Medicaid Expansion Under the Affordable Care Act and Household Financial Outcomes

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Abstract

This paper examines the initial effects of Medicaid expansion as a result of the Patient Protection and Affordable Care Act (ACA) signed into law by President Barack Obama in 2010 on the financial outcomes of low-income individuals. Using data sets from the Federal Reserve Bank of New York, The Bureau of Labor Statistics, and the United States Census Bureau, this paper draws comparisons between financial outcomes of residents in counties that expanded Medicaid and those of residents in counties that did not using difference-in-differences (DID) models, six years after the first passage of the Affordable Care Act. Throughout this paper, financial outcomes are measured using county-level household debt balances using data from the Federal Reserve Board of Governors, aggregated across years prior to, during, and post expansion to draw comparisons between the effects of Medicaid expansion on household financial outcomes by county. In applying DID models to county-level data aggregated by state and county, this paper finds positive effects of Medicaid expansion on household financial outcomes by decreasing average debt levels as a percentage of income with results largely in line with expectations.

1 Introduction

As one of the most powerful economies and wealthiest nations of the world, the United States provides strong living standards for its citizens. However, in the context of health outcomes, the United States spends more on average on healthcare compared to other nations globally, but realizes considerably sub-optimal health outcomes.

In 2010, President Barack Obama signed the Patient Protection and Affordable Care Act (ACA) into law, including a provision to modify Medicaid coverage eligibility criteria from categorical to financial determinants. Prior to 2010, Medicaid coverage was limited primarily to children and pregnant women. However, under the implementation of the Affordable Care Act, Medicaid eligibility was expanded to cover low income individuals, defined as those with incomes up to 138% of the Federal Poverty Level (FPL) (See Table 6 in Appendix for historical single individual household Federal Poverty Line and Medicaid eligibility cutoffs), which is equivalent to $17,236 for an individual in 2019. Between 2013 and 2016, approximately 16.9 million Americans previously without insurance obtained coverage as a result of the Affordable Care Act, resulting in a decline in the uninsured rate from 15.7% in 2012 to just less than 9.2% in 2016 [22]. Among those newly insured, 6.5 million individuals are beneficiaries of Medicaid expansion [10].

A primary objective of this expansion is to guard against unwarranted refusal of coverage. In prior years, individual medical underwriting by prominent health insurance providers was rampant, resulting in individuals with medical histories being denied coverage or offered unaffordable premiums. The passage of the ACA required insurance providers across the nation to offer comprehensive healthcare plans to individuals at affordable premiums that do not scale with the existence or severity of preexisting conditions. As a result of the ACA, low-income adults now have the ability to obtain coverage regardless of medical background, positively impacting vulnerable communities in rural areas of expansion states disproportionally (See Table 1 for Medicaid expansion breakdown by state below and Table 5 for non-expansion breakdown by state in Appendix) [33] [8]. Numerous studies have found evidence of this positive impact by citing more significant declines in the uninsured rates in

rural areas under expanded Medicaid coverage than compared to those of metropolitan areas of expansion states and all areas (both rural and metropolitan) of non-expansion states. This positive impact is further combined with improved hospital operation margins and reduced likelihood of hospital closures in rural areas [1]. Some may argue that with a relatively stable supply of health care providers, Medicaid expansion may further strain the already struggling system characterized by high care demand and limited supply. However, research studies have found evidence of increased availability of primary care appointment slots and higher care quality to be associated with Medicaid expansion, providing more accessible opportunities for care while not putting significant additional strain on the current system [1].

Moreover, various studies have shown that Medicaid coverage has contributed to noticeable declines in infant mortality, and has also contributed to the improvement of lower rates of hospitalization and higher lifetime educational attainment [31]. These improvements in well-being may flow into the economy and government as positive benefits, through reducing earned income tax credit payments and increasing tax collections due to higher earnings in adulthood. Substantial research point to improvements in access to care and utilization of healthcare services as a result of Medicaid expansions. Specifically, studies suggest that Medicaid expansions are positively related to early-stage diagnosis rates of cancer [34].

The expansion of health insurance under the ACA may prove beneficial beyond initial projection, as improved financial conditions of those newly insured may "spill over", whether directly or indirectly, to family members with whom they share finances and whose health insurance status remains unchanged [37]. Given excessive costs associated with medical procedures under the current healthcare delivery and implementation landscape, individuals seek healthcare insurance coverage to guard against exorbitant out-of-pocket medical spending. An exemplary application of concepts of risk pooling and management, insurance protects individuals against unexpected incidents, which may prove to be unreasonable cost burdens. According to data obtained from the Medical Expenditure Panel Survey, the annual costs of medical care for an average individual aged 18 to 64 was $25,000. The high amount of average healthcare spending costs places large out-of-pocket burdens on those

States that expanded Medicaid				
State	**Individuals with dependent children**		**Individuals without dependent children**	
	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA
Arizona	106%	138%	100%	138%
Arkansas	16%	138%	NA	138%
California	106%	138%	NA	138%
Colorado	106%	138%	20%	138%
Connecticut	191%	201%	70%	138%
Delaware	120%	138%	110%	138%
District of Columbia	206%	220%	211%	215%
Hawaii	133%	138%	133%	138%
Illinois	139%	138%	NA	138%
Iowa	80%	138%	NA	138%
Kentucky	57%	138%	NA	138%
Maryland	122%	138%	NA	138%
Massachusetts	133%	138%	NA	138%
Michigan	64%	138%	NA	138%
Minnesota	215%	205%	75%	205%
Nevada	84%	138%	NA	138%
New Jersey	200%	138%	NA	138%
New Mexico	85%	138%	NA	138%
New York	150%	138%	100%	138%
North Dakota	57%	138%	NA	138%
Ohio	96%	138%	NA	138%
Oregon	39%	138%	NA	138%
Rhode Island	181%	138%	NA	138%
Vermont	191%	138%	160%	138%
Washington	71%	138%	NA	138%
West Virginia	31%	138%	NA	138%

Table 1: A Comparison: Medicaid Eligibility Before and After the Affordable Care Act (Expansion states) [25]

uninsured, suggesting difficulties in paying medical expenses, which may in turn result in delinquency and ultimately, collections [12].

A study conducted in 2014 found that newly-insured prescription drug users who were previously uninsured prior to ACA expansion saw a decrease in out-of-pocket medical spending in 2014 by $205 on average [1]. According to *The Economic Consequences of Hospital Admissions*, Dobkin et al. find that uninsured individuals face considerable financial setbacks post hospitalization, including difficulties in obtaining approval for credit (and if approved, for lower limits) as well as significant increases in the likelihood of personal bankruptcy filings [14].

Generally, Medicaid coverage does not require premium payment, making it a unique form of insurance coverage compared to other available options, whether private or public. Thus,

while traditional insurance plans decrease the risk of exorbitant levels of medical spending, Medicaid decreases the risk of medical co-payment for covered services and procedures. Under the implementation of the ACA, eligibility criteria have been expanded to allow both those previously uninsured and insured (through other private underwriters) to gain access to Medicaid coverage. This change in policy could result in income effects for individuals who were previously paying higher premiums prior to switching to Medicaid, potentially yielding indirect effects on financial well-being.

With financial protection from Medicaid coverage, newly-insured low-income individuals are less likely to resort to debt to smooth consumption during difficult periods, including when facing exorbitant, unforeseen medical costs for necessary procedures. This improved financial condition of newly-covered individuals could allow them to gain broader access to credit, resulting in higher consumption of goods and services they would otherwise have to forgo to acquire medical procedures [12]. Given this relationship and potential positive impacts on the economy, it may be logical to hypothesize that Medicaid expansions may potentially improve financial outcomes for households with new beneficiaries, as a result of the reduced risk of out-of-pocket medical spending from obtaining Medicaid coverage [16].

2 Historical Background

Prior to the passage of the Affordable Care Act, 45 million Americans were uninsured [29]. Under the original 1965 Medicaid law, Medicaid eligibility was originally tied to cash assistance, but has since then evolved to accommodate a wider population range, including individuals with disabilities. As a result of the implementation of the Affordable Care Act, eligibility criteria for Medicaid health insurance coverage has been expanded to include low-income adults, shifting from categorical eligibility determination originally implemented to a financial evaluation of eligibility. Currently, these expansions are primarily funded by the federal government, the share of which is expected to phase down over time from 100% in 2014 to 2016 and 95% in 2017, ultimately to 90% from 2020 onward, with the remaining

share covered by state funding.

In addition to expanding insurance coverage and eliminating medical underwriting by insurance providers, the ACA encouraged enrollment by offering low to moderate-income individuals (defined as 100% to 400% of the Federal Poverty Level) tax credits for purchasing coverage on individual markets. Furthermore, the Act instituted an individual mandate, under which individuals must maintain minimum essential coverage through enrolling in qualified health insurance plans in order to avoid paying penalties [28]. The new implementation granted individuals who were enrolled in health insurance plans prior to March 23, 2010 "grandfathered status", which would exempt them from the coverage penalty should the insurance company continue to offer their current package and they continue to elect to receive coverage [20]. In contrast, individuals who purchased health insurance plans post that cutoff date are required to meet all the newly-mandated requirements of the ACA within their 2014 plan renewal date. Effective 2019, the individual mandate penalty, also known as the Shared Responsibility Payment, has been repealed through the passage of the Tax Cuts and Jobs Act by Congress in December 2017 [15].

Although the ACA was originally intended to provide additional coverage to all states and regions, actual implementation proved difficult. In the 2012 case of *National Federation of Independent Business v. Sebelius*, the United States Supreme Court delegated the decision of whether to expand Medicaid to state jurisdiction. By the conclusion of 2015, 29 states had implemented Medicaid expansions. Within the states that chose to expand coverage, health insurance coverage rates have increased considerably compared to those of states that chose not to expand [5].

Over the span of two years from 2013 to 2015, Medicaid expansion of the 29 states boosted total enrollment by 12.3 million individuals [13]. Over the same two years, the percentage of uninsured individuals decreased by 15.5 percentage points in states that expanded Medicaid compared to 9.6 percentage points in states that did not, a potential early indicator of the promising impacts of expansion [35]. As of February 2019, 37 states including the District of Columbia had expanded Medicaid coverage for its residents, while the remaining 14 states

had not (See Figure 1) [35]. Over the last five years, according to data reported at the end of 2018 from the United States Medicaid Open Data Set, net Medicaid enrollment increased coverage for more than 15.3 million people, a 27.11% increase from September 2013 [24]. To estimate the effects of Medicaid expansion on financial outcome, changes in Medicaid eligibility criteria and discrepancies between state expansion status across the nation are utilized to draw comparisons.
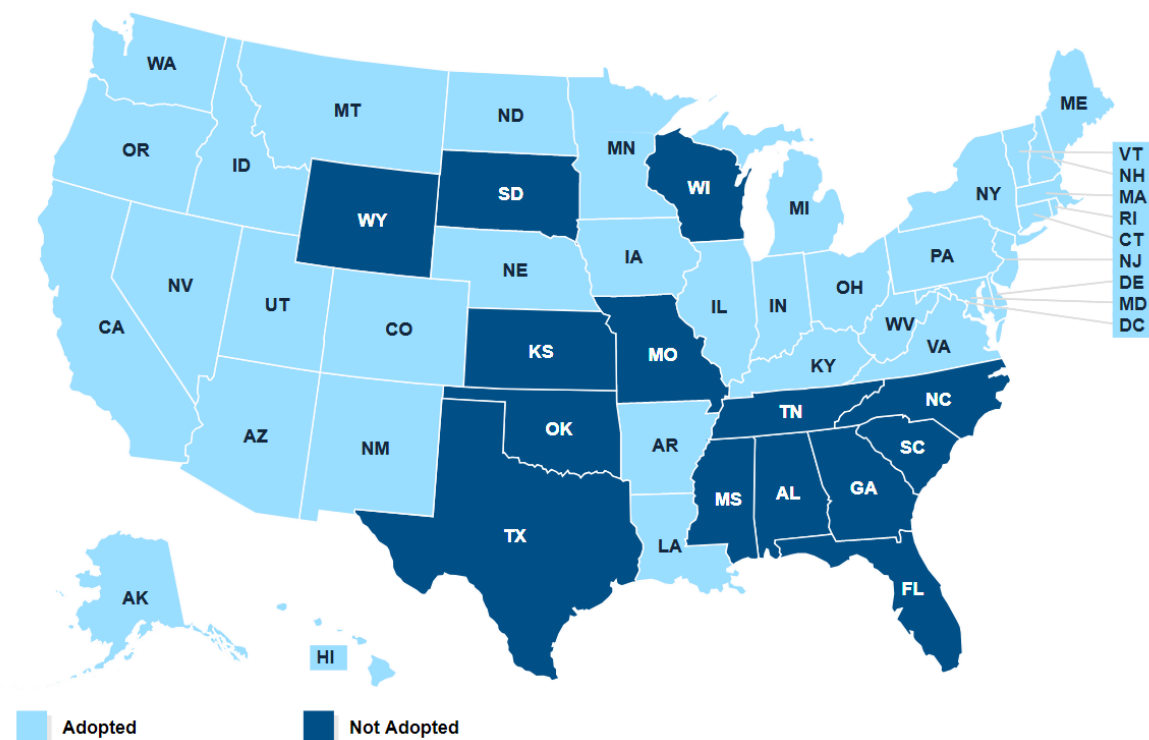

Figure 1: Medicaid Expansion Status as of February 2019

When states are delegated the decision whether to expand Medicaid coverage to its residents from the federal government, a "coverage gap" results due to differences in expansion decisions among the states nationally. As illustrated below in Figure 2, more than 2.5 million low-income, uninsured adults nationwide fall into the coverage gap [17]. These individuals are primarily non-elderly, without dependent children, and with incomes above current Medicaid eligibility requirements but below the lower-bound limit for premium tax credits for purchasing healthcare insurance on the open marketplace. Had the states these individuals

were residing in chosen to expand Medicaid coverage, these individuals would be able to benefit from expanded eligibility as new beneficiaries. Research has found that the coverage gap between expansion and non-expansion states has continued to widen since 2014 [1]. These uninsured adults without dependent children are most concentrated in states with the largest uninsured populations, with close to one-third of said individuals residing in Texas, a state with both restrictive Medicaid eligibility and a sizable uninsured population [17].

If Medicaid expansions were implemented on a nationwide level with adoption and implementation from all states, then an additional 4.5 million currently uninsured adults will be able to gain Medicaid coverage under the expanded eligibility criteria as a result of the ACA. These 4.5 million additional individuals include the 2.5 million nonelderly individuals without dependent children with incomes between pre-expansion Medicaid eligibility and 100% of the Federal Poverty Line, and 2.0 million individuals with incomes between 100% and 138% of the Federal Poverty Line who were previously only eligible for marketplace insurance coverage. The alarmingly high number of individuals currently within the coverage gap without health insurance coverage further sheds light on the undeniable impact expanded coverage across the nation may have on currently uninsured populations in states that had chosen not to pursue Medicaid expansions.

Furthermore, research from early implementations of the Affordable Care Act suggests that marketplace insurance coverage may be more limiting than Medicaid in terms of covering behavioral health services, prescription drugs, and rehabilitative and habilitative services [9]. Additional related research further substantiates the strong foreseeable positive impact of Medicaid expansions, suggesting that when compared to marketplace insurance plans, Medicaid coverage expansion realized a materially larger reduction in average total out-of-pocket spending, average out-of-pocket premium spending, and average cost-sharing spending [1].

Total = 4.9 Million Nonelderly Uninsured Adults

Currently Eligible for Medicaid
0.4 Million (8%)

Currently in the Coverage Gap
2.5 Million (51%)

Currently Eligible for Marketplace
2.0 Million (41%)

Income Below Current Medicaid Eligibility

Income Between Medicaid Eligibility & 100% FPL
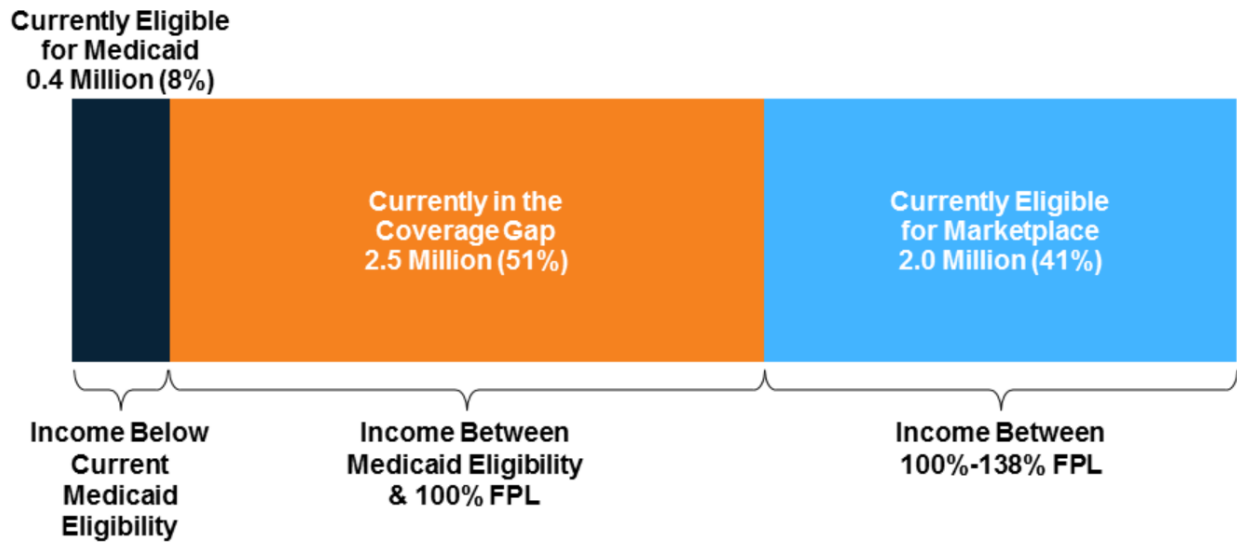
Income Between 100%-138% FPL

Figure 2: Eligible Nonelderly Uninsured Adults in Non-Expansion States

Finally, studies suggest that Medicaid expansion can promote employment or positively impact the labor market [31]. Evidence of sizable job growth resulting from expansion has been documented in state-specific studies conducted in Michigan, Pennsylvania, and Louisiana, while there is no current evidence of negative expansion effects on employment [3] [26] [30]. Additionally, Colorado has supported more than 31,000 job increases due to Medicaid expansion as of fiscal year 2016, and Kentucky has estimated that expansion would create over 40,000 jobs through 2021 [2] [11]. Furthermore, a study has shown that disabled adults residing in expansion states are significantly more likely to be employed and less likely to be unemployed due to disability status compared to disabled adults in non-expansion states [23].

The positive effects of Medicaid expansion are numerous. In a study conducted in early 2017, new Medicaid enrollees in Ohio, an expansion state, reported that expanded coverage has facilitated the process of both seeking and maintaining employment [32]. Currently, approximately 60% of adults under Medicaid coverage are employed [18], with their labor participation status broken down below in Figure 3.

With a shift towards increased beneficiary funding commitment through employment,

new Medicaid proposals with built-in work requirements could further complicate coverage eligibility and overturn previous implementations intending coverage to include those who are unsuccessful in securing employment. These potential future policies could pose foreseeable complexities and financial strain on state governments by increasing the number of personnel hired to cross-verify employment or exemption status in compliance with newly-enforced work requirements [31].
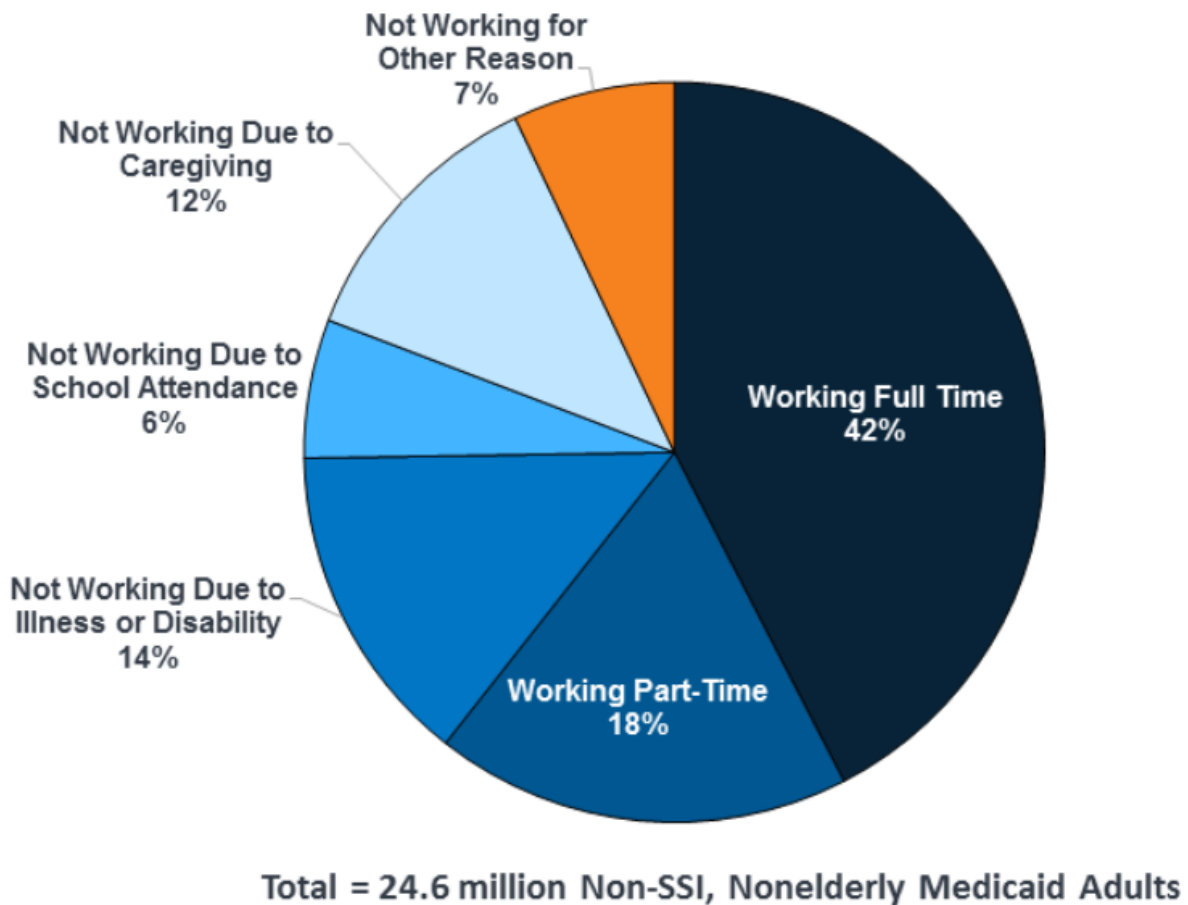

Figure 3: Labor Participation Breakdown of Non-elderly Medicaid Adults [31]

3 Related Research

Despite the potential importance research concerning the impact of publicly provided health insurance on financial well-being of low-income individuals may have on policy making, only a few studies have focused on determining the impact of Medicaid on financial outcomes.

In 2011, Gross and Notowidigdo examined pre-expansion Medicaid eligibility in the 1990s (which covered mostly children and pregnant women) by consolidating personal bankruptcy filings at the state level. They concluded that a ten percentage point increase in Medicaid eligibility reduced personal bankruptcy by approximately eight percent [19]. Similarly, according to Baicker et al. in 2013, the Oregon Health Insurance Experiment concluded that low-income adults in Oregon who received Medicaid coverage are 44% less likely to undertake loans or other forms of debt to pay for medical care and 23% less likely to face medical collection [4]. In addition, there exists evidence of a relationship between decreases in rates of personal bankruptcy and previous expansions of Medicaid [19].

In *The Oregon Health Insurance Experiment: Evidence from the First Year*, Finkelstein et al. examined the relationship between Medicaid access, healthcare usage, and medical debt by conducting a random experiment. The experiment involved a lottery in which uninsured adults in the state of Oregon with incomes up to the Federal Poverty Level were randomly selected for eligibility for Medicaid enrollment. Information from the selected beneficiaries one year post enrollment in Medicaid indicated a reduction of 6.4% in the probability of having outstanding medical bills sent to collections, equivalent to approximately a decrease of $390 on average outstanding debt [16]. Furthermore, recent research on Medicaid expansions provide evidence of decreased debt amounts outstanding to collections agencies as a result of ACA implementation [21].

Additionally, in 2016, Mazumder and Miller studied insurance expansions in Massachusetts, identifying effects on financial outcomes related to personal credit, including debt past due, accumulated credit balance, and amount under third-party collections. Through the study, the authors produced estimates for reductions in total debt overdue (22%), total balance subject to collections (20%), and likelihood of personal bankruptcy (19%) across individuals aged 18 to 64 [27]. Similarly, a research study conducted in January 2017 of Ohio's Medicaid expansion discovered a reduction of medical debt by nearly half for new expansion enrollees since enrolling in Medicaid (55.8% had debt before enrollment, compared to 30.8% with debt three years after coverage expansions), along with state monetary gains of $199 million due

primarily to revenue from premium tax of care-providing organizations [7].

Finally, in 2016, research by Hu et al. suggest that Medicaid expansions decreased average debt balances by approximately $600 to $1,000 per new enrollee, utilizing collections data on non-medical balances [21]. Their work demonstrates the considerable reduction of both large derogatory debt balances and the likelihood of new medical debt collections as a result of Medicaid expansion. In *The Effect of the Patient Protection and Affordable Care Act*, Hu et al. found that Medicaid expansions significantly reduced the amount of debt in third-party collection agencies among those living in zip codes with high proportions of low-income and uninsured. Intention-to-treat (ITT) estimates suggest that the 2014 Medicaid expansions were strongly associated with decreases of between $51 and $85 in collection amounts [21]. These results corroborate with the logical assumption that unpaid medical bills, which usually arise as a result of medical out-of-pocket expenses, can be directly decreased through expanded Medicaid coverage [6]. Although the results of Hu et al. indicate the important positive financial impacts beyond the healthcare context, they are consistent with many findings of more recent work, specifically research conducted by Finkelstein et al., which documented the approximately balanced incidence of financial effects on both the uninsured and their respective third party collection agencies [16]. Given this finding, it is reasonable to expect third party lenders and creditors to benefit, as least partially, from the positive financial effects of decreased unpaid bills from low-income and uninsured individuals from Medicaid expansion.

While there exist other studies that have evaluated the impacts of health insurance coverage on financial well-being in the United States, including Barcellos and Jacobson in *The Effects of Medicare on Medical Expenditure Risk and Financial Strain (2013)*, the above research studies most closely relate to the subject of interest of this paper.

4   Data

The data utilized in this paper are derived from *The Quarterly Report on Household Debt*

and Credit from the Federal Reserve Bank of New York, the Small Area Health Insurance Estimates (SAHIE) Group at the United States Census Bureau, Bureau of Labor Statistics, the American Community Survey, and the Board of Governors of the Federal Reserve System. The data utilized span the years from 2012 to 2016, two years prior to and two years after Medicaid expansion in 2014.

The data set obtained from the Federal Reserve Bank of New York and the Board of Governors of the Federal Reserve System contain information regarding the range and average of household debt-to-income levels from the years 2012 to 2016, sorted according to the five-digit Federal Information Processing Standard (FIPs) code unique to each state and county. The data from the Small Area Health Insurance Estimates (SAHIE) Group at the United States Census Bureau provide additional critical information on age categories, income levels, and the number and percentage of insured and uninsured population in counties across the nation, sorted similarly by the five-digit FIPs code geographic identifier. The Local Area Unemployment Statistics Program of the Bureau of Labor Statistics provides information on labor force statistics in the years of interest from 2012 to 2016, including the total population of the specific county's labor force, county-specific number of individuals employed, county-specific number of individuals unemployed, and county-specific unemployment rates.

In the context of Medicaid expansions, this paper focuses on the population aged 18 to 64, as they represent the portion of the population with both the legal ability to access credit and undertake debt and realistic likelihood to undertake additional borrowings (as age is commonly inversely related to risk tolerance), resulting in meaningful responsibility for financial outcomes. In addition, the data in this paper focus on observations with incomes below but up to 138% of the Federal Poverty Line, individuals who now qualify for Medicaid coverage as a result of eligibility expansion under the Affordable Care Act.

5 Empirical Strategy and Model

To determine whether Medicaid expansions improved financial outcomes of new beneficiaries, indicators of financial position such as average household debt levels were studied, comparing individuals before and after the expansions in counties that expanded Medicaid under the ACA to similar individuals in counties that did not.

Drawing on the separate data sets obtained from the aforementioned sources, information on the observations were merged to form the final data set based on each area's Federal Information Processing Standard (FIPs) code, a five-digit unique area identifier for each county, with two leading digits for the state and three trailing digits for the county. The aggregate data displays characteristics such as average household debt levels, health insurance coverage status, expansion status of each area, and local unemployment rate by county, all sorted according to the area FIPS code as a unique identifier and calendar year. Based on information provided in the final merged data set sorted according to both year and county, the data was split into two categories: "treatment" and "control", based on whether Medicaid was expanded in that specific state and county. Those that had expanded Medicaid were sorted into the "treatment" group, whereas those that had not expanded Medicaid were sorted into the "control" group to facilitate further comparison of expansion effects.

To further identify the relationships amongst the variables of interest, interaction term variables were created. In the model, expansion year interaction terms such as between the calendar expansion year, expansion status, and the percentage of low-income, uninsured population were created. To accurately draw comparisons of expansion effects at a more granular level between pre-expansion, during expansion, and post-expansion time periods, additional interaction terms were generated, including between after-expansion calendar year, expansion status, and the percentage of low-income, uninsured individuals at the county level. These additional terms allow for a more detailed and accurate comparison between pre-expansion and post-expansion effects on financial outcomes. In order to control for the calendar year of interest, dummy variables were generated for each year from 2012 to 2016 to facilitate the

difference-in-differences regression process.

The fundamental underlying assumption of this specific approach is the *parallel trends assumption*, which assumes comparable changes in financial outcomes between households with similar financial status and age composition in areas that did and did not expand Medicaid, had Medicaid expansions never been formally implemented under the Affordable Care Act. Given this assumption, the results would provide confidence for the effectiveness of Medicaid expansions if the examined outcomes of expansion areas displayed drastically different trends post expansion implementation when compared to any previously observed trends prior to coverage expansion.

The base model developed for this process is as follows:

$$
\begin{aligned}
Y = {} & \alpha + \beta_1 \cdot E \cdot ULI + \beta_1' \cdot EY \cdot E \cdot ULI + \beta_1'' \cdot AEY \cdot E \cdot ULI \\
& + \beta_2 \cdot ULI + \beta_2' \cdot EY \cdot ULI + \beta_2'' \cdot AEY \cdot ULI \\
& + \beta_3 \cdot E + \beta_3' \cdot EY \cdot E + \beta_3'' \cdot AEY \cdot E \\
& + \beta_4 \cdot D_{2012} + \beta_4' \cdot D_{2013} + \beta_4'' \cdot D_{2014} + \beta_4''' \cdot D_{2015} + \beta_4'''' \cdot D_{2016} \\
& + \beta_5 \cdot U \\
& + \varepsilon
\end{aligned}
\tag{1}
$$

where:

Y represents the average household debt level,

E represents the expansion status of each county,

ULI represents the percentage of uninsured, low-income individuals,

EY represents the calendar expansion year,

AEY represents years post expansion,

D_i represents the calendar year dummy for each respective year from 2012 to 2016,

U represents the county-level unemployment rate, and

ε represents the error term

Coefficient estimates for three-way interaction terms between expansion and after-expansion years, expansion status, and the percentage of uninsured, low-income individuals within each county with incomes up to 138% of the Federal Poverty Level are generated. These two three-way interaction terms delineate any potential effects of reinforcement or negation between the variables on financial outcomes, thus serving as our coefficients of interest in the difference-in-differences approach. Additionally, coefficient estimates from two-way interaction terms between expansion year and ULI identify geography-specific trends in rates of exposure to insurance coverage over time. Similarly, coefficient estimates of of two-way interaction terms between expansion status and expansion year illustrate expansion-county specific trends across time periods.

In order to run the model through STATA, a statistical and data analysis software, panel data is set according to the command `xtset`, allowing the software to later run regressions with time fixed effects. After setting the data as panel data in STATA, the data is identified to be `strongly balanced`, with all counties having appropriate respective data available for all calendar years for the regression process. In order to run the regression using appropriate time fixed effects, the process is run using `xtreg`, which recognizes the panel data and regresses it according to fixed effects as opposed to the preset ordinary least squares (OLS) regression.

6   Results

Utilizing the above model on consolidated data, the results are illustrated below, examined both separately according to pre-expansion, expansion year, and post-expansion time periods and holistically across time for five years beginning two years prior to expansion year to two years post expansion year.

During the years of 2012 and 2013 prior to expansion of Medicaid, the below trends are observed:

	(1)
	Average Debt (% Income)
Percent Uninsured	0.110
	(0.132)
2013 Year Dummy	-2.632^{***}
	(0.353)
Unemployment Rate	3.615^{***}
	(0.428)
Constant	46.96^{***}
	(5.943)
Observations	5787
p-value	0.000
F Statistic (3, 2851)	109.3
Degrees of Freedom$_{Model}$	2935
Degrees of Freedom$_{Residual}$	2851

Standard errors in parentheses

$^{*}\ p < 0.05,\ ^{**}\ p < 0.01,\ ^{***}\ p < 0.001$

Table 2: Pre-Expansion Regression

According to the above results for the Medicaid pre-expansion period, on average, for every 1% increase in the percentage of low-income individuals (those with incomes at or below 138% of the Federal Poverty Line) who are uninsured during this time period, there is a 0.11% increase in expected average household debt percentage on average. This expected increase may be due partially to additional borrowing to smooth financial outflow requirements, especially to satisfy medical charges due to lack of health insurance.

Similarly, the above results indicate a positive relationship between local area county unemployment rate and average debt levels prior to expansion, which is consistent with expectations of the impact of borrowing during unemployment on average committed debt. During this time period, for each percentage increase in the local area county unemployment

rate, average debt levels are expected to increase by 3.615% on average. This increase is considerable as it illustrates the strong relationship between local area county unemployment rate and average debt levels as unemployment often pushes individuals to resort to higher levels of borrowing in order to maintain comparable standards of living or to satisfy basic living expenses. This coefficient is also statistically significant, with a p-value of less than 0.001, indicating that this effect is highly unlikely to occur due solely to chance and could thus identify a potentially casual relationship between unemployment rate and average debt levels.

During the expansion year of 2014, the effects of Medicaid expansion on expected average household debt levels are illustrated below:

	(1)
	Average Debt (% Income)
Expansion Year · Expansion Status · ULI	0.292
	(0.217)
Percent Uninsured	-0.300^*
	(0.135)
Expansion Year · Expansion Status	-9.647
	(6.717)
Unemployment Rate	2.408^{***}
	(0.353)
Constant	65.49^{***}
	(5.631)
Observations	2914
p-value	$3.07e-11$
F Statistic (4, 2909)	13.91
Degrees of Freedom$_{Model}$	4
Degrees of Freedom$_{Residual}$	2909

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Expansion Year Regression

Interaction terms were included in this regression to identify any potentially reinforcing or offsetting effects among the variables of interest when taken together. According to the above results, when the effects of expansion year, expansion status, and the percentage of uninsured, low-income population are taken together, average household debt levels are expected to increase by 0.292% on average. However, during 2014, results indicate that for every 1% increase in the percentage of low-income, uninsured individuals, average debt levels can be expected to decrease by 0.3% on average. Since obtaining Medicaid coverage may reduce the need for individuals to save for precautionary reasons as they now have considerable portions

of critical medical procedures covered, they may choose to increase consumption or upgrade to a higher standard of living from the increase in disposable income due to new Medicaid coverage that was previously unavailable to them [21]. Such increases in consumption and upgrades in lifestyles could prompt additional borrowing, resulting in higher average debt levels as indicated in the above relationship and results. Thus, not receiving healthcare insurance coverage could urge individuals to save for potentially exorbitant unexpected medical expenses, which could result in curtailed consumption and thus less inclination to undertake addition borrowing, resulting in lower average debt levels as illustrated above.

During 2014, counties that expanded Medicaid experienced a sharp drop in expected average household debt levels. When the effects of being in the expansion year and choosing to expand Medicaid are taken together, counties that experience both of these impacts simultaneously can be expected to see a 9.647% decrease in expected average household debt levels on average. This sizable expected decrease in average debt levels for counties in states that expanded Medicaid during expansion year could potentially point to the effectiveness of Medicaid expansions in bettering household financial outcomes.

Compared to the effects of unemployment rate on average household debt in the pre-expansion period, the effects of unemployment rate on average household debt during the expansion year is slightly more moderate, due possibly to expanded Medicaid coverage to previously uninsured or ineligible populations. According to the above results, for every 1% increase in the local area county unemployment rate, average debt levels are expected to increase by 2.408% on average. This effect is more moderate compared to the 3.615% during the periods prior to Medicaid expansion, which may potentially illustrate the positive effects of Medicaid expansion on offsetting costs that would otherwise have to be incurred and curtailing additional borrowings to satisfy these otherwise incurred costs. Under Medicaid expansion, individuals who are able to obtain coverage as new beneficiaries will receive additional protection and security against hefty costs of critical medical procedures, even during unemployment or part-time employment. This additional security afforded through expanding Medicaid coverage provides protection against potentially crippling medical debt,

flexibility and leeway to not have to undertake additional borrowings to satisfy these other-wise incurred expenses as a last resort, allowing new beneficiaries to improve their financial outcomes by reducing committed debt obligations.

In the years of 2015 and 2016 after the majority of Medicaid expansion efforts, the below results are observed.

	(1) Average Debt (% Income)
After Expansion Year · Expansion Status · ULI	0.155
	(0.151)
Percent Uninsured	−0.258**
	(0.0840)
After Expansion Year · Expansion Status	−5.704
	(3.592)
2016 Year Dummy	−0.987
	(1.097)
Unemployment Rate	1.257***
	(0.274)
Constant	71.15***
	(3.213)
Observations	5875
p-value	0.00000577
F Statistic (5, 5869)	6.429
Degrees of Freedom$_{Model}$	5
Degrees of Freedom$_{Residual}$	5869

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Post-Expansion Regression

In above analysis, interaction terms were similarly included to identify potentially re-

inforcing or offsetting effects among the variables of interest when taken together. When the effects of after expansion year, expansion status, and the percentage of uninsured, low-income population are taken together, average household debt levels are expected to increase by 0.155% on average. This more moderated effect compared to during the expansion year could potentially illustrate the dampening effects of Medicaid expansion on changes in expected average debt levels in years post the expansion, keeping sharp increases in average debt levels in check.

In a similar context, for each percentage increase in the percent of individuals who are uninsured, average debt levels are expected to decrease by 0.258% on average. In line with the reasoning in the previous analysis, not receiving healthcare insurance coverage could prompt individuals to save in a precautionary manner for potentially exorbitant unexpected medical expenses, which could result in lower consumption decisions and thus less inclination to undertake additional borrowings, resulting in lower levels of debt.

When the effects of being in a year post Medicaid expansion and expansion status are taken into consideration jointly, the above results suggest a 5.704% decrease on average in the expected average debt levels. This result is in line with expectations and may serve to illustrate the effectiveness of Medicaid expansions on improving financial outcomes through considerably decreasing expected average debt levels during years post implementation in areas that experienced expansion.

Finally, as suggested by the analysis above, for every 1% increase in the local area county unemployment rate, average debt levels are expected by increase by 1.257% on average. Compared to 2.408% in the previous analyses during expansion year and 3.615% during the pre-expansion period, the effects of unemployment on average debt levels are considerably more moderate in years after Medicaid expansion. This dampening of the impact of county level unemployment rate on average debt levels observed in the years after expansion could suggest positive effects on financial outcomes as a result of Medicaid expansions. Since new Medicaid beneficiaries will receive security against costs of critical medical procedures even during unemployment or part-time employment, they are afforded additional flexibility

through incurring significantly lower out-of-pocket medical co-payment for care received. As a result, the net effect of unemployment on average debt levels given expanded coverage is expected to dampen, as illustrated in the above results that are in line with expectations.

Finally, when applied to the final aggregated data matched according to state and county FIPs codes, the baseline model developed above yields the following results:

	(1) Average Debt (% Income)
Expansion Year · Expansion Status · ULI	−0.4372
	(0.0755)
After Expansion Year · Expansion Status · ULI	−0.4263
	(0.0635)
Percent Uninsured	−0.0208
	(0.0446)
Expansion Year · ULI	0.0694
	(0.0474)
After Expansion Year · ULI	0.113**
	(0.0364)
Expansion Year · Expansion Status	1.319
	(2.360)
After Expansion Year · Expansion Status	0.848
	(1.519)
2013 Year Dummy	−2.818***
	(0.340)
2014 Year Dummy	−7.339***
	(1.844)
2015 Year Dummy	−6.489***
	(1.437)
2016 Year Dummy	−6.122***
	(1.454)
Unemployment Rate	3.197***
	(0.147)
Constant	55.77***
	(2.045)
Observations	14576
p-value	0.000
F Statistic (12, 11568)	189.6
Degrees of Freedom$_{Model}$	3007
Degrees of Freedom$_{Residual}$	11568

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Base Model Regression

Under the above model, dummy variables for each calendar year of interest were included to control for effects on average debt levels that may have occurred in each year that are independent of other control variables, such as potential economic recessions that affect states and counties across the nation relatively uniformly and are unrelated to the other

variables analyzed. Since the time period of interest for this paper spans from 2012 to 2016 and includes two years prior to the expansion year and two years post the expansion year to observe any initial effects of expansion, the 2012 year dummy variable was dropped to avoid collinearity during the analysis. Similar to the previous processes, interaction terms were included to identify potentially reinforcing or offsetting effects among the variables of interest when taken together. Given the implementation of a difference-in-differences (DID) model, the coefficients of interest are of the interaction terms between both expansion year and after expansion year, taken together along with expansion status and the proportion of uninsured, low-income individuals. These coefficients illustrate the effects of Medicaid expansion on household financial outcomes that are beyond the usual effects expected according to the parallel trends assumption.

When the effects of expansion year, expansion status, and the population percentage of uninsured, low-income individuals are taken together, average debt levels are expected to decrease by 0.4372% on average. Additionally, when the effects of after expansion year, expansion status, and uninsured, low-income population percentage are taken together, average debt levels are similarly expected to decrease by 0.4263% on average. As the coefficients of interest, these two percentages highlight the early effects of Medicaid expansion, since two years may not be sufficient time for all intended effects to realize. In furthering this analysis, it is reasonable to obtain 95% confidence intervals for relevant coefficients, identifying ranges that most appropriately capture the specific effects of a variable or interaction term on average debt levels. To arrive at the lower bound of the 95% confidence interval, each coefficient estimate is subtracted by two times its respective computed standard error. Conversely, the upper bound of the 95% confidence interval is the sum of each coefficient estimate and two times its respective computed standard error. This range is represented as $[\hat{\beta} - 2 \cdot SE, \hat{\beta} + 2 \cdot SE]$. Using this formula, the 95% confidence interval for the interaction term *Expansion Year · Expansion Status · ULI* is calculated to be [-0.1917, 0.1043]. Computed using the same formula, the 95% confidence interval for the interaction term *After Expansion Year · Expansion Status · ULI*, the DID coefficient, is calculated to be [-0.1671,

0.0819]. These two 95% confidence intervals provide reasonable ranges by establishing upper and lower bounds that reasonably capture the true effect of the variables or interaction terms of interest on the dependent variable with 95% confidence on average. Given the initial effects of Medicaid expansion, it may make sense for more states to pursue the decision of expanding Medicaid, since as detailed in the previous analyses and according to research results of numerous studies cited previously, Medicaid expansion is found to be associated with lower average debt levels, a strong indicator of improved financial outcomes. This decrease in average debt levels as a result of Medicaid expansion could pave the way for more robust individual and household financial outcomes.

According to the above results, for every 1% increase in the percent of uninsured individuals, a 0.0208% decrease in average debt levels can be expected on average. The 95% confidence interval for the variable *Percent Uninsured* is computed to be [-0.1082, 0.0666] utilizing the formula established previously. Given this range, our method provides strong confidence that the true relationship between the percentage of uninsured population and average debt levels is contained within the computed upper and lower bounds. Drawing from the reasoning in the previous analyses, which was also discussed briefly by Hu et al., not receiving healthcare insurance coverage may prompt individuals to save in a precautionary manner for unexpected medical expenses, which is likely to result in less inclination to consume and thus less borrowing to satisfy this consumption. This reduced borrowing as a result of precautionary saving has a foreseeable positive impact on reducing average debt levels, improving financial outcomes for both individuals and households.

When considered jointly, the effects of expansion year and the proportion of uninsured, low-income population result in an on average expected increase of 0.0694% in average debt levels. Similarly, when the effects of after expansion year and proportion of uninsured, low-income population are taken together, average debt is expected to increase by 0.113% on average. To extend this analysis further, it is reasonable to also compute 95% confidence intervals for the two interaction terms above. Using the same formula noted earlier, $[\hat{\beta} - 2 \cdot SE, \hat{\beta} + 2 \cdot SE]$, the 95% confidence interval for the interaction term *Expansion Year*

· ULI is computed to be [-0.0235, 0.1624]. In the same vein, the 95% confidence interval for *After Expansion Year* · ULI is calculated to be [0.0421, 0.1846]. This method produces a range defined by an upper and lower bound that captures the true relationship between *Expansion Year* · ULI and *After Expansion Year* · ULI and expected average debt levels with strong confidence. This positive association between the two interaction terms above and expected average debt levels may be due partially to the increased flexibility in borrowing decisions and options and disposable income for newly-insured beneficiaries of Medicaid expansion, evidenced by a stronger relationship during post-expansion years than compared to the relationship during expansion year. Since Medicaid coverage may reduce the inclination for individuals to "save for a rainy day" as they now have financial protection against most major critical medical procedures, they may choose to increase consumption or upgrade to a higher standard of living from the increase in disposable income due to new Medicaid coverage [21]. Such increases in consumption and upgrades in lifestyles will likely prompt more borrowing, resulting in higher average debt levels as indicated in the above relationship.

When the effects of expansion year and expansion status are taken together, average debt levels are expected to increase by 1.319% on average. Similarly, when the effects of after expansion year and expansion status are taken together, average debt levels are expected to increase by 0.848% on average. The results of expanded Medicaid coverage are evidenced from these results, with a lower expected average debt level during post-expansion years in states that experienced expansion compared to expected average debt levels prior to expansion. This result is intuitive and consistent with logical expectations.

Finally, according to the results above, for each percentage increase in the local area county unemployment rate, average debt levels are expected to increase 3.197% on average. This is in line with both previous results and logical expectations as higher local area unemployment rates may force individuals without employment or steady income streams to undertake additional debt obligations in order to smooth out their consumption.

To analyze the differences in results from both treatment and non-treatment states under the base model, a comparison is drawn between interaction terms and variables which take

into account Medicaid expansion status and those that do not. Specifically, a comparison is drawn between variables and interaction terms of expected trends for non-treatment states as indicated by non-expansion, and impacts beyond expected trends for treatment states as indicated by Medicaid expansion. The variables and interaction terms associated with baseline trends under the assumption of non-expansion include *Percent Uninsured*, *Expansion Year · ULI*, and *After Expansion Year · ULI*. The interaction terms and variables associated with expansion effects include *Expansion Year · Expansion Status · ULI*, *After Expansion Year · Expansion Status · ULI*, *Expansion Year · Expansion Status*, and *After Expansion Year · Expansion Status*.

When comparing the expansion results (treatment group) of *Expansion Year · Expansion Status · ULI* (-0.0437) and *After Expansion Year · Expansion Status · ULI* (-0.0426) against the baseline non-expansion results (control group) of *Expansion Year · ULI* (0.0694) and *After Expansion Year · ULI* (0.113), the positive impact of Medicaid expansion on financial outcomes is evident from the substantial decrease in expected average debt levels post implementation of Medicaid expansions. The above analysis of base model results reveal trends and relationships that are largely consistent with intuition and logical expectations, and highlights the beneficial impacts of Medicaid expansion on financial outcomes as measured by household expected average debt levels.

Thus, when analyzing the initial effects of Medicaid expansion on financial outcomes during the pre-expansion years (2012 to 2013), expansion year (2014), post-expansion years (2015 to 2016), and holistically across all five years using the difference-in-differences approach in the base model, an examination of obtained results suggest general consistency with expected trends and relationships. Key results identified also corroborate with the previously stated hypothesis that Medicaid expansions may reduce out-of-pocket risk associated with medical spending and thus debt levels, which may improve financial outcomes for households with new beneficiaries.

7   Conclusion

More than four years after the majority of implementations of Medicaid expansion as a result of the Patient Protection and Affordable Care Act (ACA), research suggests that Medicaid expansions provide meaningful financial protection to those who are low-income and previously uninsured. Since populations of low socio-economic status and marginalized communities are more susceptible to disease due to disadvantaged access to resources and sub-optimal access to and ability to afford expensive medical treatment, additional financial security provided by Medicaid expansions is especially crucial to their health and well-being. Given the high cost of medical procedures and health care services in the United States, need for necessary life-saving procedures that may arise from serious illnesses or injuries may impose crippling costs for under-resourced populations that may extend far beyond the timeline of treatment and recovery.

This paper examined the initial effects of Medicaid expansion on populations that are most directly affected or impacted by these expansions, focusing on low-income individuals who recently gained eligibility for coverage enrollment (with incomes up to 138% of the Federal Poverty Line) and adults aged 18 to 64, who have the legal ability to undertake debt obligations with consideration of risk tolerance across states that chose to expand Medicaid and states that did not. Using county-level information on average household debt levels as an indicator of financial outcomes and well-being, this paper draws comparisons between the financial outcomes of those in states that experienced Medicaid expansion and those in states that did not, with additional granularity through utilizing county-level data. Derived from a balanced number of sources including the Federal Reserve Bank of New York, the United States Census Bureau, and the Bureau of Labor Statistics, the final data set utilized in this paper is an aggregated consolidation of all the individual data sets obtained from the aforementioned sources according to a five digit Federal Information Processing Standard (FIPs) code unique to each state and county. Analyses through the difference-in-differences (DID) approach utilized in this paper illustrate considerable effects of Medicaid expansions

on average debt levels, largely in line with intuition and expectations. Overall, the estimates of the effect of Medicaid expansion on financial outcomes is largely consistent with the hypothesis that expanded Medicaid coverage may positively impact household financial outcomes, despite fluctuations during the expansion year as effects of the new implementations are in the process of being realized.

As initial results of the impact of Medicaid expansions on financial outcomes two years after the majority of its implementations, these conclusions could have potentially far-reaching implications in regards to policy-making decisions. The decision to expand Medicaid provides benefits to both parties that are most immediately affected through medical transactions - both the providers and payers of medical services. Through Medicaid, low-income individuals are less likely to suffer from heavy financial burden that may last far beyond their treatment, which severely limits their access to credit markets and thus potential future well-being. Similarly, providers of healthcare services are able to collect payment for their services more reliably through the federal government as a result of Medicaid expansion, instead of through low-income individuals likely without the necessary funds, providing benefits to both sides of medical transactions.

Finally, substantial research has illustrated the additional positive impacts of Medicaid expansion on state well-being, beyond those on individuals and households. By increasing state savings via lowering uncompensated healthcare costs through expansion of Medicaid, federal and state funds can be redirected to bolster economic activity and create new jobs [1]. With demonstrated improvement in financial outcomes and well-being of new Medicaid beneficiaries who were previously barred from obtaining coverage prior to the Affordable Care Act (including low-income adults without dependent children), Medicaid expansions may be an option to consider for many states that have not expanded Medicaid coverage, and are grappling with issues regarding improving accessibility to affordable healthcare services and realizing better health outcomes.

Appendix

Additional Tables and Figures

States that did not expand Medicaid				
State	**Individuals with dependent children**		**Individuals without dependent children**	
	Pre-ACA	Post-ACA	Pre-ACA	Post-ACA
Alabama	23%	16%	NA	NA
Alaska	78%	128%	NA	NA
Florida	56%	35%	NA	NA
Georgia	48%	39%	NA	NA
Idaho	37%	27%	NA	NA
Indiana	24%	24%	NA	NA
Kansas	31%	38%	NA	NA
Louisiana	24%	24%	NA	NA
Maine	133%	105%	NA	NA
Mississippi	29%	29%	NA	NA
Missouri	35%	24%	NA	NA
Montana	54%	52%	NA	NA
Nebraska	58%	55%	NA	NA
New Hampshire	47%	75%	NA	NA
North Carolina	47%	45%	NA	NA
Oklahoma	51%	48%	NA	NA
Pennsylvania	58%	38%	NA	NA
South Carolina	89%	67%	NA	NA
South Dakota	50%	54%	NA	NA
Tennessee	122%	111%	NA	NA
Texas	25%	19%	NA	NA
Utah	42%	47%	NA	NA
Virginia	30%	52%	NA	NA
Wisconsin	200%	100%	NA	NA
Wyoming	50%	59%	NA	NA

Table 5: A Comparison: Medicaid Eligibility Before and After the Affordable Care Act (Non-expansion states) [25]

Year	Federal Poverty Line Cutoff	Medicaid Eligibility (138% of FPL)
2012	$11,170	$15,415
2013	$11,490	$15,856
2014	$11,670	$16,105
2015	$11,770	$16,243
2016	$11,880	$16,394
2017	$12,060	$16,643
2018	$12,140	$16,753

Table 6: Historical Federal Poverty Line Cutoffs (Single Individual Household, Not Inflation-Adjusted) [36]

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