\$4,165 (\$3,578 - 4,752)
Good Health	\$9,574 (\$354 - 18,794)	\$4,663 (\$2,655 - 6,671)	\$6,424 (\$4,730 - 8,120)	\$8,268 (\$6,919 - 9,617)	\$7,980 (\$6,825 - 9,135)
Below Avg Health	\$11,823 (\$0 - 26,110)	\$15,674 (\$5,622 - 25,726)	\$15,697 (\$12,167 - 19,227)	\$13,453 (\$12,082 - 14,823)	\$13,831 (\$12,554 - 15,108)

C. Family Health Spending

Estimates of family spending for each family type form the basis for the calculations of all four medical-financial indicators calculated in this study. These estimates are presented below, as a precursor to presentation of the MFE findings. Overall, the families in this sample had family health spending that averaged \$10,311. However, within that overall summary, the nine family types exhibited significantly different averages (See Figure 8 and Table 9). Spending generally increased with income and with the number of chronic illnesses in the family. The lowest spending family type were low-income families in Very Good Health at \$2,830 in 2010. At the other end of the spectrum was an average \$17,484 spent by

upper income families with Below Average Health. These differences were statistically significant.

1. Components of Family Health Spending

A closer look at the components of the spending helps explain how the structural differences in insurance coverage and tax liabilities result in the spending patterns revealed in the data. Spending by families on the low end of the income spectrum was less than that of higher income families in every category. Notably, based on the data used in this study, the lower employee and employer premiums are a reflection of the lower rates of private insurance coverage among low income families, rather than a finding of differences in the type or prices of specific insurance plans held by study participants. Families uninsured all year and families with only public insurance (both groups were estimated at \$0 insurance premium in this study) were predominantly low-income, but individuals in middle- and upper-income families who were eligible for Medicaid or Medicare are also sprinkled through the study data. Consistent with the fact that all but a few hundred families in this study were insured through group plans (employer-sponsored insurance), the insurance premiums for respondents in the same state in the model only vary based on family size but not by health status. Federal and state tax payments estimated in this study were a direct function of income and tax filing status.

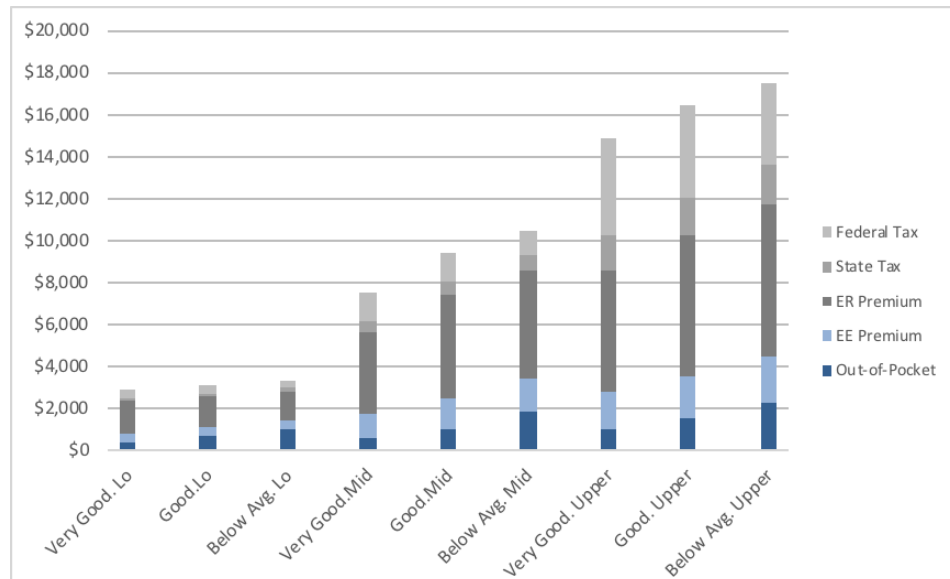


Figure 6: Estimated Family Health Spending by Family Type

Table 10: Components of Family Health Spending

Family Type	Out-of-Pocket	Employee Premium	Employer Premium	State Tax	Net Federal Tax	Total HHSP
Low Income						
Very Good Health	\$332	\$412	\$1,603	\$153	\$330	\$2,830
Good Health	\$672	\$404	1467	\$167	\$346	\$3,056
Below Avg Health	\$1,010	\$398	\$1,385	\$168	\$288	\$3,250
Middle Income						
Very Good Health	\$589	\$1,110	\$3,892	\$551	\$1,357	\$7,508
Good Health	\$1,034	\$1,433	\$4,900	\$644	\$1,214	\$9,377
Below Avg Health	\$1,834	\$1,545	\$5,173	\$701	\$1,409	\$10,467
Upper Income						
Very Good Health	\$1,019	\$1,670	\$5,863	\$1,604	\$4,970	\$14,845
Good Health	\$1,518	\$1,993	\$6,710	\$1,761	\$4,815	\$16,437
Below Avg Health	\$2,281	\$2,172	\$7,246	\$1,84	\$4,310	\$17,484
Total:						\$10,311

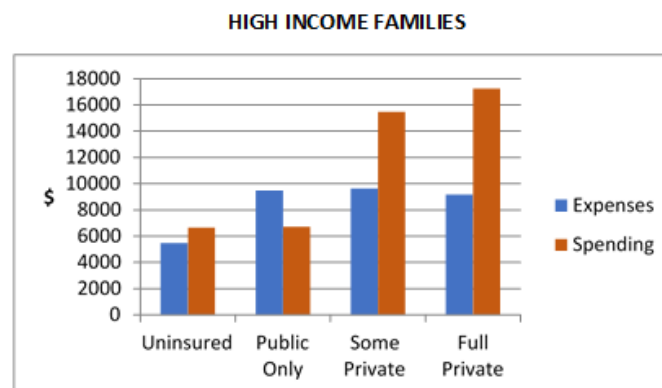
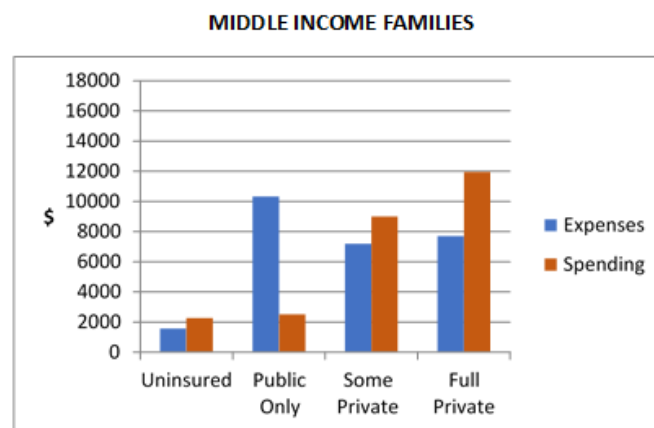
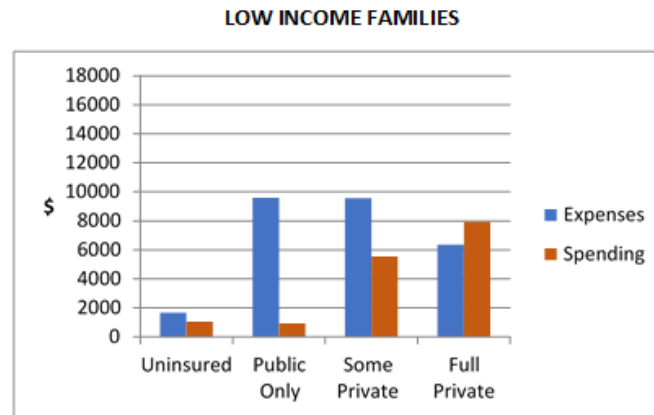


Figure 7: Medical Expenses and Family Spending

2. Geographic Influences on Family Health Spending

Geographical differences are also observed for the twenty-nine states with representative samples in the study data. Figure 8 illustrates that the states with the highest average family health spending for 2010 are concentrated in the northeast and northern plains states. There is a concentration of states on the lower end of the average family health spending scale in the southeast and midwest states.

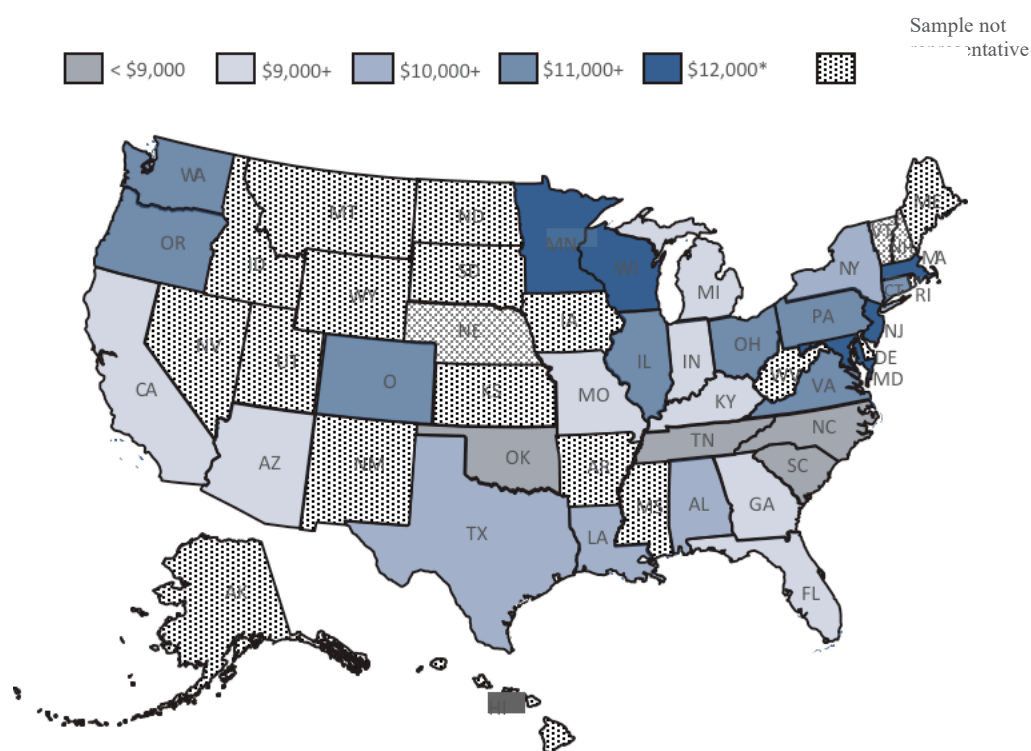


Figure 8: Median Family Health Spending by State

3. Insured vs. Uninsured Families

Sub-Question 1.0

In 2010, was the level of total family health spending by family type for 2010 lower for insured families compared to uninsured families?

The level of health spending varied greatly from one family group to the next. These results appear in Table **11**. Comparing the total family health spending by income, health, and insurance status reveals important differences in the experience of insured vs uninsured families. For seven of the nine family types (defined by income and health), the group with some public insurance had lower average family health spending. That result was significant for the low-income group and for two of three middle income groups and for upper income group in very good health. In every family type, families with private insurance had higher health spending than their uninsured counterparts, and that difference was significant at the $p < 0.01$.

Table 11: Total Family Health Spending by Family Type and Insurance Status

	Uninsured	Public Only	Some Private	Full Private	Total
	Estimated Mean (95% Confidence Interval)				
Low Income					
Very Good Health	\$614 (\$497 - \$731)	\$864* (\$702 - \$1,026)	\$4,865*** (\$3,957 - \$5,773)	\$6,700*** (\$6,197 - \$7,204)	\$2,830 (\$2,534 - \$3,125)
Good Health	\$1,411 (\$1,000 - \$1,821)	\$877* (\$774 - \$979)	\$5,705*** (\$4,746 - \$6,664)	\$8,316*** (\$7,328 - \$9,303)	\$3,055 (\$2,712 - \$3,399)
Below Avg Health	\$1,529 (\$1,072 - \$1,985)	\$1,024* (\$903 - \$1,145)	\$6,365* (\$5,314 - \$7,415)	\$9,330 (\$8,541 - \$10,119)	\$3,250 (\$2,917 - \$3,583)
Middle Income					
Very Good Health	\$2,119 (\$1,887 - \$2,352)	\$2,442* (\$2,169 - \$2,716)	\$7,532*** (\$6,929 - \$8,135)	\$10,267*** (\$9,873 - \$10,660)	\$7,508 (\$7,195 - 7,821)
Good Health	\$2,295 (\$2,034 - \$2,557)	\$2,684 (\$2,103 - \$3,265)	\$9,360*** (\$8,704 - \$10,016)	\$12,048*** (\$11,601 - \$12,495)	\$9,377 (\$9,003 - \$9,751)
Below Avg Health	\$2,954 (\$2,463 - \$3,445)	\$2,463* (\$2,173 - \$2,755)	\$10,272*** (\$9,542 - \$11,001)	\$13,468*** (\$13,054 - 13,882)	\$10,467 (\$10,064 - 10,870)
Upper Income					
Very Good Health	\$6,083 (\$5,076 - \$7,090)	\$7,249 (\$5,519 - 8,980)	\$14,234*** (\$13,011 - \$15,457)	\$15,861*** (\$15,154 - 16,568)	\$14,845 (\$14,228 - \$15,461)
Good Health	\$6,785 (\$5,509 - \$8,062)	\$5,800 (\$4,562 - \$7,039)	\$15,762*** (\$14,889 - \$16,635)	\$17,137*** (\$16,635 - \$17,639)	\$16,437 (\$15,984 - \$16,890)
Below Avg. Health	\$8,439 (\$5,957 - 10,922)	\$7,082 (\$5,595 - \$8,571)	\$16,026*** (\$14,796 - 17,256)	\$18,277*** (\$17,740 - \$18,814)	\$17,484 (\$16,988 - \$17,980)

Note: *p<.1, *p < .05, **p<.01, ***p<.001 compared to Uninsured families.

4. Visible Family Health Spending by Families

A closer look isolating out-of-pocket spending revealed a surprising result. Table 12 presents the comparison of family health spending for uninsured versus families with public and private insurance. In seven of the nine family types, the average out-of-pocket spending was lower for families with public insurance than for families who were uninsured, but this difference was statistically significant at the p<.05 level in only two of the nine family categories. Families with private insurance all year averaged *higher* out-of-pocket spending for all nine family types than their

uninsured counterparts, and that difference was significant for six of the nine family types. These result does not support the hypothesis that insured families enjoy lower out-of-pocket spending in exchange for the insurance premiums they (and their employers) pay.

Table 12: Out-of-Pocket Spending by Family Type and Insurance Status

	Uninsured	Public Only	Some Private	Full Private	Total
	Estimated Mean (95% Confidence Interval)				
Low Income					
Very Good Health	\$218 (\$104 - \$332)	\$302 (\$158 - \$446)	\$487* (\$282 - \$691)	\$385+ (\$247 - \$523)	\$332 (\$257 - \$406)
Good Health	\$915 (\$531 - \$1,298)	\$386** (\$295 - \$477)	\$645 (\$437 - \$853)	\$1,205 (\$522 - \$1,888)	\$672 (\$513 - \$832)
Below Avg Health	\$1,071 (\$628 - \$1513)	\$660* (\$544 - \$777)	\$1,662* (\$1,185 - \$2,139)	\$1,634 (\$1,086 - \$2,183)	\$1,010 (\$863 - \$1,158)
Middle Income					
Very Good Health	\$397 (\$192 - \$602)	\$495 (\$275 - \$715)	\$592 (\$397 - \$786)	\$668* (\$574 - \$762)	\$589 (\$513 - \$665)
Good Health	\$569 (\$405 - \$732)	\$910 (\$395 - \$1,461)	\$1,026*** (\$808 - \$1,244)	\$1,144*** (\$936 - \$1,352)	\$1,034 (\$890 - \$1,177)
Below Avg Health	\$1,459 (\$996 - \$1,993)	\$1,063 (\$809 - \$1,319)	\$1,813 (\$1,456 - \$2,170)	\$2,096* (\$1,866 - \$2,325)	\$1,833 (\$1,673 - \$1,995)
Upper Income					
Very Good Health	\$343 (\$138 - \$549)	\$653 (\$333 - \$973)	\$1,012** (\$575 - \$1,450)	\$1,084*** (\$871 - \$1,297)	\$1,019 (\$841 - \$1,197)
Good Health	\$1,068 (\$603 - \$1,534)	\$675 (\$404 - 947)	\$1,213 (\$956 - \$1,470)	\$1,604* (\$1,442 - \$1,768)	\$1,518 (\$1,379 - \$1,657)
Below Avg. Health	\$2,145 (\$819 - \$3,472)	\$1,771 (\$1,029 - \$2,511)	\$2,264 (\$1,872 - \$2,657)	\$2,305 (\$2,061 - 2,550)	\$2,281 (\$2,073 - \$2,489)

Note: +p<.1, *p < .05, **p<.01, ***p<.001 compared to Uninsured families

When employee-paid premiums are included, visible family health spending on out-of-pocket plus employee premiums was higher for privately- insured families compared to uninsured families in all nine family types (Table 13). With a

confidence level of greater than 99%, this data suggests that these differences are not due to sampling error alone.

Table 13: Out-of-Pocket and Employee Premium by Family Type and Insurance Status

	Uninsured	Public Only	Some Private	Full Private	Total
	Estimated Mean (95% Confidence Interval)				
Low Income					
Very Good Health	\$218 (\$104 - \$332)	\$302 (\$158 - \$446)	\$1,286*** (\$1,008 - \$1,564)	\$1,579*** (\$1,378 - \$1,780)	\$743 (\$644 - \$843)
Good Health	\$915 (\$531 - \$1,298)	\$386** (\$295 - \$477)	\$1,664** (\$1,343 - \$1,985)	\$2,586*** (\$1,883 - \$3,291)	\$1,076 (\$898 - \$1,253)
Below Avg Health	\$1,071 (\$628 - \$1513)	\$660* (\$544 - \$777)	\$2,556*** (\$2,018 - \$3,095)	\$3,225*** (\$2,643 - \$3,807)	\$1,409 (\$1,236 - \$1,580)
Middle Income					
Very Good Health	\$397 (\$192 - \$602)	\$495 (\$275 - \$715)	\$1,701*** (\$1,461 - \$1,941)	\$2,363*** (\$275 - \$715)	\$1,699 (\$1,589 - \$1,809)
Good Health	\$569 (\$405 - \$732)	\$910 (\$395 - \$1,461)	\$2,472*** (\$2,190 - \$2,755)	\$3,127*** (\$2,886 - \$3,368)	\$2,467 (\$2,293 - \$2,640)
Below Avg Health	\$1,459 (\$996 - \$1,993)	\$1,063 (\$809 - \$1,319)	\$3,292 (\$2,901 - \$3,684)	\$4,236*** (\$3,987 - \$4,486)	\$3,379 (\$3,190 - \$3,568)
Upper Income					
Very Good Health	\$343 (\$138 - \$549)	\$653 (\$333 - \$973)	\$2,657*** (\$2,205 - \$3,110)	\$2,975*** (\$2,703 - \$3,247)	\$2,719 (\$2,490 - \$2,947)
Good Health	\$1,068 (\$603 - \$1,534)	\$675 (\$404 - \$947)	\$3,133*** (\$2,788 - \$3,478)	\$3,726*** (\$3,532 - \$3,920)	\$3,511 (\$3,341 - \$3,681)
Below Avg. Health	\$2,145 (\$819 - \$3,472)	\$1,771 (\$1,029 - \$2,511)	\$4,150** (\$3,726 - \$4,573)	\$4,644*** (\$4,381 - \$4,907)	\$4,453 (\$4,226 - \$4,680)
Note: *p<.1, *p < .05, **p<.01, ***p<.001 compared to Uninsured families					

D. Research Question 1: Medical Financial Indicators

1. Burden of Family Health Spending

Sub-Question 1.1

In 2010, was the burden of family health spending by family type lower for insured families compared to uninsured families?

Burden, is defined as the ratio of family health spending to each family's income, adjusted for the value of employer-paid insurance premiums as well as the value of food aid or other public assistance. It assesses the extent to which family health spending reduces family resources available for other consumption. In this study, the average burden low-income families in the very good, good, and below average health categories respectively were .28, .31 .32 (Table 13, "Total" Column). For middle-income families, the average burden was .17, .19, and .20, for the same three categories of health level. Upper income families showed burden at .14, .14, and .15 respectively.

Compared to families with no insurance, families with private insurance had an average burden of total health spending that was 25% to 39% higher. This result held across all combinations of health and income and was significant at the $p < .001$ level. Families with public insurance generally had a lower burden, but the difference was not statistically significant across all family types.

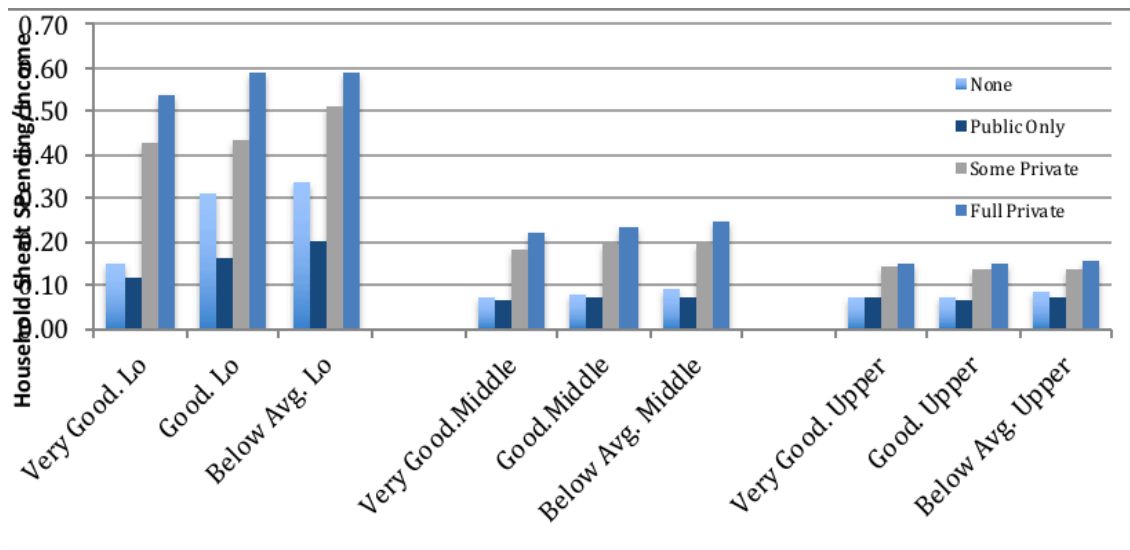


Figure 9: Burden of Family Health Spending

Table 14: Burden of Family Health Spending by Family Type and Insurance Status

	None	Public Only	Some Private	Full Private	Total
Low Income	Estimated Mean (95% Confidence Interval)				
Very Good Health	.099 (0. - 0.093)	.065 (0.032 - 0.082)	.311*** (0.254 - 0.464)	.396*** (0.405 - 0.603)	.192 (0.154 - 0.231)
Good Health	0.262 (0.143 - 0.381)	0.23* (0.076 - 0.169)	0.287 (0.228 - 0.459)	0.482*** (0.423 - 0.639)	0.238 (0.189 - 0.288)
Below Avg Health	0.289 (0.095 - 0.486)	0.169 (0.124 - .213)	0.422 (0.269 - 0.575)	0.490+ (0.373 - 0.608)	0.272 (0.227 - 0.317)
Middle Income					
Very Good Health	0.014 (0.007 - 0.021)	0.013 (0.008 - 0.021)	0.043*** (0.039 - 0.048)	0.058*** (0.055 - 0.061)	0.043 (0.040 - 0.046)
Good Health	0.018 (0.013 - 0.023)	0.242 (0.011 - 0.037)	0.059* (0.052 - 0.066)	0.070*** (0.065 - 0.075)	0.057 (0.053 - 0.061)
Below Avg Health	0.044 (0.029 - 0.060)	0.036 (0.024 - 0.049)	0.074** (0.065 - 0.083)	0.093*** (0.086 - 0.100)	0.077 (0.072 - 0.082)
Upper Income					
Very Good Health	0.004 (0.002 - 0.007)	0.008 (0.003 - 0.013)	0.030*** (0.023 - 0.037)	0.029*** (0.027 - 0.032)	0.027 (0.025 - 0.030)
Good Health	0.012 (0.007 - 0.017)	0.009 (0.005 - 0.014)	0.029*** (0.025 - 0.033)	0.036*** (0.034 - 0.037)	0.034 (0.032 - 0.035)
Below Avg Health	0.023 (0.008 - 0.038)	0.021 (0.012 - 0.031)	0.039** (0.034 - 0.045)	0.043*** (0.041 - 0.046)	0.042 (0.040 - 0.044)

Note: +p<.1, *p<.05, **p<.01, ***p<.001 compared to Uninsured families

Table 15: Burden of Out-of-Pocket and Employee Premium by Family Type and Insurance Status

	Uninsured	Public Only	Some Private	Full Private	Total
	Estimated Mean (95% Confidence Interval)				
Low Income					
Very Good Health	.147 (.083 - .212)	0.119 (0.085 - 0.154)	0.430*** (0.372 - 0.488)	0.537*** (0.472 - 0.602)	0.276 (0.2408 - 0.3192)
Good Health	0.311 (0.193 - 0.429)	0.162* (0.115 - 0.208)	0.434* (0.319 - 0.549)	0.589*** (0.490 - 0.688)	0.31 (0.2708 - 0.3492)
Below Avg Health	0.339 (0.151 - 0.529)	0.200 (0.156 - 0.245)	0.508 (0.383 - 0.634)	0.589* (0.516 - 0.660)	0.32 (0.2808 - 0.3592)
Middle Income					
Very Good Health	0.071 (0.064 - 0.079)	0.063 (0.057 - 0.071)	0.179*** (0.169 - 0.190)	0.221*** (0.216 - 0.227)	0.17 (0.16412 - 0.17588)
Good Health	0.075 (0.069 - 0.081)	0.069 (0.056 - 0.082)	0.196*** (0.184 - 0.208)	0.234*** (0.228 - 0.241)	0.19 (0.18216 - 0.19784)
Below Avg Health	0.090 (0.074 - 0.106)	0.073* (0.061 - 0.086)	0.197*** (0.185 - 0.209)	0.248*** (0.241 - 0.256)	0.2 (0.19216 - 0.20784)
Upper Income					
Very Good Health	0.072 (0.065 - 0.079)	0.073 (0.061 - 0.084)	0.143*** (0.130 - 0.156)	0.146*** (0.142 - 0.151)	0.14 (0.13608 - 0.14392)
Good Health	0.073 (0.064 - 0.081)	0.063 (0.051 - 0.076)	0.133*** (0.126 - 0.141)	0.150*** (0.147 - 0.153)	0.14 (0.13804 - 0.14196)
Below Avg. Health	0.083 (0.061 - 0.105)	0.072 (.062 - 0.082)	0.135*** (0.127 - 0.143)	0.153*** (0.149 - 0.156)	0.15 (0.14804 - 0.15196)

Note: *p<.1, *p<.05, **p<.01, ***p<.001 compared to Uninsured families

2. Variability of Family Health Spending

Sub-Question 1.2

In 2010, was the variability of family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?

The next dimension of medical-financial security considers the imprecision and unpredictability of total family health spending within groups with similar characteristics and, perhaps, within a specific family from year to year. In this study,

Variability is reported as a component of the MFE profile, as an indicator of the level of uncertainty associated with average expenditures on health care. Variability is calculated for each family type (by insurance category) as the standard deviation of family health spending divided by the mean, also known as the coefficient of variation. Rather than reporting the standard deviation as an absolute number, it is shown as a percentage of FHSP for each subgroup.

The results from the variability indicator illustrate another dimension of the level of financial insecurity faced by different families. Larger standard deviations relative to the mean of spending suggest more difficulty for families in anticipating or preparing for possible medical expenses. It is understandable that this uncertainty is an important cause for worry and financial insecurity even for families that have yet to experience a costly medical event.

As with the burden indicator, the results are easily grouped by family income level.

Table 16: Variability of Family Health Spending shows the results by family type and insurance category. For low-income families, the high burden of health spending is exacerbated by variability greater than 100%. Specifically, in this sample, the standard deviation of family health spending in proportion to the mean family health spending (across all insurance categories) was 111%, 105%, 120% for families with very good, good, and below average number of chronic conditions, respectively. For middle-income families, the variation was around half that level: 57%, 57% and 47%. Finally, upper income families had the lowest variation in their

health spending, at 42%, 38% and 37% for the very good, good, and below average health categories.

Table 16: Variability of Family Health Spending

	Uninsured	Public Only	Some Private	Full Private	Total Sample
Low Income					
Very Good Health	115%	168%	79%	47%	111%
Good Health	152%	117%	68%	55%	105%
Below Average Health	190%	141%	72%	47%	120%
Middle Income					
Very Good Health	97%	63%	56%	44%	57%
Good Health	66%	119%	52%	44%	57%
Below Average Health	58%	71%	53%	37%	47%
Upper Income					
Very Good Health	54%	47%	40%	42%	42%
Good Health	57%	53%	33%	38%	38%
Below Average Health	47%	61%	39%	35%	37%

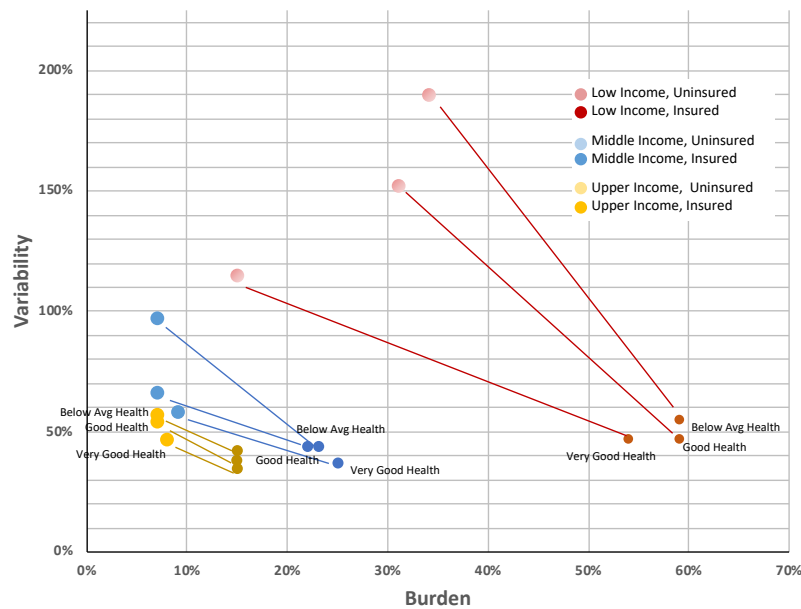
The Variability parameter is defined by the coefficient of variation of family health spending: the standard deviation divided by the mean of family health spending for each subgroup.

The results of this analysis are only partially consistent with the hypothesis that variability of family spending would be higher for uninsured families, especially those with more chronic illnesses that could trigger serious unexpected episodes of illness. As anticipated, uninsured families reported higher variability than comparable families with private insurance. Within the uninsured category, low income families exhibited the greatest variability in their spending. For middle and upper income families without insurance, an unexpected finding was that the families with fewer chronic illnesses experienced a greater level of variability than

their counterparts who had more chronic illness to contend with. Families in this study with public insurance exhibited the widest range of variability.

3. Relationship between Burden and Variability

Another important finding can be observed by consideration of the two indicators **Burden** and **Variability** together for each family type. Figure 10 shows the results for Burden and Variability by family type plotted as coordinates of each observation. Uninsured and Fully Privately insured families are represented on the chart.



Note: Each group of markers represents the three levels of health for each income/insurance status combination. For example, reading from left to right, the three red markets above represent low income uninsured families with Very Good, Good and Below Average health respectively. Connector lines highlight the difference in burden and variability of FHSP between uninsured and fully privately-insured families in the same health and income categories.

Figure 10: Burden and Variability of Family Health Spending, Uninsured vs. Privately Insured

The twofold nature of the financial dilemmas faced by all except the upper income families becomes evident when these burden and variability data are examined together. This is especially true for low income families, who endure this double financial trouble while consuming fewer services than their wealthier counterparts. For poorer families with no insurance, FHSP consumes nearly double the share of income as for middle and upper income families. This burden is exacerbated by variability that is also greater than that of their higher income counterparts. Uninsured poorer families would need cash reserves (or access to credit or borrowing) at a higher percentage of income than wealthier families to be poised to accommodate the potential swings in spending. For the low-income families with private insurance, the overall variability is greatly reduced, FHSP is predictable within a narrower range, but at a much higher level of baseline spending. Private insurance offers low income families an opportunity to have greater access to care, and better predictability, at the cost of an additional 25-40% of the average burden experienced by low-income uninsured families in comparable health.

Looking simultaneously at burden and variability for privately-insured and uninsured across family types, the tradeoff between lower variability in health spending and higher burden experienced by uninsured versus insured families is evident. Furthermore, the extent to which that tradeoff is most pronounced for lower and middle-income categories is also apparent.

4. Risk of Excessive or Catastrophic Health Spending

Sub-Question 1.3

In 2010, was the risk of catastrophic levels of family health by family type for 2010 lower for insured families compared to uninsured families?

The next MFE indicator calculated was **Risk**, a measure of the proportion of families of each type that incurred family health spending as a percentage of adjusted income at or above the thresholds that can be considered excessive (20%) or catastrophic (40%). The 20% and 40% thresholds are commonly used in prior literature on catastrophic health spending and are used here for conceptual consistency. First, the results are presented for each of the nine family types, which are segmented by health and income. Following that, the family types are further segmented by insurance status, revealing additional nuance about which families are positioned to have an excessive share of their resources allocated to health care spending. Reported on the following pages are the proportions of families in the sample whose health spending reached the 20% and 40% thresholds. A final analysis for this section calculates the risk that out-of-pocket payments and employee-paid premiums reach excessive or catastrophic spending levels.

a. Risk of Health Spending in Excess of 20% of Family Income

The level 20% of income is a threshold intended to represent the point at which excessive health spending triggers hardship or deprivation. Table 16 and Figure 11: Risk of Family Health Spending >20% of Income present the results of the analysis of the data in this study. For low-income families, the proportion at risk for health spending in

excess of 20% of income was sizeable--in the range of 40-41% across the three health status categories. For middle-income families, 36%, 46% or 52% of families with zero, one or two, or three of more chronic health conditions experienced health spending at the level considered excessive. Only 5%, 7% and 10% of upper income families in the respective health categories reached that same level.

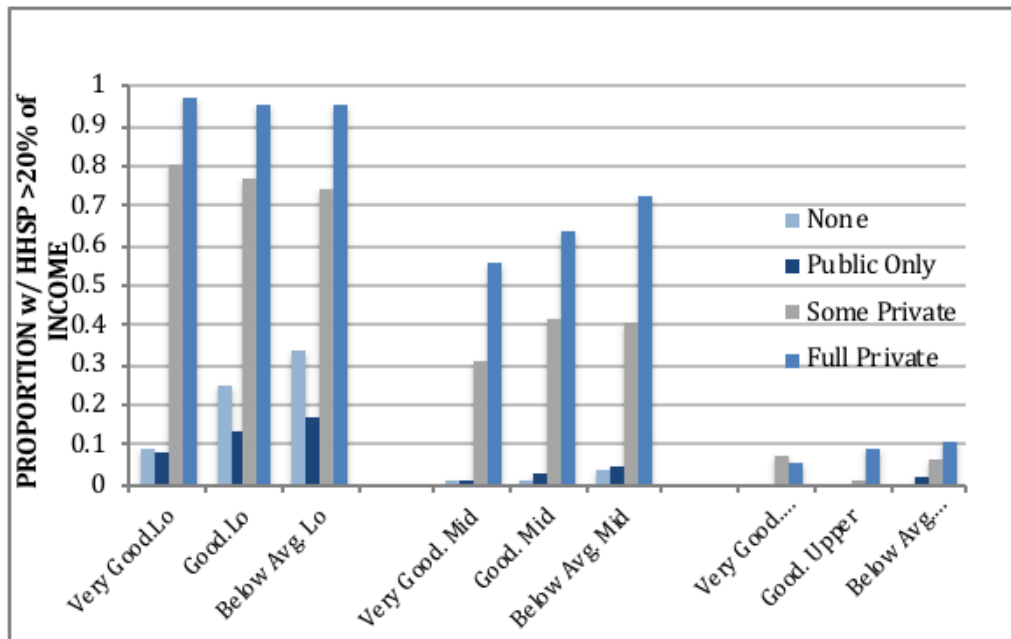


Figure 11: Risk of Family Health Spending >20% of Income

Table 17: RISK20 by Family Type and Insurance Status

	None	Public Only	Some Private	Full Private	Total
Low Income	Estimated Mean (95% Confidence Interval)				
Very Good Health	.093 (0.040 - 0.146)	.080 (0.050 - 0.111)	.804*** (0.728 - 0.879)	.974*** (0.956 - 0.992)	.414 (0.371 - 0.456)
Good Health	0.248 (0.195 - 0.455)	0.133* (0.107 - 0.215)	0.769*** (0.686 - 0.852)	0.954*** (0.929 - 0.980)	0.397 (0.357 - 0.439)
Below Avg Health	0.337 (0.218 - 0.456)	0.172** (0.133 - 0.211)	0.738*** (0.630 - 0.847)	0.955*** (0.925 - 0.986)	0.403 (0.364 - 0.441)
Middle Income					
Very Good Health	0.136 (0.0 - 0.035)	0.015 (0.00 - 0.036)	0.308*** (0.237 - 0.378)	0.554*** (0.508 - 0.600)	0.356 (0.324 - 0.387)
Good Health	0.015 (0.0 - 0.032)	0.027 (0.001 - 0.053)	0.420*** (0.0 - 0.03088)	0.639*** (0.02208 - 0.02992)	0.456 (0.425 - 0.486)
Below Avg Health	0.041 (0.00 - 0.098)	0.045 (0.011 - 0.080)	0.406*** (0.331 - 0.481)	0.725*** (0.688 - 0.762)	0.516 (0.483 - 0.549)
Upper Income					
Very Good Health	0 (0.00 - 0.00)	0 (0.00212 - 0.01388)	0.076* (0.00516 - 0.02084)	0.054*** (0.00804 - 0.01196)	0.053 (0.030 - 0.076)
Good Health	0 (0.00 - 0.00)	0 (0.00508 - 0.01292)	0.011 (0.00 - 0.024)	0.087*** (0.065 - 0.109)	0.073 (0.054 - 0.091)
Below Avg Health	0 (0.00 - 0.00)	0.020 (0.00 - 0.060)	0.066** (0.020 - 0.112)	0.104*** (0.080 - 0.129)	0.095 (0.074 - 0.116)

Note: *p<.1, *p<.05, **p<.01, ***p<.001 compared to Uninsured families

b. Risk of Health Spending in Excess of 40% of Family Income

The 40% of income threshold is intended to represent a potentially catastrophic level of health spending. Since much of the spending estimated in this study is paid indirectly through taxes or passively through employer-paid premiums, most families would not be aware of their entire burden. Accordingly, the term catastrophic is an imperfect description of the experience, but it is used here for conceptual consistency with other research on this topic. These costs are extracted from or on behalf a family's income and earnings without their direct participation, and ultimately do reduce the resources they might otherwise have discretionary control over. For low-income families, the proportion at risk for burden in excess of

40% of income was sizeable--in the range of 20-21% across the three health status categories. For middle-income families, 13%, 3% or 3% of families with zero, one or two, or three or more chronic health conditions experienced burden in excess of 20% of their income. In this sample, less than 1% of upper income families reached the 40% burden threshold.

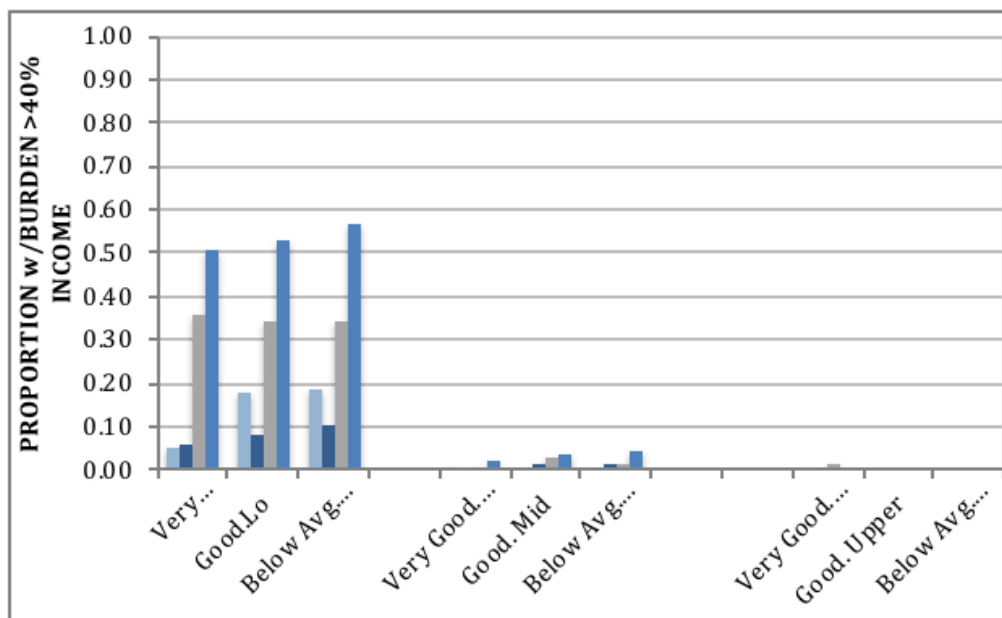


Figure 12: Risk of Family Health Spending >40% of Income

Table 18: RISK40 by Family Type and Insurance Status

	None	Public Only	Some Private	Full Private	Total
Low Income	Estimated Mean (95% Confidence Interval)				
Very Good Health	.052 (0.011 - 0.093)	.057 (0.032 - 0.082)	.359*** (0.254 - 0.464)	.504*** (0.405 - 0.603)	.211 (0.173 - 0.248)
Good Health	0.181 (0.195 - 0.455)	0.082* (0.048 - 0.115)	0.343* (0.228 - 0.459)	0.531*** (0.423 - 0.639)	0.221 (0.184 - 0.258)
Below Avg Health	0.184 (0.074 - 0.292)	0.102 (0.069 - .135)	0.340 (0.228 - 0.451)	0.570* (0.481 - 0.658)	0.224 (0.190 - 0.258)
Middle Income					
Very Good Health	0.003 (0.0 - 0.008)	0.0 (0.00 - 0.0)	0.002 (0.0 - 0.007)	0.022** (0.508 - 0.600)	0.013 (0.006 - 0.020)
Good Health	0.0 (0.0 - 0.032)	0.119 (0.00 - 0.032)	0.031* (0.0 - 0.056)	0.039*** (0.022 - 0.057)	0.030 (0.019 - 0.042)
Below Avg Health	0.0 (0.00 - 0.0)	0.014 (0.001 - 0.043)	0.013* (0.001 - 0.026)	0.045*** (0.027 - 0.062)	0.032 (0.020 - 0.43)
Upper Income					
Very Good Health	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0.011 (0.00- 0.033)	0.0 (0.0 - 0.0)	0.002 (0.0 - 0.005)
Good Health	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
Below Avg Health	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0 (0.0 - 0.0)	0.0 (0.00 - 0.0)

Note: *p<.1, *p<.05, **p<.01, ***p<.001 compared to Uninsured families

c. Risk of Excessive Health Spending by Family Type and Insurance Status

When these risk results are further segmented by insurance status in addition to family type, very stark differences in the frequency of excessive health spending emerge. Over one third (34%) of uninsured low-income families with three or more chronic conditions had health spending above 20% of income (Column 1, Table 16). Even with no chronic conditions, 9% of low-income uninsured families reached the 20% of income threshold. The proportion of privately-insured low-income families allocating over 20% of their income to health spending was over 95-97%. Over 50% of privately-insured low-income families exceeded the 40% of income threshold (see Table 17).

Compared to low-income uninsured families, uninsured middle-income families generally escaped excessive health spending. Middle-income families met that threshold in 4% of the cases if they had three or more chronic conditions, but only 1% of the families with fewer than three chronic illnesses had spending levels considered excessive by the 40% standard.

These results are not consistent with the hypothesis that uninsured families would be at greater risk of excessive family health spending using the 20% or 40% of income threshold. A majority of privately-insured families in the low and middle-income categories were revealed to be at risk of spending 20% of annual income on healthcare, regardless of health status. In comparison, the share of uninsured families with family health spending above 20% of income was smaller than for families with private insurance. Low-income families with public insurance.

Contrary to predictions, and contrary to the general understanding of the economic benefits of insurance, the families in this sample with private insurance were not less likely to incur health spending in excess of 20% or 40% of their income. In fact, the proportion of privately-insured low- and middle-income families in this sample with out-of-pocket spending plus employee premiums in excess of 20% of income was higher than the proportion their uninsured counterparts.

d. Excessive Levels of Spending for Out-of-Pocket and Employee Premiums

For low-income families, the higher proportion of privately-insured with excessive visible spending was statistically significant for all levels of health. Ironically, uninsured families were less likely to exceed the catastrophic thresholds. For middle-income families, the risk of exceeding the 40% threshold was below 5% for privately insured families at all health levels, and virtually none of the upper income families in this sample had family health spending at catastrophic levels. The particularly surprising finding in this sample was that insured families were more frequently spending excessive or catastrophic levels of the visible components of health spending, that is out-of-pocket and employee premiums, than their uninsured counterparts in the same health category. That said, it is notable that even the visible components of out-of-pocket spending and employee-paid premiums were more likely to exceed 20% of income for the families that were privately-insured compared to uninsured families with comparable low and middle-incomes. For middle-income families, the pattern was similar if less extreme.

Compared to uninsured families, a smaller proportion of families with public insurance incurred excessive levels of spending, but that result was not statistically significant. These data further underscore the finding that, at the insurance premium levels prevailing in 2010, the cost of healthcare through a typical private insurance plan was far beyond what would be considered affordable.

**Table 19: % Families with Excessive Level of Visible Healthcare Spending
(Out-of-Pocket plus Employee Premiums in Excess of 20% of Income)**

	None	Public Only	Some Private	Full Private	Total
Low Income	Estimated Mean (95% Confidence Interval)				
Very Good Health	.089 (.036 - .141)	.073 (.044 - .102)	.275*** (.186 - .366)	.304*** (.214 - .393)	.165 (.133 - .197)
Good Health	.243 (.155 - .331)	.122* (.084 - .161)	.342 (.224 - .460)	.378* (.224 - .483)	.222 (.186 - .260)
Below Avg Health	.262 (.152 - .372)	.188 (.148 - .228)	.425* (.304 - .545)	.488** (.397 - .580)	.281 (.244 - .317)
Middle Income					
Very Good Health	.002 (0 - .008)	.015** (0 - .036)	.004 (0 - .009)	.015* (.004 - .025)	.010 (.004 - .016)
Good Health	.008 (0 - .019)	.020 (0 - .044)	.030 (.004 - .056)	.019 (.008 - .031)	.021 (.012 - .030)
Below Avg Health	.026 (0 - .075)	.039 (.006 - .073)	.037 (.015 - .060)	.056 (.035 - .076)	.048 (.034 - .062)
Upper Income					
Very Good Health	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - .004)	.001 (0 - .003)
Good Health	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Below Avg Health	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)	.009* (.001 - .018)	.007 (.001 - .014)

Note: *p<.1, **p<.05, ***p<.01, ****p<.001 compared to Uninsured families

5. Geographic Extremes Out-of-Pocket Health Spending

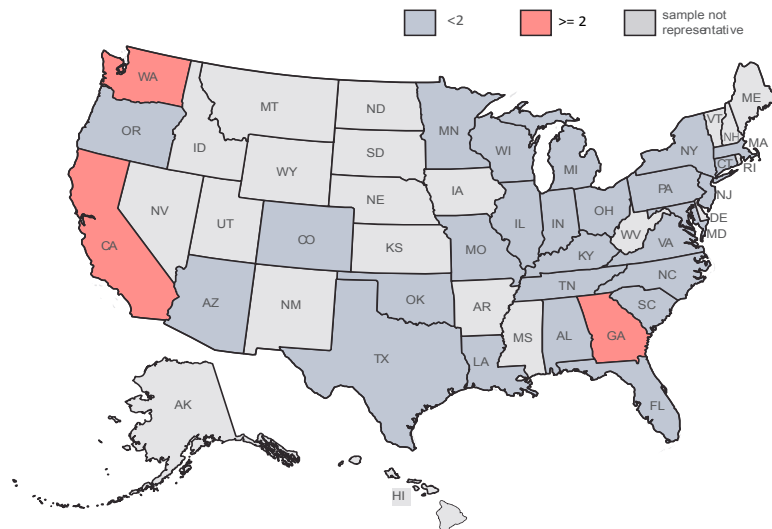
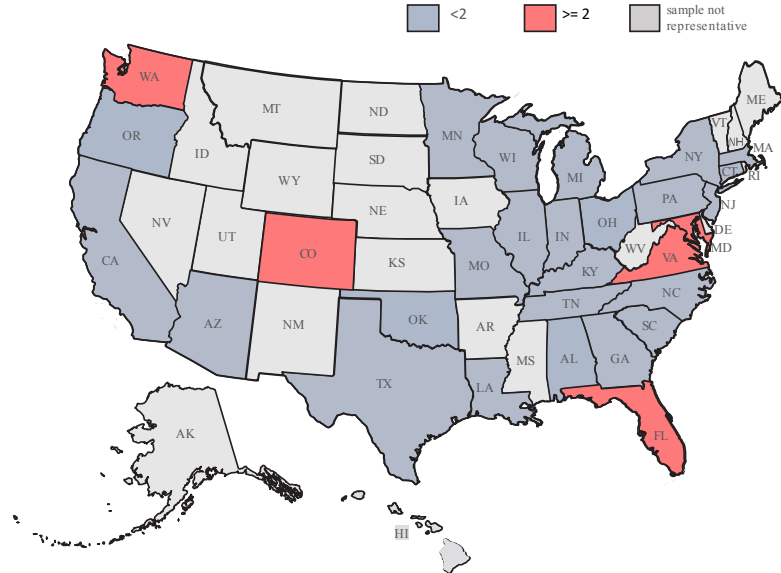
Sub-Question 1.4

Are there states where families experience levels of health spending that are double the level predicted for their family type and insurance status?

Conceptually, the next analysis identifies several states where the estimated average out-of-pocket health spending is double the level that would be predicted for a comparable family using the model in this study. It is measured as the ratio of

observed out-of-pocket health spending to expected out-of-pocket health spending. The expected spending is the predicted value from regression analysis of out-of-pocket health spending using three variables of interest as regressors, along with control variables. The indicator is calculated on out-of-pocket health spending in order to highlight the costs most conspicuous to families. Furthermore, it was important to exclude federal taxes for which the rules are the same across the entire study population. The details of the regression model and its results are presented in a later section of this chapter.

Figure 13 and Figure 14 present the results of the Extreme Out-of-Pocket calculation for uninsured and privately-insured low-income families in this study respectively. Having demonstrated that low income families are at substantially higher risk for burdensome spending and having further demonstrated statistically significant differences in the level and risk associated with spending related to insurance status, low-income families, uninsured and fully insured were selected to explore with this Extreme Out-of-Pocket measurement. States shown in red denote where the average out-of-pocket health spending in 2010 was double the level predicted based on family size, family type, and insurance status. Based on the results of the preceding sections, the findings for low income families, those with the most worrisome MFE results were selected for presentation in this report.



On average, uninsured families in five states in this sample (Figure 13), namely Washington, Colorado, Florida, Virginia and Maryland were in Shock, that is having average out-of-pocket spending that was twice the level predicted using family characteristics (health, income, and the demographic controls) and several state-level characteristics.. Insured low-income families in Washington, California, and Georgia showed out-of-pocket spending double the predictions from the regression model (Figure 14). The explanation for these results requires further investigation into the particulars of health markets and pricing or utilization in these locations and to evaluate whether the pattern of extreme-out-of-pocket spending would be observed in the same places in other years as well. Both investigations are beyond the scope of this study. It is a subject worthy of further research at the state or within-state market levels.

E. Regression Analysis

Sub-Question 2

Is the effect of insurance status on family health spending greater than the effect of family type (as defined by health and income)?

In order to further explore the relative importance of income, health, insurance status and selected state-level characteristics on health-spending, regression analysis was performed. Using the family weights on 10,522 sampled observations resulted in a regression model representing 104,618,291 million non-elderly families. To best fit the data, a semi-log regression model was selected, and the survey command were used to properly account for the survey sample design. The

model was estimated with the national sample using several constructs of the variables of interest along with demographic controls.

1. Results

Table 18 shows the inputs for the regression model. The output from the model had an R^2 of 77.34%, is presented in to family health spending that is 134%, 142%, and 143% higher than the reference group.

Upper income family types VG/Upper, G/Upper, and BA/Upper had log-FHSP that were greater than the reference group by .97, .94, and .90 respectively. In percentage terms, those differences correspond to family health spending 164%, 157%, and 148% higher than the reference group. One curious and unexpected result is that within the upper income groups the families with very good health had the highest spending. Absent other factors, the research hypothesis in this study would have predicted that the highest health spending family type would be those with higher incomes and below average health. The regression coefficients for number of chronic conditions was .019, corresponding to 1.98% higher health spending for each additional chronic illness reported within the family. This effect was statistically significant to $p < .001$. Similarly, as family income increased as a percentage of FPL, family health spending was higher. The coefficient for income (as a % FPL) corresponded to an increased log-FHSP of .007 for every 100% FPL increase, or 7% higher family health spending. This result was also statistically significant to $p < .001$.

Table 20: Log Linear Survey Regression Results. The first independent variable of interest is the family type variable with 9 levels, representing families with different health-income combinations as categorically different groups. The coefficients for the effects of each family type are consistent with the preliminary arithmetic results in the descriptive report on the MFE profile indicators earlier in this chapter.

In the regression model, low-income families with very good health, that is no chronic conditions were the reference group. Holding other factors constant, compared to VG/Lo families, low income families with good health, that is one or two chronic conditions, returned a log-family health spending that was .09 higher. That increase corresponds to family health spending 10.1% higher than their counterparts with zero chronic illnesses reported in this study, but the difference was not statistically significant to less than $p=.01$. For low income families with three or more chronic conditions, considered below average health in this study, the increase in log-FHSP over the reference group was .22. That corresponds to family health spending 25.2% higher than the reference group, and that result was significant to $p=.001$.

Regression coefficients for the three middle income family types and the three upper income family types were all significant to the $p=.001$ level. Middle income families with very good or below-average health, had log-FHSP that was .85, .886, and .888 higher than the reference group, respectively. Those regression

coefficients correspond to family health spending that is 134%, 142%, and 143% higher than the reference group.

Upper income family types VG/Upper, G/Upper, and BA/Upper had log-FHSP that were greater than the reference group by .97, .94, and .90 respectively. In percentage terms, those differences correspond to family health spending 164%, 157%, and 148% higher than the reference group. One curious and unexpected result is that within the upper income groups the families with very good health had the highest spending. Absent other factors, the research hypothesis in this study would have predicted that the highest health spending family type would be those with higher incomes and below average health. The regression coefficients for number of chronic conditions was .019, corresponding to 1.98% higher health spending for each additional chronic illness reported within the family. This effect was statistically significant to $p < .001$. Similarly, as family income increased as a percentage of FPL, family health spending was higher. The coefficient for income (as a % FPL) corresponded to an increased log-FHSP of .007 for every 100% FPL increase, or 7% higher family health spending. This result was also statistically significant to $p < .001$.

Table 20: Log Linear Survey Regression Results

Number of observations	10,383
Population size	104,618,291
R-squared	0.7734

Ln(Household Health Spending)	Coef. β	t	P> t 	% Change FHSP ($e^{\beta} - 1$) x 100
Family Characteristics				
Family Type (vs Very Good Health, Low Income))				
Good Health, Low Income	0.097	1.38	0.167	10.18%
Below Avg, Health Low Income	0.225	3.24 **	0.001	25.23%
Very Good Health, Middle Income	0.851	18.36 ***	0.000	134.18%
Good Health, Middle Income	0.887	18.74 ***	0.000	142.78%
Below Avg, Middle Income	0.888	16.44 ***	0.000	143.14%
Very Good Health, Upper Income	0.974	19.92 ***	0.000	164.84%
Good Health, Upper Income	0.947	19.08 ***	0.000	157.82%
Below Avg, Health, Upper Income	0.909	16.34 ***	0.000	148.09%
Insurance Status (vs. Uninsured)				
Public Only	-0.462	-9.04 ***	0.000	-36.97%
Some Private	1.343	34.42 ***	0.000	283.03%
Full Private	1.574	42.47 ***	0.000	382.64%
Chronic Illnesses	0.020	3.85 ***	0.000	1.98%
Family Income %FPL	0.001	24.85 ***	0.000	0.07%
Demographics				
Family Size	0.202	36.86 ***	0.000	22.36%
Root- Age Head of Household (HOH)	0.026	2.49 *	0.013	2.65%
Education (HOH)	0.031	9.05 ***	0.000	3.10%

Significance at * $p < .05$, ** $p < .01$, *** $p < .001$. Source: Nov30.log line7309, authors analysis.

The next research variable of interest was Insurance Status, in which all categories showed statistically significant results at the level of $p < .001$. Compared to the uninsured (the reference category), respondents with public insurance only had a log-FHSP that was .46 lower than the uninsured, which translates to 36.97% lower family spending on healthcare. Families with private insurance for part of the family or part of the year had a log-FHSP 1.34 above the uninsured, corresponding to 283% higher health spending. Fully private insurance showed a log-FHSP 1.57 higher than the uninsured, which corresponds to family health spending 382.4% higher than the uninsured. These results are consistent with the research hypothesis and observation of the descriptive data that families with private health insurance spend more, not less, on health care. This additional spending includes insurance premiums, most of which is paid to health plans directly by employers (and partially in lieu of wages) , and it also reflects the higher out-of-pocket spending on medical care that the insured can avail themselves of more easily than the uninsured.

Demographic factors also showed effects on family health spending. Family size was associated with higher spending on healthcare. As family size increased by one, the log-FHSP increased .2018, which corresponds to 22.36% higher family health spending. Age and education of the head of family also had a modest, but statistically significant, effect on log-FHSP. Race of head of family was significant. Compared to responding families where the head of family was white (reference group), families with a black head of family showed a log-FHSP .234 lower, which corresponded to 20.85% lower spending on healthcare. That result was significant to $p < .001$. Asian head of family resulted in log-FHSP .0705 lower than the reference

group, which corresponds to 6.81% lower annual family health spending with significance level $p < .05$. The effects of the other categories of race, were not statistically significant to the $p = .05$ level compared to the reference group.

The state level characteristics were considered for inclusion in this regression were chosen based on findings in prior research on health spending and costs at the state level. Variables were retained for the model based on preliminary review of correlations with the dependent variable and independence from other variables in the study. Overall, the state-level variables available in this study did not result in a sizable effect on comprehensive FHSP, when considered with the other variables of interest. A 100-point increase in the state Gini coefficient had a coefficient of $-.0109$, corresponding to just a 1.08% lower average family health spending in the state. The state Gini index returned a regression coefficient with a statistically significant p -value of $.038$. An increase of $.10$ in Gini was associated with a $.173$ decrease in the natural log of family health spending. Other state level characteristics associated with lower family health spending were being in a Medicaid expansion state ($-.109$ lower $\ln$ -family health spending), higher proportion of population under 65 years old uninsured ($-.0036$ lower for each percentage point increase), the number of insurance companies serving the large group market ($-.0154$ lower $\ln$ -family health spending for each additional insurer in the state market), and regional pricing levels ($-.0050$ lower $\ln$ -family health spending for each increase in RPP). State variables associated with higher family health spending were Per capita disposable income ($.006$ higher $\ln$ -FHSP for every \$1000 more disposable income); cost per hospital inpatient day ($.015$ higher $\ln$ -FHSP per additional \$100 daily hospital cost); and,

residing in a state preparing for a state-run exchange was associated with an increase of .0025 in the ln-FHSP. Both the Medicaid and State Exchange variables represent political culture in this study because, as of 2010, these policies were newly-enacted law and yet-to materialize in a concrete way in the markets for public and private health insurance.

2. Regression Diagnostics

A plot of the residuals versus predicted values for this model exhibited heteroskedasticity at the lower range of income. This result is consistent with a theory of underconsumption of services, higher incidence of medical debt and/or low rates of private insurance coverage among lower income families, both of which would lead to lower than expected health spending. The variance inflation factor for the variables in this model averaged 2.42, indicating that multicollinearity is not a problem in this study.

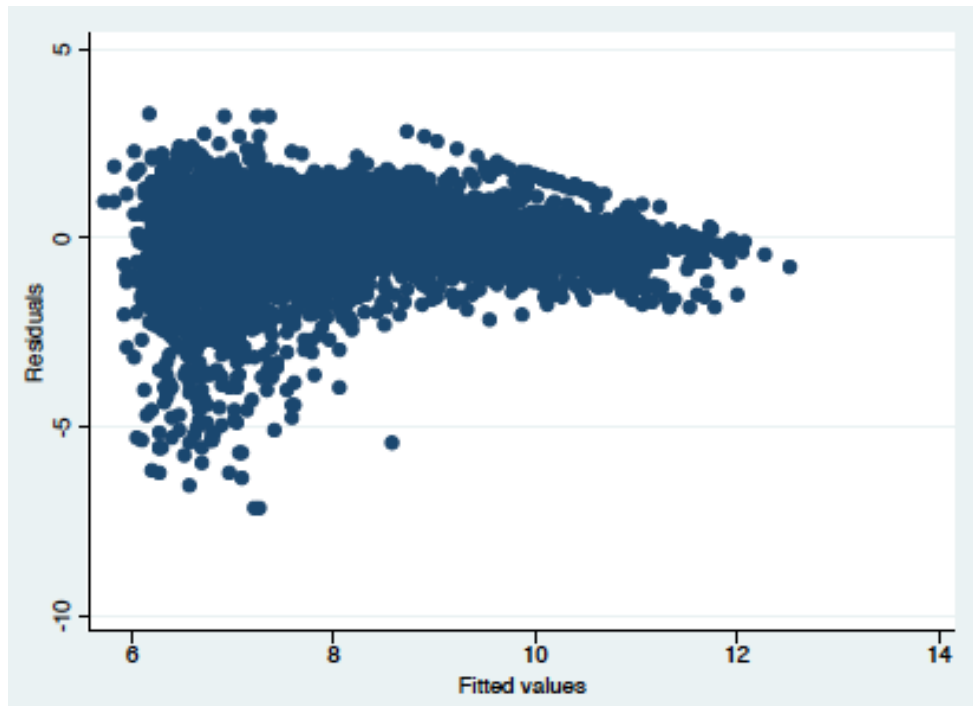


Figure 15: Residuals vs. Fitted Values of Ln(Family Health Spending)

Table 21: Research Questions and Results

Sub-Questions	Results
1.0 In 2010, was the level of total family health spending (and its components) by family type for 2010 lower for insured families compared to uninsured families?	The estimated level of health spending among non-elderly families with public insurance was lower than that of families without insurance, but the finding was not statistically significant at the $p=.05$ level across the 9 family types. Conversely, the estimated health spending for families with private insurance was more than the estimated family health spending by uninsured families. The findings were statistically significant across all 9 family types.
1.1 In 2010, was the burden of family health spending (and its components) by family type lower for insured families compared to uninsured families?	The estimated burden of family health spending was generally lower families with some public insurance than for families who were uninsured, but that result was significant at the $p<.05$ level for only one of the nine family types. Across all family types, the estimated burden of family health spending was higher for families who had private insurance all year when compared to that of families without insurance. That result was observed for all nine family types and was significant at the $p<.001$ level.
1.2 In 2010, was the variability of family health spending (and its components) by family type lower for insured families compared to uninsured families?	Comparing variability of health spending between low and middle income uninsured families and families with some public insurance did not reveal a clear pattern that supports the hypotheses that families with some public insurance enjoyed lower variability in health spending. For upper income families with some public insurance, variability was lower than for families without insurance. Privately insured families across all income and health levels did have lower overall variability in their health spending level compared to uninsured families.

Sub-Questions	Results
1.3 In 2010, was the risk of excessive or catastrophic levels of family health spending (and its components) by family type lower for insured families compared to uninsured families?	For low-income family types, the proportion of families with catastrophic health spending (40% of income) was smaller with some public insurance compared to low-income families without any insurance. A larger proportion of privately-insured families had health spending at 40% of their annual income. Even excluding tax and employer premiums, families with private-health insurance spent more. The proportion of families with Visible Family Health Spending (Out-of-pocket and Employee Premiums) in excess of 20% of income was higher for privately insured families than uninsured families of comparable health for every family type.
1.4 Are there states where families experience Extreme Out-of-Pocket expenditures that are double the level predicted for their family type and insurance status?	The combination of family type, insurance, and relevant state-level characteristics results in widely divergent levels of out-of-pocket health spending. In 2010, there were 5 states in which the estimated mean OOP for low-income uninsured families were double the level predicted by this model. Low-income privately-insured families in 3 states exhibited Extreme Out-of-Pocket expenditures.
2.0 Is the effect of insurance status on family health spending greater than the effect of family type (as defined by health and income)?	The effect of insurance status is significant across the entire study population. The association between family type and health spending will be greater in magnitude and in statistical significance than the association between insurance status and health spending.

Table 22: MFE Indicators of Families with Public Insurance Compared to Uninsured Families

Family Types	Access	<u>Burden</u>		Varia- bility	Total> 20%	<u>Risk</u>	Total > 40%
		Total	Visible			Visible > 20%	
Low Income							
Very Good Health							
Good Health							
Below Average Health							
Middle Income							
Very Good Health							
Good Health							
Below Average Health							
Upper Income							
Very Good Health							
Good Health							
Below Average Health							
Legend:  Worse, Significant  Worse, but not Significant  Inconclusive  Better, but not Significant  Better, Significant							

Table 22 summarizes the results comparing the several indicators of medical-financial security of families with some public insurance compared to their uninsured counterparts. A chart full of solid blue markers would illustrate that in 2010, public insurance reliably improves medical-financial experience. The summary does suggest that for low-income families, the system of restricted access to public insurance based on eligibility requirements (age, disability, income) is a

benefit to their medical-financial security, but the improvements are not robust when looking at the entire group. For middle income families, the pattern of results cannot be explained by the data in this analysis. For several indicators, the MFE results did not improve for families with public insurance compared to being uninsured. For upper income families, the results are inconclusive largely due to the fact that the sample of upper income families in this data set with members eligible for Medicare or Medicaid was too small to use for meaningful analysis.

The corresponding summary comparing the MFE profile of Privately-Insured families to uninsured families shows a more distinct pattern. Table 23 shows the entire MFE profile of privately-insured families compared to uninsured families. Defining medical-financial security as access to care without financial hardship, these results suggest that families with private insurance had more access to care, but they achieved that access at great cost. With private insurance, the burden of paying for health care was generally higher, as was the likelihood for allocating excessive share of income to paying for health. This study was not designed to adequately deconstruct how much of the incremental burden was due to differential pricing paid to reimburse providers by private insurance plans, which would include some cost-shifting to compensate for patients unable to pay for services received. Privately insured families did appear to enjoy greater predictability of health spending relative to their uninsured peers.

Table 23: MFE Indicators of Families with Private Insurance Compared to Uninsured Families

Family Types	Access	Burden		Varia- bility	Total> 20%	Risk	Total > 40%
		Total	Visible			Visible > 20%	
Low Income							
Very Good Health							
Good Health							
Below Average Health							
Middle Income							
Very Good Health							
Good Health							
Below Average Health							
Upper Income							
Very Good Health							
Good Health							
Below Average Health							

Legend:

 Worse, Significant

 Worse, but not Significant

 Inconclusive

 Better, but not Significant

 Better, Significant

V. DISCUSSION

A. Research Objectives

ACA reform provisions were developed and sequenced with an explicit goal of improving Americans' access to health care and in response to national alarm about unsustainable and destabilizing cost growth of insurance and health care. Implicit in the process was the assertion that health insurance is a necessary prerequisite to access and to avoiding financial ruin in the event of severe illness. This dissertation sought to explore the relationship between medical-financial experience for non-elderly families of varying income and health levels. Specifically, the analysis in this dissertation evaluated whether families with insurance had a better medical-financial experience than families without insurance in 2010, the outset of major health care reform.

Insights gleaned from prior literature inspired three features in the design of this study. First, I developed a comprehensive model to estimate family spending on health. Second, I segmented the non-elderly families in the 2010 MEPS survey sample into groups based on characteristics correlated to their health spending. Finally, I articulated an expansive profile of MFE. Better MFE involves increased access to beneficial medical care, with the same or a lower cost burden, with improved predictability and without risk of catastrophic costs. The construct of MFE developed and employed for this dissertation encompassed traditional concepts of burden and catastrophic risk, and it was also extended to include measures of variability and extreme out-of-pocket spending. Measures of patient financial

acumen and decision-making were beyond the scope of the data used for this analysis but are also an essential part of the construct of MFE envisioned for this study.

B. Research Findings

These study results are in line with prior research data showing an upward trends in health spending going back the past 50 years. The application of statistical tests to comparisons of spending levels between subgroups anchors this study results in economic theory and earlier empirical studies that demonstrate that chronic illness, income, and insurance status have a positive effect on health spending. This study extends this conclusion by providing an estimate of the relative magnitude of the structural differences attributable to each factor. In this study, the effect of income outweighed the influence of health. Insurance status had a more sizeable effect than health or income alone.

In this study, the positive association between insurance (both public and private) and access to medical care, as quantified by medical expenses, was both strong and sizeable. This positive association is consistent with findings of earlier studies such as the landmark RAND Health Insurance Experiment¹²⁷ and the more recent Oregon Medicaid Experiment¹²⁸. This result was observed across all income and health levels, with a high level of statistical significance. The data in this study

¹²⁷ Manning, 1987.

¹²⁸ Baicker et al, 2011.

suggest a stronger influence of insurance on consumption levels among low and middle-income families than on upper income families.

The results of estimating family health spending are consistent with the prediction that total family health spending will be higher for families with incomes on the higher end of the scale, for families with more chronic illnesses, and for families with private insurance coverage, when compared for families with lower incomes or families without insurance. The lower level of medical care utilization by uninsured and lower income families, the higher rates of insurance coverage among higher income families, and the income tax scheme combine to create a very stark contrast in the way different families experience the costs of healthcare and the consequences of those costs. For some, high costs and/or lack of insurance result in family members unable to access necessary medical care. For other families, unseen or prepaid costs and cross subsidies through insurance or taxes, result in contributions to healthcare spending up to 10 times what they see and spend out-of-pocket.

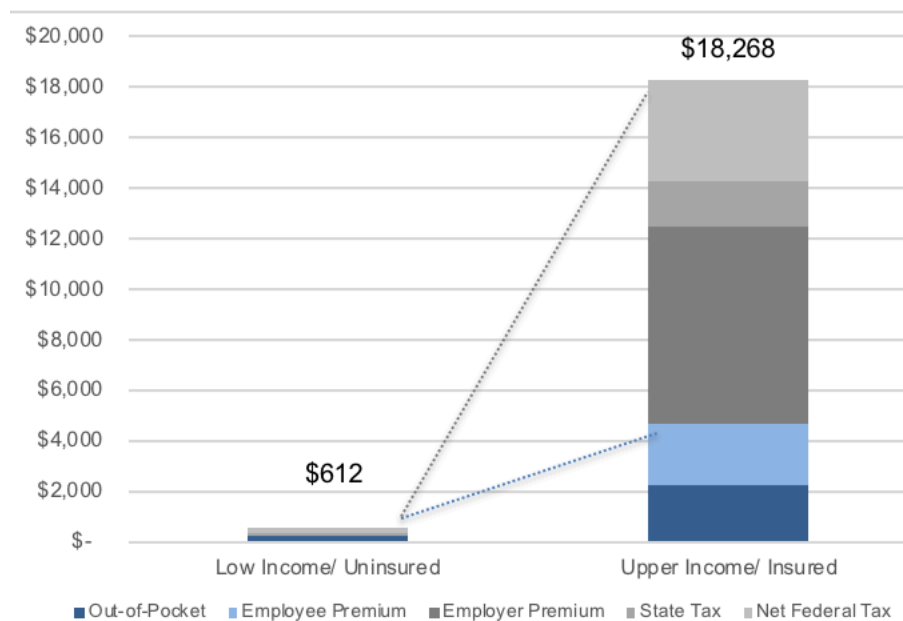


Figure 16: Family Health Spending (Selected Family Subgroups)

This provides a perspective on a possible contradiction between which families are likely to recognize their risk and which ones are vulnerable or are incurring sizeable opportunity costs from the financial burdens of healthcare but may not know it.

C. Indicators of Medical-Financial Experience

1. Burden

The first MFE indicator evaluated was Burden, total family health spending as a percentage of income (including employer-paid insurance premium and public assistance). Ceteris paribus, lower burden would be considered preferable. In 2010, the average burden for families who only had public health insurance was lower than the average for families with no insurance in eight of the nine family

types, but that result was not statistically significant. Privately insured families had an average burden higher than the average for uninsured families across all family type categories. That result was significant, for all family types. These estimates in this study are in line, or on trend, with prior literature on financial burden in health . For the sample in this study, overall burden of family health spending for non-elderly families averaged 19.9%. This study estimated burden in 2010 at 21% for privately-insured families with at least three people as a comparison to the earlier study by Auerbach and Kellermann¹²⁹ that included an estimate of median spending at 17% for 2009 (published in 2011 using unspecified data sources). Compared to Blumberg et al.'s¹³⁰ estimate of 8.9% median health spending exclusive of tax payments, this study estimated by Blumberg et al. (published in 2014 using MEPS data). Average burden of health spending for out-of-pocket and premiums was 15.4% in this study, compared to a median burden of out-of-pocket and premiums reported by Blumberg et al. (2009 MEPS data) at 8.9%. However, the results in this study offer a more specific view which is more descriptive of specific subpopulations and offers context for how characteristic of health, income, and insurance status contribute to the medical-financial experience of non-elderly families. A surprising result that merits further investigation was that average visible spending (out-of-pocket spending plus employee-paid premiums) was greater for privately-insured families than for uninsured families of comparable

¹²⁹ Auerbach and Kellermann, "A Decade of Health Care Cost Growth," 2011.

¹³⁰ Blumberg, et al., "Trends in Health Care," 2014.

health and income. Accordingly, this study illuminates the increased financial burden associated with health insurance at the premium levels prevailing in 2010. The research estimates the disparate magnitude of that incremental burden on low- and middle- income families. The group with the highest total burden, low-income families with three or more chronic illnesses and private insurance, had an average burden that was six times that of their counterparts within the upper income group with comparable health and insurance. It is left for future investigation and research to inform insurance design to apportion the higher total spending observed for insured families and the increased visible spending between pricing, utilization, cost-shifting, or something else entirely.

2. Variability

The next MFE indicator evaluated in this study was variability, measured as the standard deviation of health spending divided by the average health spending. Lower variability would be considered easier to predict, plan for, and manage. The results of this study were that five of the nine family types had improved variability of health spending with public insurance only, with no discernable pattern across income or health levels. For low-income families who were uninsured or had only public insurance, variability of total health spending meant their expected annual outlay could be expected to vary more than 100% from the estimated average.

Accordingly, this study does not support a conclusion that public insurance with the eligibility restrictions in effect in 2010 reliably improved the variability of family health spending. This result was most pronounced for low-income families and was

also sizeable for middle income families, with variability for uninsured low- and middle- income family types exceeding 50% around the average. The variability of total family health spending was lower for families with private health insurance, and this was observed for all nine family types. For privately-insured low- and middle-income family types, observed variability was below 50% for all except one group. This benefit of insurance reported in isolation is misleading because this improved predictability achieved by prepayment of a majority of health care costs through insurance premiums including employer-paid premiums (in lieu of wages or other compensation), which is simultaneously associated with higher spending overall. The analysis in this study does not provide specific insight to deconstruct the drivers behind the increase in spending, but some combination of increased access to care or service utilization levels, differential pricing, and cost-shifting between risk groups are possibilities that come immediately to mind based on prior analyses of health care costs. This variability indicator was an innovation of this study, so I have no prior health services research literature to directly compare findings.

The importance of unpredictability in health spending, both as a barrier to getting needed care and as a destabilizer for family finances was highlighted in prior research in Hacker et al's Economic Security Index¹³¹ and several studies by the

¹³¹ Hacker, Jacob S., Gregory Huber, Austin Nichols, Philipp Rehm, Mark Schlesinger, Robert G. Valletta, and Stuart Craig. The Economic Security Index: A New Measure for Research and Policy Analysis. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, October 27, 2012.

Commonwealth Fund¹³², which regularly reports on the percentage of families who forego needed medical care due to costs or who carry medical debt for more than a year. The high variable nature of health spending, which would be experienced at enrollment time and potentially with each encounter with a medical provider requiring an out-of-pocket expenditure suggests that as of 2010, improving predictability or improving families access to financial reserves for unplanned expenses was crucial to achieving a goal of medical-financial security and to minimize families foregoing needed medical care due to their inability to pay unexpected costs.

3. Risk of Excessive or Catastrophic Spending

Risk of Extreme (or Catastrophic) Spending was another MFE indicator explored in this study. Prior research comparing the U.S. to other nations, and using data from 2003 and 2004, showed that the U.S. was one of the rare industrialized nations with more than .5% of the population incurring catastrophic levels of health care spending. The results of this study suggest that the problem of extreme or catastrophic health spending had worsened by 2010. In 2004, Waters et al.¹³³ reported more than 25% of low-income families with chronic illness had total health spending (in excess of 10%). In this study of families in 2010, more than 25% of low-income families with at least one chronic condition had health spending in

¹³² Schoen, Cathy, Michelle M. Doty, Ruth H. Robertson, and Sara R. Collins. "Affordable Care Act Reforms Could Reduce The Number Of Underinsured US Adults By 70 Percent." *Health Affairs* 30, no. 9 (September 1, 2011): 1762–1771.

¹³³ Waters, et al., "Measuring Financial Protection," 2004.

excess of 20%. Low-income families with some public insurance exceeded the 20% of income spending threshold more than 10% of the time.

4. Extreme Out-of-Pocket Spending

The final MFE indicator reported in this study explored geographic extremes in out-of-pocket spending for low-income families, considered most immediately vulnerable to relatively small financial shocks or at risk to forego medical care due to costs. The results revealed a list of states where average out-of-pocket spending was double the level that might be predicted by a national model of health spending using family type (health and income), insurance status, and selected state-level characteristics. The results from this analysis, with the MEPS dataset, must be interpreted with extreme caution, for multiple reasons. First, the MEPS data only purports to be representative for 29 of the 50 states. Second, health care pricing may follow markets defined by geographies smaller than entire states, or that cross state boundaries (i.e., the Washington, DC metro area, including northern Virginia and Maryland). With those limitations noted, the results in this study suggest that 4 states (Virginia, Washington, Colorado, and Florida) merit a closer examination of out-of-pocket spending by uninsured families. Out-of-pocket spending in California, Washington, and Georgia emerged as outliers for low-income families with private insurance. Such further exploration should seek to understand the specific drivers of and consequences of extreme out-of-pocket spending as observed in this study. The insights gleaned would be instructive beyond the specific markets examined if it could illuminate the relationship between insurance design, consumer decision-

making, and medical outcomes in addition to the medical-financial outcomes of direct interest in this study.

D. Health Insurance and Financial Security

The overall results of the analysis suggest that the enhancements to MFE associated with insurance as of 2010 were mixed. In the case of public insurance, I assert that this is because the eligibility limits for people to access Medicaid in 2010 was far more restrictive than the need, both in terms of the income thresholds and because childless adults were categorically eligible in only a minority of states. For private insurance, the impact of health insurance on MFE is fraught in three ways as seen in this study: 1) prevailing premiums that were high relative to median income, 2) average out-of-pocket spending that was higher, not lower, than uninsured families with in comparable income or health categories, and 3) out-of-pocket costs that were highly unpredictable with our without insurance. It was from this baseline that the ACA launched a series of initiatives that prioritized reducing the number of uninsured Americans through more generous Medicaid eligibility, requirements that insurance companies eliminate annual or lifetime caps on benefits, and mandating insurance coverage for nearly all Americans.

E. Prospects For Medical-Financial Security Through Health Policy Reform

Jonathan Oberlander (2012) described the era of health reform implementation circa the passage of Affordable Care Act as a "crossroads"¹³⁴ for health policy.

¹³⁴ Oberlander, "Unfinished Journey," 2012.

1. Affordable Care Act Provisions

Implementation of the 2010 law and the ongoing policy debates it launched will continue the pattern of incremental policy change and will reshape the medical-financial experience of American families over the next several years. In many ways, the new law will improve the medical-financial experience of millions of American households. More people have public insurance coverage, the cost of employee-paid insurance premiums will be contained within a statutory threshold percentage of income, people who buy insurance on the non-group market are eligible for income-based subsidies to limit their exposure to insurance premiums, the risk of catastrophic medical spending will be reduced through caps on out-of-pocket spending, and annual and lifetime coverage limits will be phased out.

Some financial relief will accrue to millions, but the gains will not be universal. Unless or until the ACA or other cost and quality initiatives successfully reduce wasteful, unnecessary, or harmful care, or other efforts successfully reduce preventable illness, the ACA financial protections offered to poor, or medically-needy, patients must be paid for with yet higher contributions to health spending. The question of how much or whether the health policy reforms launched in 2010 through the ACA will eventually reduce per capita health care spending or public spending per taxpayer remains open.

In isolation, the ACA initiatives resulting in increased insurance coverage cannot be expected to decrease overall financial burden or risk of extreme health spending at the 20% of income threshold. On the contrary, the analysis in this study

would suggest that low- and middle-income families who were at risk for destabilizing medical-financial outcomes before the ACA would still be in danger until a subsequent wave of reform took effect with meaningful reductions to the cost of medical care delivery, incentives and tools to empower families with the financial resources and acumen to manage their health, and health spending using sophisticated insurance products with value-based benefits design, or health-savings accounts. Another reason the ACA was unlikely to systematically improve MFE for most Americans is that it left the structural contours of health care financing largely unchanged. For the most part, employer-sponsored health care remained in place after ACA implementation. Rather, the first wave of ACA reforms might be described as a pragmatic approach to towards universal health coverage in America, within the then-existing structures of health-care finance. The data in this study supports predictions that have since begun to materialize that per capita and overall health costs would increase albeit more slowly than without ACA limits on premiums and insurance medical-loss ratios. This study further predicts that absent subsequent reforms that directly address the prevailing cost of medical care relative to family income, the financial insecurity in health will extend to families at ever higher levels on the income scale. Finally, the process of conducting this research using data available for 2010, revealed limits to policy-makers ability to articulate appropriate benchmarks for health spending adequate to maintain or improve health status in a way that recognizes and distinguishes high-value vs. low-value care.

2. Additional Health Policy Imperatives

Based on the analysis in this study, there are several remaining policy next steps that would enhance medical-financial security for the broadest number of American families and maintain access to medical care at the same time.

- Extend cost-sharing and premium protections to families with employer-sponsored insurance plans.
- Use income tax rules to realign the incidence of health spending towards a more equal burden across income groups.
- Redefine affordability to limits on out-of-pocket and employee premiums together.
- Revisit essential benefits, using value-based design principles, and the findings of early ACA comparative effectiveness research to encourage the use of high-value services that achieve the most health for a family's available resources.
- Create policies to support successful use of cash reserves and health-savings accounts. Such policies would need to go beyond tax existing incentives to also include counseling and advisory services when people are budgeting and planning, when treatment decisions are pending, and on how to restore cash reserves after a costly health event depletes a family's available reserves.

- Incorporate assessment of environmental and social determinants of health to federal and state health policies as an approach to improving the overall financial burden of health and MFE.

F. F. Opportunities For Future Research

1. Further Refining Models Of Family Health Spending

The strength of the model in this study depends on how accurately FHSP can be estimated using family characteristics and the available input parameters that define spending on healthcare through insurance and through tax payments. The existing data used in this study serves as a starting point for such a tool. The limitations of the existing data suggest a set of refinements that would ideally be included to add precision and sophistication to the analysis of FHSP going forward, either with modifications to existing microsimulation tools or through the creation of a new modeling tool. Survey data such as MEPS could be used to check and update model parameters periodically over time as policy changes and market conditions evolve.

a. Additional Variables

More precise estimates of family types and characteristics that are influences on family health spending but are unobserved in this study would refine the assessment of the relationship between MFE indicators and independent variables in this study. Examples of more granular information that would enhance the sophistication of the family health spending estimate are as follows: geographic characteristics measured at a more local level, more complete data on health status

- to include major accident or injury in addition to the priority chronic health conditions, and variables on the type of health plan, to better recognize the role of the health plan design on spending, out-of-pocket payments, information on recommended but unused medical care.

b. Improve Model Parameters on Tax Payments.

The precision of the estimates of family health spending in this model would be improved if a more sophisticated tax simulation model had been used to estimate the contribution to health spending through federal and state taxes. Tax-related provisions of the Affordable Care Act would be important to capture in any estimate of FHSP from 2014 going forward. It is unclear whether the additional precision in individual estimates would change the direction or magnitude of the study results in a particular way, but the validity of the estimates of the incidence of health spending through tax payments should be tested against a robust tax simulation tool to correct for, or at least understand any systematic bias that may be introduced in this tool from the use of marginal federal tax rates and estimates of state tax burden as the sole source of estimating health spending through tax payments.

Given the reliance on modelled data for major components of spending in this study, the MFE profile indicators are not well suited to replace any surveys aimed at accurately reporting the levels of family spending in any given year. Rather, this profile is best in understanding the dynamics and relative influence of the many factors that affect spending and how those factors impact differently based on family characteristics.

2. Extending the Measurement of Medical-Financial Experience

The vision of an MFE profile described in Chapter III of this study includes 2 indicators of family capacity to act in their own best interest regarding their medical-financial experience. Adding a measurement of additional family characteristics and resources would ensure that they are able to exercise agency over their health spending and the resulting medical-financial experience. Family head of household's level of education is currently included, but it is likely an imprecise measure of the survey respondents' ability to discern and/or appreciate the complexity of the financial implications of the decisions they make regarding their medical care. Similarly, Head of household's education may not be a good indicator of the family's ability to shop for high-value medical treatments or to reserve and manage cash for unplanned expenses like out-of-pocket medical costs.

3. Measuring the True Dollar Value of Medical Services Used and Services Forgone

Medical expenses reimbursed is the best available proxy for the amount of medical care consumed, but it is a weak proxy. The MFE profile will be dramatically improved upon availability of a valid estimate of the amount of care or services families consume and a means to link that consumption to real medical outcomes. Only then will any attempt to describe value from health spending and establish reasonable targets for burden and risk be useful in a holistic or comprehensive way. In the grand scheme of family financial security, the entirety of health spending must be examined compared to the opportunity cost of that spending (at the family, company, and country levels). This inability to understand how much spending is

appropriate based on benefits to health, as well as opportunity costs and tradeoffs, inhibits the use of this or any other measure of financial burden of health that is disconnected from an understanding of the underlying medical needs and how well those needs were met. We can estimate the level and patterns of spending but continue to fall short in determining how much of available family resources we “should” invest in each family’s own health care or should contribute to public investments in medical care for our fellow citizens. This estimate should also appreciate that lower spending can also reflect underconsumption of medically-necessary or recommended preventive care services such that the objective function for any health spending optimization model must be to minimize cost, subject to constraints of achieving satisfactory access to care and/or health status.

4. Distinguishing Medically-Necessary Vs. Discretionary Medical Care

Some limitations will remain difficult to overcome in any large-scale data analysis of health spending. In healthcare, as with any other good, families consume essentials and some consume luxuries. Ideally, an analysis of health spending that compares the consumption behavior of upper- and lower- income families experiences should exclude truly discretionary or luxury services before making any comparison. The assessment would have to be determined using a complex algorithm that could distinguish between cosmetic and reconstructive services, or concierge or convenience services, that would not reasonably be included in a standard or benchmark bundle of essential medical care.

5. Incorporating Consumer Behavior and Insurance Design

Having demonstrated that insurance status is the single largest driver influencing average health spending, the analysis in this research reinforces the question of how to use insurance design to improve customer and patient decisions towards better health outcomes and better financial outcomes for their own family and for the country overall.

G. Conclusion

This dissertation was motivated by a curiosity about the recent interplay between health care policy and medical-financial security at the heart of the debate that resulted in the passage of the ACA. I attempted to expand our understanding of the household financial challenge, both in magnitude and in character, as broadly experienced by different types of families. This research study seeks to contribute a useful description of medical-financial experience that responds to gaps in prior research approaches to evaluating financial burden in health. By developing and employing a multi-dimensional profile of indicators, this study explores an assertion implicit in the ACA launch: that health insurance improves medical-financial security. In so doing, the analysis examines medical-financial experience connected to observable characteristics (health, income, insurance status, geography) that should be considered when policy goals are established and policy effectiveness is evaluated. The results of this study demonstrate that insurance can improve access to care and predictability of overall spending—as desired by risk-averse health care consumers. At the same time, the additional cost represents additional financial

exposure. This is particularly true while prevailing costs (directly for insurance and medical care, and indirectly contributing to public spending through tax payments) relative to median family income remain untenably high as observed in 2010 and as is still true in 2019.

While the results of this study do not demonstrate a compelling correlation between health insurance and all elements of medical-financial security as of 2010, I do not conclude from this analysis that the fundamental assertion underlying sequencing of the ACA provisions was wrong. There were financial protections built into the new law, such as caps on premium growth, limits to cost-sharing exposure. Individuals who gained Medicaid coverage could certainly anticipate a better medical-financial experience in addition to greater access to medical care. Rather the results of this study underscore the limits of expanded insurance coverage alone as an instrument of medical-financial security. Privately-insured families, whether with employer-sponsored coverage, or with non-group coverage purchased through the subsidized exchanges, stand to benefit from the limits which prevent the most severe financial liabilities, but within the ACA limits, millions will still be underinsured, and at risk for making choices to get medical care if or when they have cash, rather than when they need care. Millions of citizens the ACA intended to benefit from expanded Medicaid coverage were delayed or still do not enjoy eligibility, due to decisions by their individual states not to participate in Medicaid expansion. Much more remains to be done. Financial security in health will require solutions in addition to expanding health insurance coverage through the existing

vehicles of employer-based health plans, categorically selective public insurance, and highly-subsidized premiums in the market for non-group health insurance.

Similarly, comprehensive measurement tools and metrics, broadly reported and understood, are a necessary, but not sufficient, component in the way forward. Tackling several dueling health policy goals—access to care versus financial security; universal coverage and choice versus fiscal restraint; a market-based system wholly dependent on public subsidy; and, communal expenses versus a system with more overt centralized influence over access, utilization, and pricing—remain unfinished work for America’s health policymakers. At the same time, it is unlikely that the solution to the dilemmas in health policy can be resolved irrespective of larger concerns over demographic cycles, disparities in social determinants of health, income inequality, and a dearth of personal financial acumen. America’s policymakers have yet to resolve the clash that have resulted in policy that treats health care as a public utility and a discretionary good at the same time. Absent such resolution, it is difficult to set targets for how much of a family’s resources, or America’s resources, should be invested in medical insurance or medical care.

Uwe Reinhardt (2013) described this challenge of balancing health care costs and household income as the primary challenge of U.S. health policy. "This central political dilemma in American health policy - leave health care to those who can afford it or increase tax revenues to broaden coverage - will continue as far as the

eye can see"¹³⁵. We have a choice to reframe the central policy challenge, if clear-eyed analysis can be applied to the policy reform process. Until the health value, total cost and opportunity costs of medical care and health insurance relative to income are broadly understood, and more directly managed, the end of the road toward a sustainable, positive medical-financial experience for all American families will remain out of sight.

¹³⁵ Reinhardt, Uwe. "The Central Challenge In U.S. Health Policy".
<https://economix.blogs.nytimes.com/2013/08/30/the-central-challenge-in-u-s-health-policy/>

APPENDIXES

Appendix A: History of Federal Health Insurance Reforms

Federal Health Insurance Reforms

With Direct Impact on Medical-Financial Security

Year	Description
1940s	1942: Tax deduction created for extraordinary medical expenses in excess of 5% of adjusted gross income (AGI). Revenue Act of 1942. Initially intended to be temporary, the deduction would never be repealed. 1943: Employer-sponsored insurance (ESI) benefits exempted from wage controls 1946: Hospitals required to provide a reasonable amount of charity care in exchange for construction/building expansion funds
1950s	1954: ESI expenditures excluded from taxable income; the threshold for medical expense deduction lowered to 3% of AGI; cap doubled 1956: Govt. insurance added for dependents of members of armed forces
1960s	1960: Federal Employees Health Benefit Plan (FEHBP) created 1960: Federal funding allocated to state medical programs for elderly and low-income citizens 1965: Federally-funded Neighborhood Health Centers created in poor and medically-underserved communities 1965: Medicare Parts A (hospital care) and B (optional physician care) created; Medicaid created for families receiving cash assistance (26 states participating in the inaugural year) 1967: Medicaid categories expanded beyond families receiving cash assistance; preventive care benefits added to Medicaid (EPSDT)

Year	Description
1970s	By 1971: 48 states had joined the Medicaid program 1971: Limits imposed on increases in physician and hospital charges 1972: States required to offer Medicaid to SSI (disabled) residents 1972: Medicare benefits extended to non-elderly with end-stage renal disease, with a two-year exclusion period 1973: Employee Retirement Security Act (ERISA) regulates employer sponsored health plans 1974: State of Hawaii requires employers to provide health insurance for employees working at least 20 hours/week 1974: ERISA creates exemption for self-insured employers from state regulations such as mandated benefits; employers mandated under Hawaii's new plan exempted from ERISA
1980s	1981: Additional payments required to hospitals serving a disproportionate share (DSH) of low-income and Medicaid patients; states newly allowed to set Medicaid reimbursement rates (previously required to equal Medicare reimbursement) as part of the Federal Budget Reconciliation Act (OBRA 81) 1981: Medicaid waivers created for states to enroll certain populations in mandatory managed care plans; coverage extended to home-based long-term care services under certain circumstances 1982: States allowed to extend Medicaid benefits to non-institutionalized disabled children (called Katie Beckett option) 1982: Arizona becomes the 50th state to join the Medicaid program. 1983: Medicare prospective payment system for hospital care implemented by Diagnostic Related Groups (DRGs)

Year	Description
	1986: Hospitals required to screen and stabilize all patients presenting at Emergency rooms, regardless of insurance status or ability to pay, as a condition of Medicare participation as part of the Emergency Medical Treatment and Active Labor Act (EMTALA) 1986: COBRA allows employees to continue participation in employer's health plan up to 18 months after they lose their jobs (employee fully responsible for premium). 1986: States allowed to cover pregnant women, infants and young children with incomes up to 100% FPL, independent of participation in AFDC program 1986: States allowed to pay Medicare premiums for elderly residents with low-income under 100% FPL (dual-eligibles) through Medicaid program 1987: States allowed to raise Medicaid eligibility for pregnant women, infants, and young children to 185% FPL 1988: Medicare Catastrophic Coverage Act adds prescription drugs to Medicare and caps out-of-pocket expenses; repealed the following year 1988: States required to extend one year of transitional Medicaid coverage to families no longer eligible for Medicaid due to increased earnings from work as part of the Family Support Act 1989: States required to include pregnant women and children under age 6 with income up to 133% FPL (OBRA 89)
1990s	1990: States required to phase in coverage for children ages 6-18 with income up to 100% FPL 1993: Additional Medicaid waiver/demonstration projects approved; projects included managed care delivery and adding eligibility for previously uncovered groups 1996: Federal restrictions imposed on insurers use of pre-existing conditions in determining insurance coverage; tax-advantaged treatment of long-term care insurance added to the (Health Insurance Portability and Accountability Act- HIPAA) 1996: Medical Savings Accounts (MSAs) authorized as a demonstration project, allowing participants to shelter funds in a special savings account to pay medical expenses.

Year	Description
	1996: Medicaid eligibility uncoupled from AFDC eligibility; legal immigrants barred from Medicaid coverage within five years of arrival to U.S.
2000s	2003 Medicare Modernization Act creates Health Savings Accounts (replacing Archer MSAs), allowing individuals with HDHP to set aside tax-excluded funds for paying OOP medical expenses; Medicare Part D provides optional subsidized coverage of Prescription Drugs for beneficiaries
2010s	Affordable Care Act creates several provisions scheduled for implementation over several years; demonstration projects allow Medicaid expansion ahead of the 2014 schedule; limits on denial of insurance coverage due to pre-existing conditions; young adult children up to age 26 allowed to remain on their parents' health coverage; tax-subsidies for non-group insurance; requirements for employers with at least 50 employees to offer minimum level of health insurance benefits; individuals mandated to maintain health insurance

Source: Author's analysis of Kaiser Family Foundation History of Health Reform in the United States; Center for Budget and Policy Priorities

APPENDIX B: Supplementary Data Sources

- U.S. Treasury Department, IRS Tax Tables
- White House, Office of Management and Budget, Historical Tables
- U.S. Dept of Health and Human Svc, Agency for Healthcare Research and Quality, MEPS IC 2010 (for Insurance Premiums)
- Tax Foundation State and Local Tax Burden 2010
- National Association of State Budget Directors, State Expenditure Report
- U.S. Dept. of Labor, Census Bureau
- Kaiser Health Foundation, Kaiser State Health Facts

APPENDIX C: DATASET FORMATTING

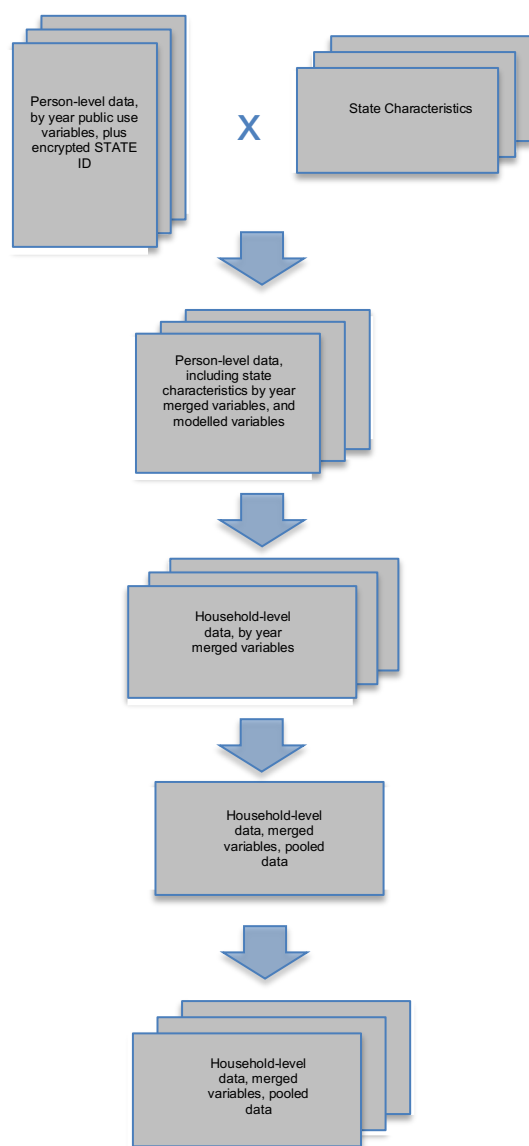


Figure 17: MEPS Data, State Characteristics Formatted for Analysis

APPENDIX D: NATIONAL SAMPLE DESCRIPTIVE OVERVIEW

Table 24: Descriptive Statistics, 2010 Sample

	Low Income	Middle Income	Upper Income
Number of families sampled	3,193	4,454	2,875
Families represented	25,200,000	42,342,712	38,439,765
Average Income			
>100%FPL	\$9,452		
100-138%FPL	\$20,179		
139-249%FPL		\$32,237	
250-399%FPL		\$52,982	
<400%FPL			\$113,732
Family Insurance Status			
Uninsured	18%	5%	3%
Public Insurance Only	47%	18%	2%
Some Private	15%	18%	14%
Fully Privately Insured	20%	59%	81%
Family Health Status			
<i>(respondents aged >17)</i> ¹³⁶	35%	32%	25%
No reported conditions per family	34%	38%	39%
One or Two reported condition	31%	30%	36%
Three or more reported conditions			
Average Medical Expenses			
No chronic conditions	\$3,237	\$2,902	\$4,165
One or Two chronic conditions	\$6,419	\$5,837	\$7,980
Three or more chronic conditions	\$13,831	\$13,964	\$13,830
Household Health Spending			
No chronic conditions	\$2,830		\$14,845
One or Two chronic conditions	\$3,051		\$16,437
Three or more chronic conditions	\$3,250		\$17,484

¹³⁶ Chronic conditions measured include arthritis, angina, coronary heart disease, other heart disease, cancer, diabetes, emphysema, hypertension, stroke and are reported only for adults in the MEPS survey

APPENDIX E: STATA OUTPUT

Table 25: STATA OUTPUT: Breusch Pagan Test for Heteroskedasticity

Variable	VIF	1/VIF
fam_ills	3.43	0.291881
povlev10	2.76	0.362523
type9_hielev		
2	2.49	0.401963
3	2.93	0.341491
4	1.96	0.509837
5	2.96	0.337376
6	4.25	0.235229
7	2.77	0.360768
8	4.18	0.239465
9	5.49	0.182034
fam_instat4		
1	2.54	0.393991
2	2.54	0.394373
3	3.61	0.277375
famszeyr	1.10	0.908425
Sqrt_age	1.47	0.680271
Educyra	1.32	0.757496
Raceex		
2	1.04	0.963808
3	1.01	0.988071
4	1.02	0.976384
5	1.00	0.995738
6	1.01	0.991243
Mean VIF	2.42	

APPENDIX F: SENSITIVITY ANALYSIS

Insurance Premium Estimates

This veracity of the analysis presented in this chapter is dependent on the estimates of insurance premiums, so a sensitivity analysis is indicated. To evaluate whether the interpretation offered herein is robust enough to withstand the possibility that lower income families have lower insurance premiums expenditures, both by the families and by employers, the average burden was recalculated (“back of the envelope”) with a 30% decrease in the total insurance premium estimate, a level roughly in line with insurance premiums at the 25th percentile of private insurance for each state across the U.S. in 2010. Even with that reduction, lower income families still face the burden of household health spending greater than their higher income counterparts. Prevailing insurance premiums for low income families would have to be more than 30% lower than the state medians used for the estimates in this study in order to bring the estimate for average burden for low income family groups towards the range experienced by middle income family groups. This adjustment does not account for any difference in overall utilization of care that is likely reflected in the substantial difference in total medical expenses incurred between low- income families and their higher income counterparts with comparable health status.

REFERENCES

A. Related Empirical Research

Auerbach, David I., and Arthur L. Kellermann. "A Decade of Health Care Cost Growth has Wiped Out Real Income Gains for an Average US Family." *Health Affairs* 30, no. 9 (September 1, 2011): 1630–1636.

...a descriptive analysis of the growth of median family health spending relative to income. Demonstrates that growth in health spending consumed most of the income gains for the median family in period 1999-2009

Blumberg, Linda J., Timothy A. Waidmann, Fredric Blavin, and Jeremy Roth. "Trends in Health Care Financial Burdens, 2001 to 2009." *Milbank Quarterly* 92, no. 1 (March 1, 2014): 88–113.

...an analysis of the increased share of household income allocated to health care insurance and out-of-pocket expenditures, for privately-insured households between 2001 and 2009. Reveals the magnitude of the increase in burden and the increased share of the population with excessive burden.

Cook, Keziah, David Dranove, and Andrew Sfekas. "Does Major Illness Cause Financial Catastrophe?" *Health Services Research* 45, No. 2 (April 2010): 418–436.

... An analysis of the association between health shocks and decline in household assets among near-elderly families, controlling for the effects of insurance status and illness. Findings include that newly ill, uninsured households (at the median income) lost 30-50% of household wealth. Insured households did not experience comparable declines.

Ketsche, P., E. K. Adams, S. Wallace, V. D. Kannan, and H. Kannan. "Lower-Income Families Pay A Higher Share Of Income Toward National Health Care Spending Than Higher-Income Families Do." *Health Affairs* 30, no. 9 (September 1, 2011): 1637–1146. doi:10.1377/hlthaff.2010.0712.

...An analysis of the ratio of household health spending to income, disaggregated by income quintile. Reveals patterns of regressive financing, especially due to state level tax structures

Porter, Eldon Grant. Calculating Medicaid's Taxpayer Burden for FY 2008, from a National and State Perspective. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, 2010. <http://papers.ssrn.com/abstract=1642548>.

...Estimates the differing contributions of taxpayers by state to the funding of Medicaid/CHIP. Findings include variation in both the dollar amount and the percentage of state spending borne in-state. The burden on tax payers can vary significantly from the average cost of public health spending estimated on a per capita basis. Median taxpayer (income \$32,879 in 2008) contributed \$130-300 in federal tax for Medicaid (.4-.9% of income). In-state burden of Medicaid funding varies dramatically across states. An estimated 40% of state-level spending is borne by non-residents.

Waters, Hugh R., Gerard F. Anderson, and Jim Mays. "Measuring Financial Protection in Health in the United States." *Health Policy* 69, no. 3 (September 2004): 339–349.

... Uses 1996 MEPS to explore likelihood of households' own-health (private) spending in the United States to exceed stated thresholds for premiums, out-of-pocket spending varies by income level, extent of insurance coverage, and the presence of chronic conditions. The findings show that % of the American population exceeded the thresholds, with poor families and families with multiple chronic conditions being especially at risk. In 1996, 16.9% of poor families and 21.2% of families with multiple chronic illnesses exceeded the 40% of income or \$2,000 per person spending threshold.

B. Theoretical and Conceptual References

Hacker, Jacob, Phillipp Rehm, and Mark Schlesinger. "Standing on Shaky Ground: Americans' Experiences with Economic Insecurity." The Rockefeller Foundation, December 2010.
<http://www.rockefellerfoundation.org/news/publications/standing-shaky-ground-americans>.

Hoffman, Allison K. "Health Care Spending and Financial Security After the Affordable Care Act." *North Carolina Law Review* 92 (2014): 102–156.

Long, Peter, and Jonathan Gruber. "Projecting The Impact of the Affordable Care Act on California." *Health Affairs* 30, no. 1 (January 1, 2011): 63–70.
doi:10.1377/hlthaff.2010.0961.

Moreno-Serra, Rodrigo, Christopher Millett, and Peter C. Smith. "Towards Improved Measurement of Financial Protection in Health." *PLoS Med* 8, no. 9 (September 6, 2011): e1001087. doi:10.1371/journal.pmed.1001087.

- Murray, Christopher J., Ke Xu, Jan Klavus, Kei Kawabata, Piya Hanvoravongchai, Riadh Zeramdini, Ana Mylena Aguilar-Rivera, and David Evans. "Assessing the Distribution of Household Financial Contributions to the Health System: Concepts and Empirical Application." In *Health Systems Performance Assessment: Debates, Methods and Empiricism*, edited by Christopher J Murray and David B. Evans, Chapter 38. Geneva: World Health Organization, 2003.
- Ruger, Jennifer Prah. "An Alternative Framework for Analyzing Financial Protection in Health." *PLoS Med* 9, no. 8 (August 21, 2012): e1001294. doi:10.1371/journal.pmed.1001294.
- Saenz, Carla. "What Is Affordable Health Insurance?: The Reasonable Tradeoff Account of Affordability." *Kennedy Institute of Ethics Journal* 19, no. 4 (2009): 401–414.
- Wagstaff, Adam. Measuring Financial Protection in Health. Policy Research Working Paper. World Bank, March 2008.

C. Complete List of References

- Aaron, Henry J. Health Care Reform: The Clash of Goals, Facts, and Ideology. NBER Chapters. National Bureau of Economic Research, Inc., 1996.
- Abraham, Jean Marie, Thomas DeLeire, and Anne Beeson Royalty. "Moral Hazard Matters: Measuring Relative Rates of Underinsurance Using Threshold Measures." *Health Services Research* 45, no. 3 (2010): 806–824. doi:10.1111/j.1475-6773.2010.01084.x.
- Arrow, Kenneth J. "Uncertainty and the Welfare Economics of Medical Care." *The American Economic Review* 53, no. 5 (December 1, 1963): 941–973.
- Auerbach, David I., and Arthur L. Kellermann. "A Decade of Health Care Cost Growth has Wiped Out Real Income Gains for an Average US Family." *Health Affairs* 30, no. 9 (September 1, 2011): 1630–1636.
- Baicker, Katherine, and Amy Finkelstein. "The Effects of Medicaid Coverage — Learning from the Oregon Experiment." *New England Journal of Medicine* 365, no. 8 (August 25, 2011): 683–685.
- Baicker, Katherine, and Amitabh Chandra. "The Labor Market Effects of Rising Health Insurance Premiums." *Journal of Labor Economics* 24, no. 3 (July 1, 2006): 609–634.

- Baicker, Katherine, Amitabh Chandra, and Jonathan Skinner. "Geographic Variation in Health Care and the Problem of Measuring Racial Disparities." *Perspectives in Biology and Medicine* 48, no. 1x (2005): S42–S53. doi:10.1353/pbm.2005.0034.
- Babiarz, Patryk, Richard Widdows, and Tansel Yilmazer. "Borrowing to Cope with Adverse Health Events: Liquidity Constraints, Insurance Coverage, and Unsecured Debt." *Health Economics* (2012).
- Barnett, Jessica C. and Edward R. Berchick. Health Insurance Coverage in the United States: 2016, United States Census Bureau. September 2017.
- Bernard, D, and J. Banthin. Family-Level Expenditures on Health Care and Insurance Premiums among the U.S. Nonelderly Population, 2006. Research Findings. Agency for Healthcare Research and Quality, March 2009.
- Bernard, Didem M., Jessica S. Banthin, and William E. Encinosa. "Wealth, Income, And The Affordability Of Health Insurance." *Health Affairs* 28, no. 3 (May 1, 2009): 887–896. doi:10.1377/hlthaff.28.3.887.
- Blavin, Fredric, Adele Shartzter, Sharon K. Long, and John Holahan. Employer-Sponsored Health Insurance Stays Strong, with No Signs of Decay under the ACA: Findings Through March 2016. Urban Institute Health Policy Center, 2016. <http://hrms.urban.org/briefs/employer-sponsored-insurance-aca-march-2016.html>
- Blumberg, Linda J., Timothy A. Waidmann, Fredric Blavin, and Jeremy Roth. "Trends in Health Care Financial Burdens, 2001 to 2009." *Milbank Quarterly* 92, no. 1 (March 1, 2014): 88–113. doi:10.1111/1468-0009.12042.
- Bodenheimer, Thomas. "The Political Divide in Health Care: A Liberal Perspective." *Health Affairs* 24, no. 6 (November 1, 2005): 1426–1435.
- Boudreaux, Michel H., Gilbert Gonzales, and Brendan Saloner. "Medical Financial Burden Declined for Consumers in the Nongroup Market." *Health Affairs* 36, no. 5 (May 1, 2017): 833–837. doi:10.1377/hlthaff.2016.1480.
- Buettgens, Matthew. "Who Will Be Uninsured After Health Insurance Reform?" Text, March 18, 2011. <http://www.urban.org/publications/1001520.html>.
- Buettgens, Matthew, Genevieve M. Kenney, Hannah Recht, and Victoria Lynch. "Eligibility for Assistance and Projected Changes in Coverage Under the ACA: Variation Across States." Washington, DC: The Urban Institute. [Http://www.](http://www.)

- Urban. org/publications/412918. Html, 2013.
http://www.urban.org/UploadedPDF/412918-Eligibility-for-Assistance-and-Projected-Changes-in-Coverage-Under-the-ACA.pdf?RSSFeed=UI_Health/Healthcare.xml.
- Burtless, Gary, and Sveta Milusheva. "Effects of Employer-Sponsored Health Insurance Costs on Social Security Taxable Wages." *Soc. Sec. Bull.* 73 (2013): 83.
- Butler, S. M. "The Conservative Agenda for Incremental Reform." *Health Affairs* 14, no. 1 (February 1, 1995): 150–160.
- Chernew, Michael, David Cutler, and Patricia Seliger Keenan. "Charity Care, Risk Pooling, and the Decline in Private Health Insurance." *The American Economic Review* 95, no. 2 (May 1, 2005): 209–213. doi:10.2307/4132818.
- Chernew, Michael E., Lindsay M. Sabik, Amitabh Chandra, Teresa B. Gibson, and Joseph P. Newhouse. "Geographic Correlation Between Large-Firm Commercial Spending and Medicare Spending." *The American Journal of Managed Care* 16, no. 2 (February 2010): 131–138.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3322373/>.
- Cohen, Robin A., Diane M. Makuc, Amy B. Bernstein, Linda T. Bilheimer, and Eve Powell-Griner. *Health Insurance Coverage Trends, 1959-2007: Estimates from the National Health Interview Survey*. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, July 2009.
- Cohen, Robin A., Emily P. Zammitti, and Michael E. Martinez. "Health insurance coverage: Early release of estimates from the National Health Interview Survey , 2016." National Center for Health Statistics. May 2017
- Collins, Sara R., Ruth Robertson, Tracy Garber, and Michelle M. Doty. "Insuring the Future: Current Trends in Health Coverage and the Effects of Implementing the Affordable Care Act." Commonwealth Fund, April 2013.
http://www.statecoverage.org/files/CMWF_Biennial_Survey_2012.pdf.
- Collins, Sarah R., Munira Z. Gunja, Michelle M. Doty, and Sophie Beutel. How the Affordable Care Act Has Improved Americans' Ability to Buy Health Insurance on Their Own, The Commonwealth Fund. February 2017.
- Congressional Budget Office. Federal Subsidies for Health Insurance Coverage for People Under Age 65: 2017 to 2027. Washington DC: Congressional Budget Office, 2017 www.cbo.gov/publication/53091

- Cook, Keziah, David Dranove, and Andrew Sfekas. "Does Major Illness Cause Financial Catastrophe?" *Health Services Research* 45, no. 2 (April 2010): 418–436.
- Daly, Hugh F., Leslie M. Oblak, Robert W Seifert, and Kimberly Shellenberger. "Into the Red to Stay in the Pink: The Hidden Cost of Being Uninsured." *Health Matrix* 12, no. 1 (2002): 39–61.
- De Meza, David. "Health Insurance and the Demand for Medical Care." *Journal of Health Economics* 2, no. 1 (1983): 47–54.
- DeNavas -Walt, Carmen, Bernadette Proctor, and Robert Mills. *Income Poverty, and Health Insurance Coverage in the United States: 2003*. U.S. Census Bureau, Current Population Reports. U.S. Government Printing Office, (August 2004),
- DeNavas -Walt, Carmen, Bernadette D. Proctor, and Jessica C. Smith. *Income Poverty, and Health Insurance Coverage in the United States: 2012*. U.S. Census Bureau, Current Population Reports. U.S. Government Printing Office, 2013.
- Dranove, David, and Michael L Millenson. "Medical Bankruptcy: Myth Versus Fact." *Health Affairs* 25, no. 2 (March 1, 2006): w74–w83.
doi:10.1377/hlthaff.25.w74.
- Eibner, Christine, Amado Cordova, Sarah A. Nowak, Carter C. Price, Evan Saltzman, and Dulani Woods. "The Affordable Care Act and Health Insurance Markets." Product Page, 2013.
http://www.rand.org/pubs/research_reports/RR189.html.
- Elmendorf, Douglas. CBO's Analysis of the Major Health Care Legislation Enacted in March 2010. Statement before the Subcommittee on Health, Committee on Energy and Commerce, U.S. House of Representatives, March 30, 2011.
- Epstein, Richard. *Mortal Peril: Our Inalienable Right to Health Care?* 1st ed. Basic Books, 2000.
- Feldstein, Martin S. "The Welfare Loss of Excess Health Insurance." *Journal of Political Economy* 81, no. 2 (March 1, 1973): 251–280.
- Feldman, Roger, and Bryan Dowd. "A New Estimate of the Welfare Loss of Excess Health Insurance." *The American Economic Review* 81, no. 1 (March 1, 1991): 297–301.
- Finkelstein, Amy. "The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare." *The Quarterly Journal of Economics* 122, no. 1 (February 1, 2007): 1–37.

- Franzini, Luisa, Osama I. Mikhail, and Jonathan S. Skinner. "McAllen And El Paso Revisited: Medicare Variations Not Always Reflected In The Under-Sixty-Five Population." *Health Affairs* 29, no. 12 (December 1, 2010): 2302–2309. doi:10.1377/hlthaff.2010.0492.
- Freeman, Joseph D., Srikanth Kadiyala, Janice F. Bell, and Diane P. Martin. "The Causal Effect of Health Insurance on Utilization and Outcomes in Adults." *Medical Care* 46, no. 10 (October 2008): 1023–1032.
- Frick, Kevin D., and Michael E. Chernew. "Beneficial Moral Hazard and the Theory of the Second Best." *Inquiry* 46, no. 2 (July 1, 2009): 229–240.
- Friedman, Milton, and L. J. Savage. "The Utility Analysis of Choices Involving Risk." *Journal of Political Economy* 56, no. 4 (1948): 279–304.
- Fuchs, Victor R. *Who Shall Live?: Health, Economics, and Social Choice*. World Scientific, 1998.
- Gabel, Jon, Roland McDevitt, Laura Gandolfo, Jeremy Pickreign, Samantha Hawkins, and Cheryl Fahlman. "Generosity and Adjusted Premiums in Job-Based Insurance: Hawaii is Up, Wyoming is Down." *Health Affairs* 25, no. 3 (May 1, 2006): 832–843. doi:10.1377/hlthaff.25.3.832.
- Girod, Chris, Sue Hart, and Scott Wetz. *2017 Milliman Medical Index*, Milliman. May 2017.
- Graetz, Michael J., and Jerry L. Mashaw. *True Security: Rethinking American Social Insurance*. Yale University Press, 1999.
- Graig, Laurene A. *Health of Nations: An International Perspective on U.S. Health Care Reform*. Washington, D.C: Congressional Quarterly, 1999.
- Gruber, Jonathan. *Public Finance and Public Policy*. Third Edition. Worth Publishers, 2011.
- Gruber, Jonathan, and Kosali Simon. Crowd-Out Ten Years Later: Have Recent Public Insurance Expansions Crowded Out Private Health Insurance?. Working Paper. National Bureau of Economic Research, January 2007. <http://www.nber.org/papers/w12858>.
- Hacker, Jacob. "The New Economic Insecurity --And What Can Be Done About It." *The Harvard Law & Policy Review* 1, no. 1 (2007): 111-126.
- Hacker, Jacob, Phillipp Rehm, and Mark Schlesinger. "Standing on Shaky Ground: Americans' Experiences with Economic Insecurity." The Rockefeller

Foundation, December 2010.

<http://www.rockefellerfoundation.org/news/publications/standing-shaky-ground-americans>.

Hacker, Jacob S., Gregory Huber, Austin Nichols, Philipp Rehm, Mark Schlesinger, Robert G. Valletta, and Stuart Craig. The Economic Security Index: A New Measure for Research and Policy Analysis. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, October 27, 2012.
<http://papers.ssrn.com/abstract=2167568>.

Himmelstein, David U., Deborah Thorne, Elizabeth Warren, and Steffie Woolhandler. "Medical Bankruptcy in the United States, 2007: Results of a National Study." *The American Journal of Medicine* 122, no. 8 (August 2009): 741–746.
doi:10.1016/j.amjmed.2009.04.012.

Himmelstein, David U., Deborah Thorne, and Steffie Woolhandler. "Medical Bankruptcy in Massachusetts: Has Health Reform Made a Difference?" *The American Journal of Medicine* 124, no. 3 (March 2011): 224–228.
doi:10.1016/j.amjmed.2010.11.009.

Himmelstein, David U., Elizabeth Warren, Deborah Thorne, and Steffie J. Woolhandler. "Illness and Injury as Contributors to Bankruptcy." *Health Affairs* Web exclusive (February 2, 2005): w5–63v1.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=664565.

Himmelstein, David U., and Steffie Woolhandler. "The Current and Projected Taxpayer Shares of US Health Costs." *American Journal of Public Health* 106, no. 3 (January 21, 2016): 449–52.

Himmelstein, David U., Steffie Woolhandler, Mark Almberg, and Clare Fauke. "The Ongoing U.S. Health Care Crisis: A Data Update." *International Journal of Health* 48, no. 2 (April 2018): 209–222.
<https://doi.org/10.1177/0020731418764073>.

Hoffman, Allison K. "Health Care Spending and Financial Security After the Affordable Care Act." *North Carolina Law Review* 92 (2014): 102–156.

Hoffman, Allison K. "Three Models of Health Insurance: The Conceptual Pluralism of the Patient Protection and Affordable Care Act". *University of Pennsylvania Law Review* 159 (2011): 1873–1954.

Holahan, John, Linda J. Blumberg, Lisa Clemans-Cope, Stacey McMorro, and Erik Wengle. *The Evidence on Recent Health Care Spending Growth and the Impact of the Affordable Care Act*. Urban Institute, 2017.

- Immergut, Ellen. "Institutions, Veto Points, and Policy Results: A Comparative Analysis of Health Care." *Journal of Public Policy* 10, no. 4 (1990): 391–416.
- Jacobs, Paul D, and Gary Claxton. "Comparing the Assets of Uninsured Households to Cost Sharing Under High-deductible Health Plans." *Health Affairs (Project Hope)* 27, no. 3 (June 2008): w214–w221.
- Karlan, Pamela, Goodwin Liu, and Christopher Schroeder. *Keeping Faith with the Constitution*. Oxford University Press, USA, 2010.
- Keehan, Sean P., Andrea M. Sisko, Christopher J. Truffer, John A. Poisal, Gigi A. Cuckler, Andrew J. Madison, Joseph M. Lizonitz, and Sheila D. Smith. "National Health Spending Projections Through 2020: Economic Recovery And Reform Drive Faster Spending Growth." *Health Affairs* 30, no. 8 (August 1, 2011): 1594–1605. doi:10.1377/hlthaff.2011.0662.
- Keehan, Sean P., John A. Poisal, Gigi A. Cuckler, Andrea M. Sisko, Sheila D. Smith, Andrew J. Madison, Devin A. Stone, Christian J. Wolfe, and Joseph M. Lizonitz. "National Health Expenditure Projections, 2015–25: Economy, Prices, And Aging Expected To Shape Spending And Enrollment." *Health Affairs*, July 13, 2016, 10.1377/hlthaff.2016.0459. doi:10.1377/hlthaff.2016.0459.
- Ketsche, Patricia, E. Kathleen Adams, Sally Wallace, Viji Diane Kannan, and Harini Kannan. "Lower-Income Families Pay A Higher Share Of Income Toward National Health Care Spending Than Higher-Income Families Do." *Health Affairs* 30, no. 9 (September 1, 2011): 1637–1646. doi:10.1377/hlthaff.2010.0712.
- Leonard, Elizabeth. *State Constitutionalism and the Right to Health Care*. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, June 18, 2009.
- Levy, Helen, and Thomas DeLeire. "What Do People Buy When They Don't Buy Health Insurance and What Does That Say About Why They Are Uninsured?" *Inquiry: A Journal Of Medical Care Organization, Provision And Financing* 45, no. 4 (Winter 2008/2009): 365–379.
- Lipsey, R. G., and Kelvin Lancaster. "The General Theory of Second Best." *The Review of Economic Studies* 24, no. 1 (January 1, 1956): 11–32.
- Long, Peter, and Jonathan Gruber. "Projecting the Impact of the Affordable Care Act on California." *Health Affairs* 30, no. 1 (January 1, 2011): 63–70. doi:10.1377/hlthaff.2010.0961.

- Manning, Willard G. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment." *American Economic Review* 77, no. 3 (1987): 251–277.
- Marshall, William. "National Healthcare and American Constitutional Culture." *Harvard Journal of Law and Public Policy* 35, no. 1 (January 2012): 131–152.
- Martin, Anne B., Lekha Whittle, Stephen Heffler, Mary Carol Barron, Andrea Sisko, and Benjamin Washington. "Health Spending By State Of Residence, 1991–2004." *Health Affairs* 26, no. 6 (November 1, 2007): w651–w663. doi:10.1377/hlthaff.26.6.w651.
- Martin, Anne B., Micah Hartman, Benjamin Washington, Aaron Catlin, and the National Health Expenditure Accounts Team. "National Health Spending: Faster Growth in 2015 as Coverage Expands and Utilization Increases." *Health Affairs*, December 2, 2016, 10.1377/hlthaff.2016.1330. doi:10.1377/hlthaff.2016.1330.
- Martin, Anne B., Micah Hartman, Lekha Whittle, and Aaron Catlin. "National Health Spending In 2012: Rate Of Health Spending Growth Remained Low For The Fourth Consecutive Year." *Health Affairs* 33, no. 1 (January 1, 2014): 67–77. doi:10.1377/hlthaff.2013.1254.
- Milliman, Inc. *2010 Milliman Medical Index*, Milliman. May 2010.
- Moreno-Serra, Rodrigo, Christopher Millett, and Peter C. Smith. "Towards Improved Measurement of Financial Protection in Health." *PLoS Med* 8, no. 9 (September 6, 2011): e1001087. doi:10.1371/journal.pmed.1001087.
- Murray, Christopher J., Ke Xu, Jan Klavus, Kei Kawabata, Piya Hanvoravongchai, Riadh Zeramdini, Ana Mylena Aguilar-Rivera, and David Evans. "Assessing the Distribution of Household Financial Contributions to the Health System: Concepts and Empirical Application." In *Health Systems Performance Assessment: Debates, Methods and Empiricism*, edited by Christopher J Murray and David B. Evans, Chapter 38. Geneva: World Health Organization, 2003.
- Newhouse, Joseph P. *Free for All? Lessons from the RAND Health Insurance Experiment*. Harvard University Press, 1993.
- Newhouse, Joseph P., and Alan M. Garber. "Geographic Variation in Health Care Spending in the United States: Insights From an Institute of Medicine Report." *JAMA* 310, no. 12 (2013): 1227–1228.

- Nowak, Sarah A., Christine Eibner, David M. Adamson, and Evan Saltzman. Effects of the Affordable Care Act on Consumer Health Care Spending and Risk of Catastrophic Health Costs. Santa Monica, CA: RAND Corporation, 2013.
- Nyman, John A. "The Economics of Moral Hazard Revisited." *Journal of Health Economics* 18, no. 6 (December 1999): 811–824.
- Nyman, John A. *The Theory of Demand for Health Insurance*. Stanford University Press, 2002.
- Oberlander, Jonathan. "Unfinished Journey — A Century of Health Care Reform in the United States." *New England Journal of Medicine* 367, no. 7 (2012): 585–590.
- O'Hara, Brett and Kyle Caswell. *Health Status, Health Insurance, and Medical Services Utilization: 2010*, United States Census Bureau, October 2012.
- Paez, Kathryn Anne, Lan Zhao, and Wenke Hwang. "Rising out-of-Pocket Spending for Chronic Conditions: A Ten-Year Trend." *Health Affairs* 28, no. 1 (2009): 15–25.
- Pauly, Mark V. "The Economics of Moral Hazard: Comment." *The American Economic Review* 58, no. 3 (June 1, 1968): 531–537.
- Pauly, Mark V., and Thomas W. Grannemann. *Medicaid Everyone Can Count On: Public Choices for Equity and Efficiency*. 1st ed. Aei Press, R&L, 2010.
- Philipson, Tomas J., Seth A. Seabury, Lee M. Lockwood, Dana P. Goldman, and Darius N. Lakdawalla. "Geographic Variation in Health Care: The Role of Private Markets." *Brookings Papers on Economic Activity*, 2010, 325–355.
- Planalp, Colin and Lacey Hartman. *Financial Burden and Cost-related Barriers to Care: Changes since Implementation of the ACA*, State Health Access Data Assistance Center. April 2017.
- Porter, Eldon Grant. Calculating Medicaid's Taxpayer Burden for FY 2008, from a National and State Perspective. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, 2010.
- Quadagno, Jill. *One Nation, Uninsured: Why the U.S. Has No National Health Insurance*. 1st ed. Oxford University Press, USA, 2006.
- Rabkin, Jeremy. "American Exceptionalism and The Healthcare Reform Debate." *Harvard Journal of Law & Public Policy* (January 1, 2012).

- Reinhardt, Uwe E. "Can Efficiency in Health Care Be Left to the Market?" *Journal of Health Politics, Policy and Law* 26, no. 5 (2001): 967–992.
- Romer, Christina, and Mark Duggan. "Exploring the Link between Rising Health Insurance Premiums and Stagnant Wages | The White House." Accessed October 7, 2014. <http://www.whitehouse.gov/blog/2010/03/12/exploring-link-between-rising-health-insurance-premiums-and-stagnant-wages>
- Ruger, Jennifer Prah. "An Alternative Framework for Analyzing Financial Protection in Health." *PLoS Med* 9, no. 8 (August 21, 2012): e1001294. doi:10.1371/journal.pmed.1001294.
- Ryu, A. J., T. B. Gibson, M. R. McKellar, and M. E. Chernew. "The Slowdown In Health Care Spending In 2009-11 Reflected Factors Other Than The Weak Economy And Thus May Persist." *Health Affairs* 32, no. 5 (May 1, 2013): 835–840. doi:10.1377/hlthaff.2012.1297.
- Saenz, Carla. "What Is Affordable Health Insurance?: The Reasonable Tradeoff Account of Affordability." *Kennedy Institute of Ethics Journal* 19, no. 4 (2009): 401–414.
- Scanlon, Dennis P., Shailender Swaminathan, Michael Chernew, and Woolton Lee. "Market and Plan Characteristics Related to HMO Quality and Improvement." *Medical Care Research and Review* 63, no. 6 suppl (December 1, 2006): 56S – 89S. doi:10.1177/1077558706293835.
- Schlesinger, Mark. "On Values and Democratic Policy Making: The Deceptively Fragile Consensus Around Market-Oriented Medical Care." *Journal of Health Politics Policy and Law* 27, no. 6 (December 2002): 889–925.
- Schoen, Cathy, Michelle M. Doty, Ruth H. Robertson, and Sara R. Collins. "Affordable Care Act Reforms Could Reduce The Number Of Underinsured US Adults By 70 Percent." *Health Affairs* 30, no. 9 (September 1, 2011): 1762–1771. doi:10.1377/hlthaff.2011.0335.
- Schoen, Cathy, Stuart Guterman, Mark A. Zezza, and Melinda K. Abrams. Confronting Costs: Stabilizing U.S. Health Spending While Moving Toward a High Performance Health Care System, January 10, 2013. <http://www.commonwealthfund.org/publications/fund-reports/2013/jan/confronting-costs>.
- Seifert, Robert W, and Mark Rukavina. "Bankruptcy Is The Tip Of A Medical-Debt Iceberg." *Health Affairs* 25, no. 2 (March 1, 2006): w89–w92. doi:10.1377/hlthaff.25.w89.

- Short, Kathleen. *The Research Supplemental Poverty Measure: 2010*. Current Population Reports. United States Census Bureau, 2011.
- Sisko, Andrea M., Sean P. Keehan, Gigi A. Cuckler, Andrew J. Madison, Sheila D. Smith, Christian J. Wolfe, Devin A. Stone, Joseph M. Lizonitz, and John A. Poisal. "National Health Expenditure Projections, 2013–23: Faster Growth Expected With Expanded Coverage And Improving Economy." *Health Affairs* 33, no. 10 (October 1, 2014): 1841–1850. doi:10.1377/hlthaff.2014.0560.
- Smith, Owen, and Son Nam Nguyen. "Improving Financial Protection and Equity: A Safety Net for All." Accessed July 6, 2014.
http://elibrary.worldbank.org/doi/abs/10.1596/9780821398838_CH04.
- Sommers, Benjamin D., Atul A. Gawande, and Katherine Baicker. "Health Insurance Coverage and Health — What the Recent Evidence Tells Us." *New England Journal of Medicine* 377, no. 6 (August 10, 2017): 586–93.
<https://doi.org/10.1056/NEJMs1706645>.
- Starr, Paul. *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry*. Basic Books, 1984.
- Stone, Deborah. "Moral Hazard." *Journal of Health Politics, Policy and Law* 36, no. 5 (October 1, 2011): 887–896.
- Sudgen, Ryan. "Sick and (Still) Broke: Why the Affordable Care Act Won't End Medical Bankruptcy." *Washington University Journal of Law and Policy* 38, no. 1 (2012).
- Tchouaket, Éric N., Paul A. Lamarche, Lise Goulet, and André Pierre Contandriopoulos. "Health Care System Performance of 27 OECD Countries." *The International Journal of Health Planning and Management* 27, no. 2 (April 2012): 104–129.
- Thorpe, Kenneth E., Curtis S. Florence, David H. Howard, and Peter Joski. "The Rising Prevalence of Treated Disease: Effects on Private Health Insurance Spending." *Health Affairs* 24, no. 4 (2005): 1188.
- Troy, Tevi D. and Kara L. Jones. *State of Employer-Sponsored Health Care Part 1: Top Concerns of CHROs and Their Teams*. American Health Policy Institute, June 2016.

- Uberoi, N., K. Finegold, E. Gee. "Health Insurance Coverage and the Affordable Care Act, 2010-2016". Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services, 2016.
- Von Neumann, John, and Oskar Morgenstern. *Theory of Games and Economic Behavior*. Princeton: Princeton University Press, 1953.
- Wagstaff, Adam. Measuring Financial Protection in Health. Policy Research Working Paper. World Bank, March 2008.
- Wagstaff, Adam, and Patrick Hoang-Vu Eozenou. CATA Meets IMPOV: A Unified Approach to Measuring Financial Protection in Health. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, May 1, 2014.
- Ward, Brian W., and Jeannine S. Schiller. "Prevalence of Multiple Chronic Conditions Among US Adults: Estimates From the National Health Interview Survey, 2010." *Preventing Chronic Disease* 10 (April 25, 2013). doi:10.5888/pcd10.120203.
- Waters, Hugh R., Gerard F. Anderson, and Jim Mays. "Measuring Financial Protection in Health in the United States." *Health Policy* 69, no. 3 (September 2004): 339–349. doi:10.1016/j.healthpol.2004.01.003.
- Woolhandler, Steffie, and David U. Himmelstein. "Paying For National Health Insurance—And Not Getting It." *Health Affairs* 21, no. 4 (July 1, 2002): 88–98. <https://doi.org/10.1377/hlthaff.21.4.88>.
- Xu, Ke, David B. Evans, Guido Carrin, Ana Mylena Aguilar-Rivera, Philip Musgrove, and Timothy Evans. "Protecting Households From Catastrophic Health Spending." *Health Affairs* 26, no. 4 (July 1, 2007): 972–983.
- Xu, Ke, David B. Evans, Kei Kawabata, Riadh Zeramdini, Jan Klavus, and Christopher JL Murray. "Household Catastrophic Health Expenditure: A Multicountry Analysis." *The Lancet* 362, no. 9378 (2003): 111–117.
- Zeckhauser, Richard. "Medical Insurance: A Case Study of the Tradeoff between Risk Spreading and Appropriate Incentives." *Journal of Economic Theory* 2, no. 1 (2012): 10–26. <http://ideas.repec.org/a/eee/jetheo/v2y1970i1p10-26.html>.
- Zhang, Yuting, Seo Hyon Baik, A. Mark Fendrick, and Katherine Baicker. "Comparing Local and Regional Variation in Health Care Spending." *New England Journal of Medicine* 367, no. 18 (2012): 1724–1731. doi:10.1056/NEJMsa1203980.

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