MEDICAID EXPANSION AND FINANCIAL WELLBEING: EVIDENCE FROM LOUISIANA

A DISSERTATION

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Abstract:

My PhD thesis comprises three papers, primarily evaluating the impact of Medicaid expansion on the non-medical debt burden, with a specific focus on Medicaid beneficiaries in Louisiana and individuals with chronic health conditions.

The first paper delineates the financial predicament of individuals eligible for Medicaid in southern states yet to adopt expansion policies, utilizing credit report data from 1.4 million individuals across high uninsurance rate zip codes. Our findings suggest that if Southern non-expansion states were to adopt Medicaid expansion, the number of medical debts would decrease by 28.7%, and the medical debt balance would also decline by 46.5% from the baseline mean.

The second paper in my dissertation primarily investigates the effects of Medicaid expansion on non-medical debt and other financial indicators. Utilizing administrative data from Louisiana, we employed a difference-in-difference analysis and found that Medicaid expansion significantly reduces the number of non-medical debts and the incidence of 30-day delinquencies, while also improving individuals' Vantage scores. These findings underscore the positive role that Medicaid expansion plays in enhancing individuals' financial well-being.

The third paper in my dissertation primarily examines the impact of Medicaid expansion on both medical and non-medical debt among patients with chronic illnesses. Utilizing the same methodology as the second paper, we also applied a difference-in-difference analysis. The results indicate that, compared to Medicaid beneficiaries without chronic condition, Medicaid expansion has a more substantial effect in reducing both medical and non-medical debt for patients with chronic conditions, suggesting Medicaid expansion plays a crucial role in enhancing financial stability for vulnerable group.

Paper 1: Debt burden landscape in the Southern US, 2014-2019

Abstract:

Objectives: To depict the debt burden landscape of individuals eligible for Medicaid coverage should states decide to expand.

Methods: Utilizing credit reports for 1.4 million individuals from high uninsurance rate zip codes in non-expansion states (Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, Texas), we constructed a sample to project Medicaid expansion's potential impact on financial well-being. We explored disparities in financial indicators across demographic sectors, including urbanity, income, and race. Data collected annually from June 30, 2014, to 2019, formed a 6-year panel of 933,691 unique individuals.

Results: If other southern states were to achieve similar outcomes to Louisiana's Medicaid expansion, the number of medical debts in the southern states in 2019 could decrease to 1.39 counts, representing a 28.7% reduction from the baseline mean. The medical debt balance in the southern states in 2019 could also drop to $699, a 46.5% decrease from the baseline mean.

Conclusions: Our analysis reveals significant financial challenges for Medicaid-eligible individuals in Southern non-expansion states. Despite some debt alleviation factors, rising delinquencies and bankruptcy trends underscore ongoing financial vulnerabilities, especially in rural areas, emphasizing the necessity for comprehensive healthcare reform. Policymakers should also carefully consider a multitude of factors and create targeted policies aimed at reducing economic vulnerabilities and disparities prevalent among distinct demographic segments.

Introduction:

Health insurance serves as a financial buffer for households by decreasing medical expenses and facilitating consumption smoothing during periods of illness or job loss[1]. As of 2022, the average uninsured rate across United States was approximately 8%, yet states that have not expanded Medicaid under the Affordable Care Act exhibit markedly higher rates, averaging 11.9%[2]. Particularly in the Southern non-expansion states, where socio-economic disparities are more pronounced, uninsured rates ranged from 8.8% to an alarming 16.6%2. These disparities not only highlight the unequal access to healthcare but also suggest a broader impact on financial stability and debt accumulation among the population in these areas[2-3].

The nexus between healthcare coverage and financial health is well-documented, with medical debt being a leading cause of financial strain for many American families[4-7]. The lack of Medicaid expansion in certain Southern states exacerbates this issue, as uninsured individuals are often faced with exorbitant medical bills that can lead to debt accumulation, credit score degradation, and in severe cases, bankruptcy[6-7]. A substantial number of literatures has demonstrated the beneficial impact of Medicaid expansion on reducing medical debt and enhancing the financial well-being of individuals. For instance, Miller et. al. 's study in Michigan demonstrated that the enrollment in Medicaid significantly correlated with decreased amounts of unpaid bills, medical bills, and instances of poor credit history[8]. Caswell and Hu's study also witnessed financial improvements in states that expanded their Medicaid programs as measured by reduced medical bills, improved credit scores, and reduction in the probability of a new bankruptcy filing[6,9-10].

Despite the proven benefits of Medicaid expansion in reducing medical debt, the majority of Southern states had not adopted Medicaid expansion as of 2023[11]. The South is characterized

by higher poverty rates, a larger African American population, and greater medical burdens than other parts of the country[12-14]. These factors make the lack of Medicaid expansion in these states a critical policy issue. Although the study conducted by Callison and Walker on the Medicaid expansion in Louisiana, a Southern state, also asserts that adopting Medicaid expansion was associated with a reduction in the medical debt burden for those who gained coverage, the implications of such policy decisions for other Southern states remain unclear[15].

To address this uncertainty, it is necessary to depict the debt burden landscape for individuals eligible for Medicaid coverage should states decide to expand. However, while there are studies examining the distribution of medical debt across the United States, research specifically focusing on the Southern states that have not expanded Medicaid is scarce. Furthermore, there is a lack of research examining the association of financial debt with differences across socioeconomic groups, particularly among racial and ethnic groups, in states that have not adopted Medicaid expansion. Therefore, this paper employs credit report data to (1) document the scale and prevalence of various forms of financial debt in Southern states which have not expanded Medicaid, and (2) characterize the differences in these financial debts across urban-rural groups, income groups, racial groups, and age category groups.

Method:

Data Source and Study Population:

We have access to randomly extracted credit reports for approximately 1.4 million individuals residing in zip codes characterized by high uninsurance rates in states that, as of 2023, had not adopted Medicaid expansion. These states include Alabama, Florida, Georgia,

Mississippi, North Carolina, South Carolina, Tennessee, and Texas. Zip codes were classified as having a high uninsurance rate if, according to the 2015 American Community Survey, the proportion of uninsured individuals in that zip code exceeded the state's 75th percentile for zip code–level uninsurance rates. We used these data to construct our sample population who are likely to acquire coverage should their states adopt Medicaid expansion. By delineating the debt burden picture of potential beneficiaries of Medicaid expansion, we can better analyze the effects that Medicaid expansion in these states would have on individuals' financial well-being.

We collected data each June 30th from 2014 to 2019 to generate a 6-year panel dataset. These criteria resulted in a final sample of 933,691 unique individuals and 5,602,146 individual-years.

Study Outcome:

The credit report data includes several indices of financial debt. In our study, we included number of medical debt collection, medical debt balance, number of non-medical debt collection over $500, number of 30-day's delinquency, number of bankruptcy trades, and vantage scores as study outcomes. Medical debt collections capture the frequency of healthcare-related debts being referred to collection agencies; medical debt balance, indicating the total amount of outstanding medical debt and illustrating the financial weight of healthcare expenses; non-medical debt collections over $500, highlighting the prevalence of significant financial obligations beyond healthcare; the 30-day delinquencies, a marker of short-term financial strain indicating bills past due by at least a month; bankruptcy trades, reflecting severe financial distress through legal insolvency declarations; and vantage scores, a comprehensive assessment of creditworthiness consolidating various aspects of credit behavior and financial history. Together, these variables not only delineate the scope of financial health related to medical and non-medical debts but also

elucidate the broader implications of financial stability and creditworthiness in the context of consumer financial health.

Analysis:

Our study delineated the disparities in each financial indicator across different demographic groups, including urban-rural groups, income groups, racial groups and age categories. To measure the variations by income, we calculated the mean of each debt for the years 2014-2019, segmented by income quintiles derived from zip code-level per capita income estimates from the 2015 American Community Survey. Each zip code was allocated to an income quintile, enabling analysis of debt distribution across varying income levels. Similarly, for racial groups, we utilized the proportion of African Americans in each zip code to categorize them into quintiles. The age categories are divided into five groups, specifically: 18-30 years, 30-40 years, 40-50 years, 50-60 years, and over 60 years. Subsequently, we assessed each financial indicator within these quintiles and categories separately, thus providing a detailed examination of how financial debt indicators diverge among different socio-economic demographics.

Results:

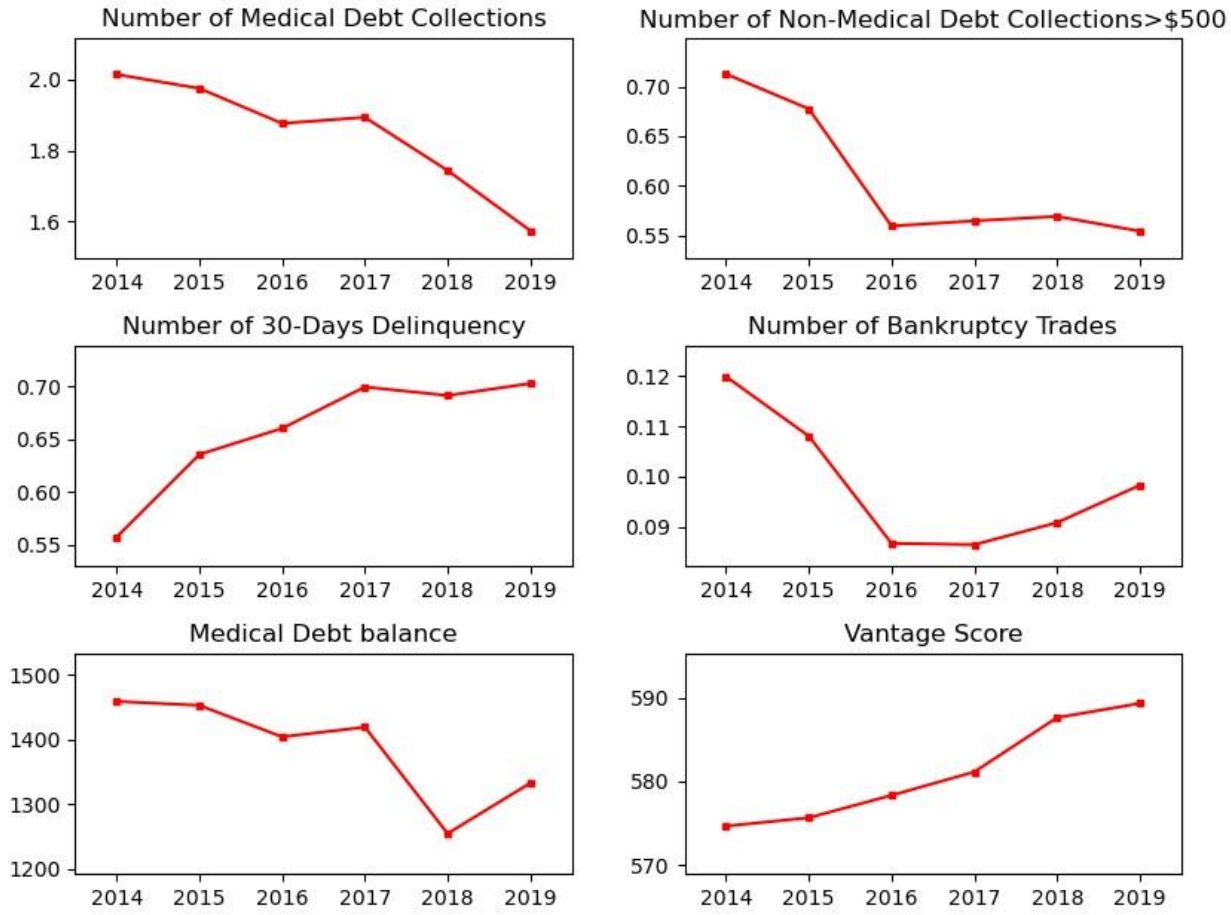

Figure1: Value of each financial indicator by year for 2014-2019

In the analysis conducted over the period from 2014 to 2019, our study meticulously tracked the annual fluctuations in various financial indicators, as depicted in Figure 1. Notably, the value of medical debt collections exhibited an overall declining trend throughout this timeframe. Despite a slight increase in 2017 compared to 2016, there was a significant reduction of 22% in the number of medical debt collections in 2019 relative to 2014. Both the number of non-medical debt collections over $500 and the number of bankruptcy trades experienced a sharp decrease between 2014 and 2016. However, post-2016, the trend in non-medical debt collections plateaued, while bankruptcy filings gradually increased. The medical debt balance saw a steady

decline until reaching its nadir in 2018 at $1,255, but to rebound sharply to $1,333 in 2019. The number of 30-day delinquencies consistently rose over the entire study period, marking a contrast to the overall declining trend observed in other debt indicators. In general, vantage scores improved steadily from 2014 to 2019, suggesting an incremental enhancement in the financial creditworthiness of potential Medicaid beneficiaries in the Southern states.

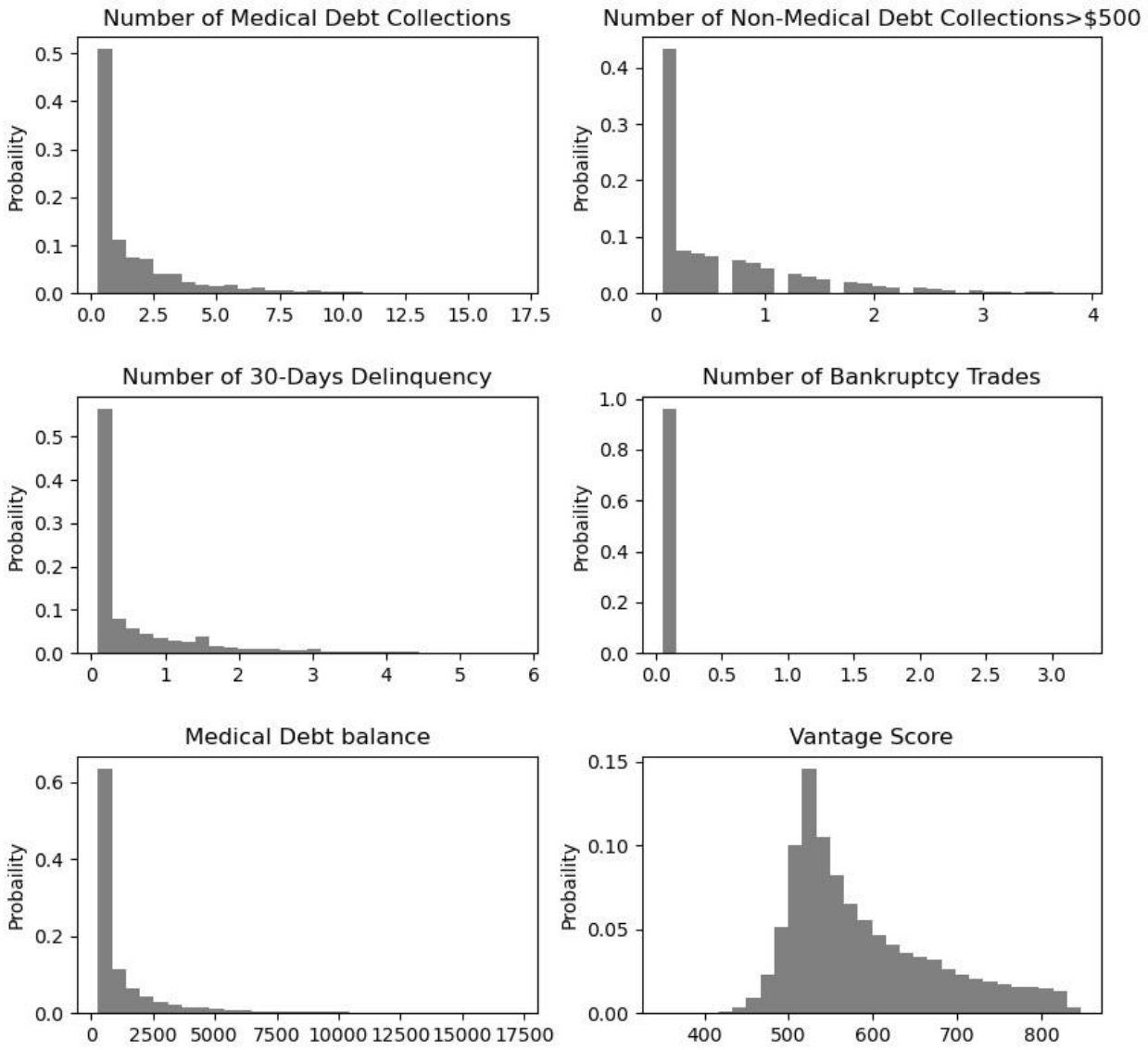

Figure2: Probability distribution of each financial indicator.

Figure 2 presents the probability distributions for various financial indicators. It is observable that, with the exception of the Vantage score, the shapes of almost all distributions resemble a long-tailed distribution, where the probability decreases as debt increases. Besides, the number of 30-day delinquencies shows a slightly higher probability at a value of 1.5 compared to its surroundings. The shape of the Vantage score distribution appears to be bimodal, with the probability reaching a peak around a value interval of approximately 530.

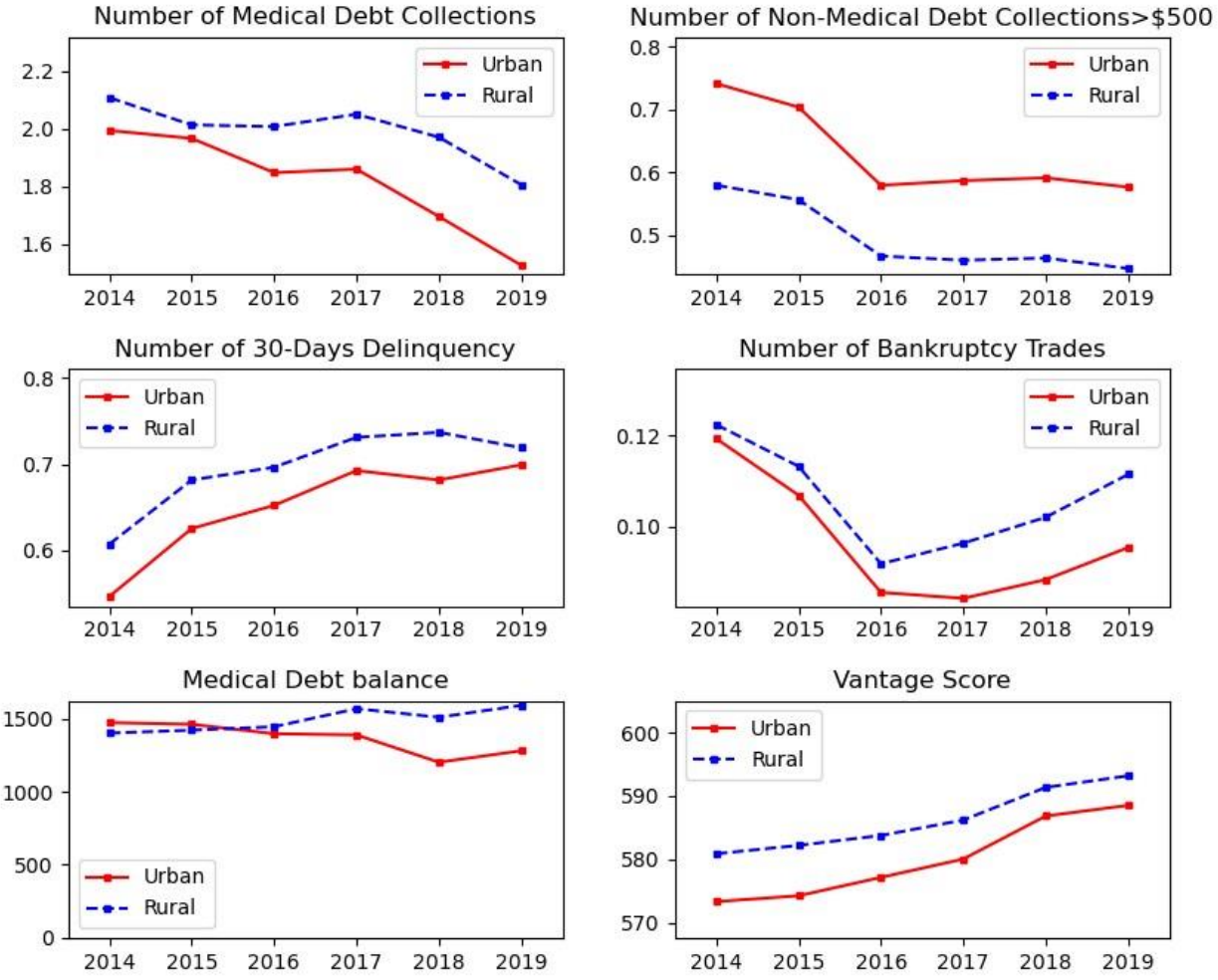

Figure3: Trends of each financial indicator by urban/rural status.

Figure 3 shows the trends of each financial indicator across urban/rural groups. Notably, with the exception of medical debt balance, the trajectories for rural and urban populations generally parallel. Individuals residing in rural areas exhibit a higher number of medical debt collections compared to the urban ones, but with a lower volume of non-medical debt accrued, a difference possibly attributed to the lower cost of living in rural settings. Significantly, rural residents show a markedly higher incidence of 30-day delinquencies and bankruptcy trades, suggesting greater financial distress in these areas. However, paradoxically, they also possess better Vantage scores, indicating a nuanced landscape of creditworthiness that transcends simple urban-rural distinctions.

The divergence becomes particularly pronounced when examining medical debt balance. Until 2016, individuals in rural areas had consistently lower medical debt balances than those in urban locales. Post-2016, this trend reversed, with rural residents not only surpassing urban residents in terms of medical debt balance but also experiencing a yearly increase. This shift post-2016 highlights a growing financial vulnerability among rural populations, specifically in the context of healthcare-related debt, suggesting an evolving and increasingly burdensome financial landscape for these communities.

Detailed tables capturing each variable's value and standard deviation for every year are provided in the appendix for a more granular exploration.

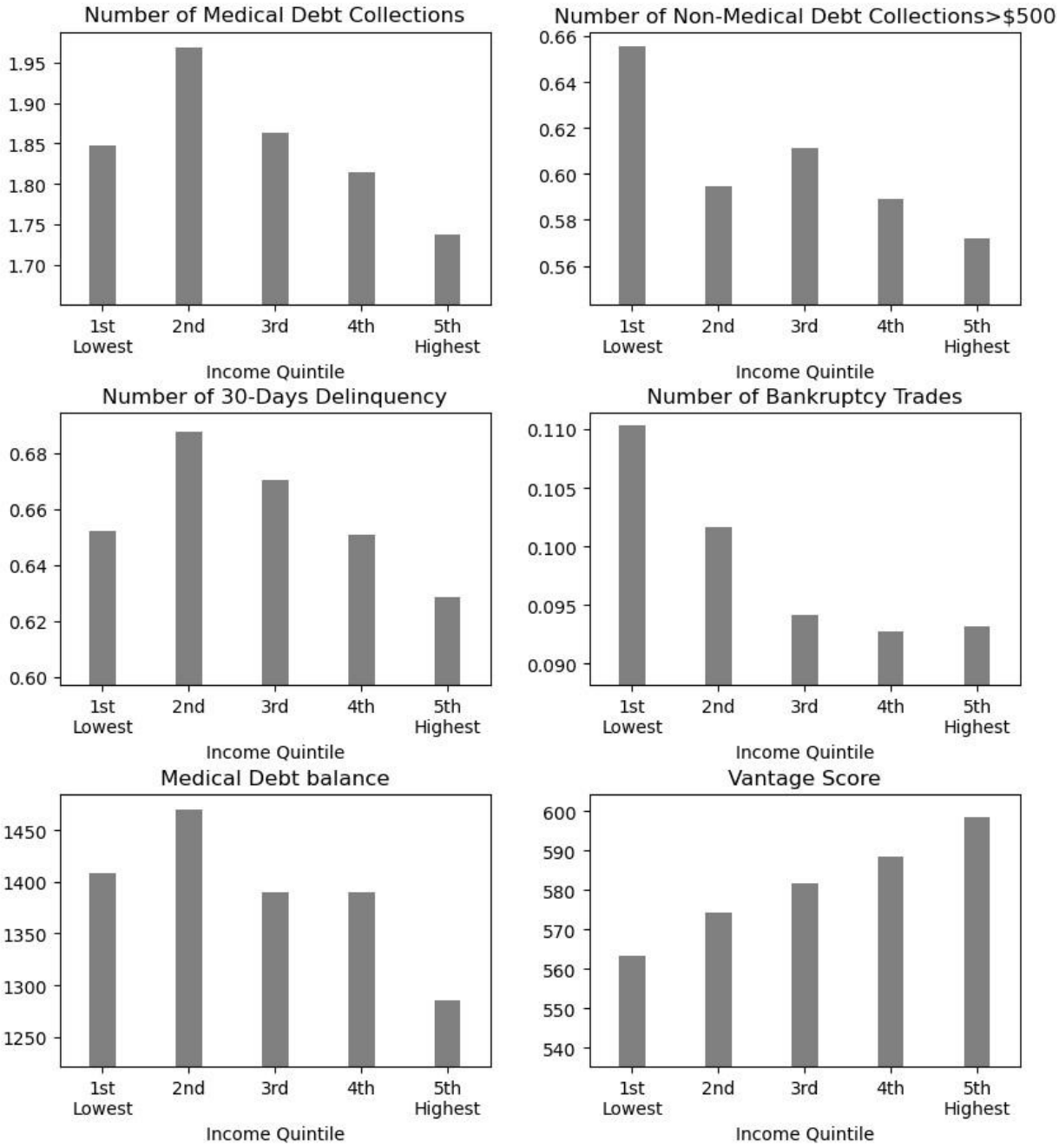

Figure4: Value of each financial indicator by zip code income quintile

In Figure 4 which charts the value of each financial indicator by zip code income quintile, we observe that financial debt trends do not exhibit a monotonic increase or decrease across income quintile groups. For the number of medical debts, medical debt balances, and instances

of 30-day delinquency, it is the second income quintile group that bears the highest debt burden. Intriguingly, individuals residing in the lowest average income areas showed a suppressed level of medical debt collection. However, the first income quintile group, representing the lowest income bracket, exhibited significantly higher levels of non-medical debt and bankruptcy trades than other groups. This pattern suggests that the most financially vulnerable population faces more severe financial stress from non-medical debts.

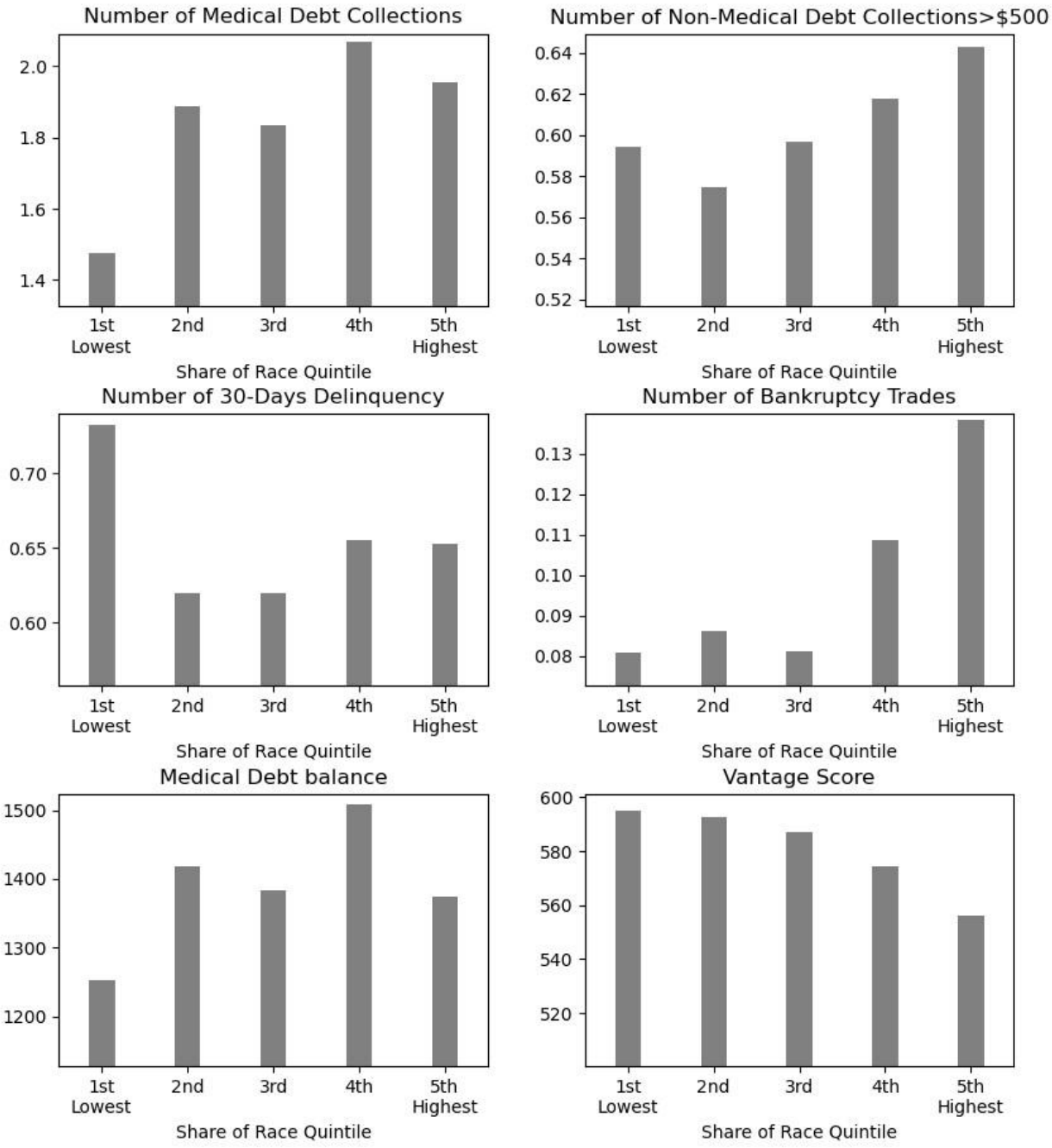

Figure5: Value of each financial indicator by zip code share of African American quintile

Figure 5 presents the value of each financial indicator by zip code share of African American quintile, where quintiles represent increasing proportions of African American residents. Overall, areas with a higher share of African American residents incur more non-

medical debt and have significantly higher bankruptcy trades, leading substantially. For medical debt, both the number of medical debt collections and the medical debt balance peak in the fourth racial quintile group. Areas with the smallest proportion of African American residents bear the least medical debt. Yet, the first race quintile group, with the lowest percentage of African American residents, faces the highest short-term debt collection record, as evidenced by the number of 30-day delinquencies. Lastly, Vantage scores significantly decrease as the share of African American residents in the area increases, indicating a correlation between higher racial diversity and lower credit scores.

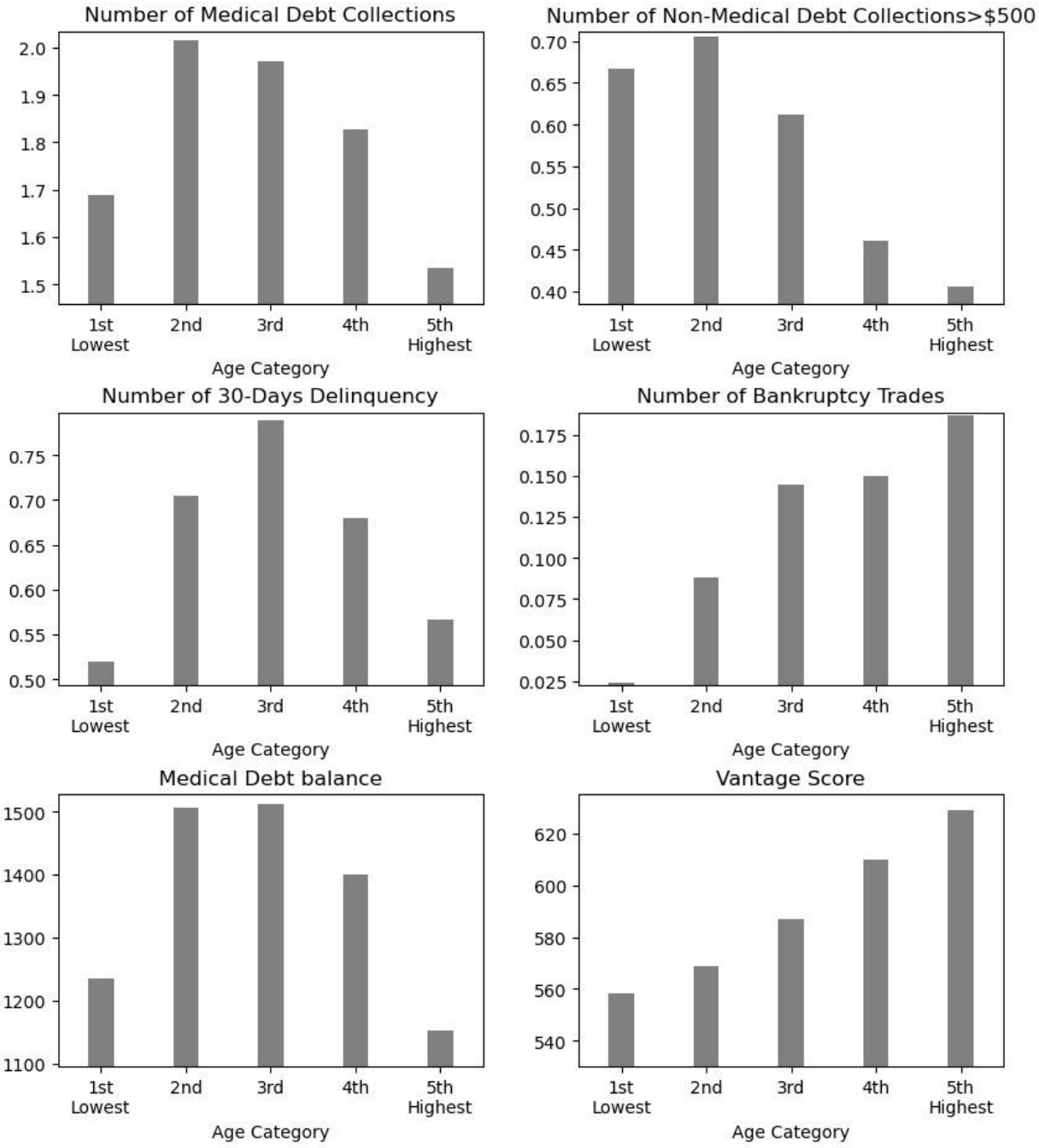

Figure6: Value of each financial indicator by age category

Figure 6 illustrates the mean values of each financial indicator across different age categories. It is evident that for the number of medical debts, individuals aged 30-40 years have the highest debt, followed by those in the 40-50-year age bracket. The over-60 age group has the

least medical debt, with those under 30 also accumulating relatively low amounts. The medical debt balance exhibits a similar pattern to the number of medical debts.

Regarding non-medical debt, the 30-40 age group again exhibits the highest levels of debt, with individuals under 30 showing the second highest levels. Conversely, the over-60 age group has the least non-medical debt. The trend in the number of 30-day delinquencies presents a mid-range peak, with the highest occurrences found in the 40-50 age group. The number of bankruptcy trades, however, displays a distinctly different trend, with bankruptcy incidents increasing with age. Similarly, the Vantage score improves as age increases, indicating higher scores in older demographics.

Discussion:

Our study's findings provide profound insights into the financial burden of individuals eligible for Medicaid in Southern non-expansion states from 2014-2019. Several key insights emerge.

Firstly, in these Southern states, the debt load borne by those who might benefit from Medicaid expansion significantly surpasses the national average. Although no existing studies have directly examined the potential alleviation of financial debt in these states post-Medicaid expansion, the research conducted by Callison and Walker on Louisiana—a Southern state that expanded Medicaid in 2016—provides insightful benchmarks. Should the other Southern states mirror Louisiana's outcomes, the prevalence of medical debts by 2019 could potentially reduce to 1.39, marking a 28.7% decline from the baseline average. Similarly, the average medical debt balance might drop by 46.5% to 9[15].

Nevertheless, despite the clear advantages of Medicaid expansion illuminated by various studies, it is crucial to also take into account the intricate socio-demographic and geographic factors that influence policy implementation. The general downward trend in medical debt collections implies that factors, possibly including economic conditions or partial policy measures, have somewhat mitigated medical debt burdens even without Medicaid expansion. Yet, the increasing trends in 30-day delinquencies and the post-2016 resurgence in bankruptcy filings and medical debt balances underscore the ongoing financial vulnerability and the fragile nature of healthcare affordability for the uninsured, especially in rural locales. The divergent trends observed between rural and urban populations, where rural residents show higher medical debts and financial distress yet paradoxically possess better Vantage scores, reveal the complex interplay between geographic location, access to healthcare, and financial health. It suggests that while rural residents may face greater challenges in accessing affordable healthcare, leading to higher medical debts, factors such as lower cost of living or differing credit utilization patterns might contribute to their relatively less non-medical debt and better creditworthiness. This complexity calls for targeted policy interventions that consider the unique needs and circumstances of rural populations.

Moreover, the disparities across income and racial quintiles highlight systemic inequities that exacerbate financial stress among the most vulnerable groups. The interplay of economic and social dynamics, especially pronounced in economically marginalized or predominantly African American areas, significantly exacerbates financial distress and elevates bankruptcy risk. It emphasizes the importance of policies that address not only healthcare accessibility but also economic disparities and social determinants of health. Notably, an observed correlation between

community racial diversity and lower credit scores underscores the link between racial discrimination and financial instability.

Besides, financial behaviors and vulnerabilities exhibit distinct patterns across age groups, with the 30-40 year demographic facing high levels of both medical and non-medical debt, likely due to major life events such as family formation and career development. This contrasts with individuals under 30 who show slightly lower debt levels, possibly due to fewer financial obligations or more cautious spending influenced by recent economic downturns. Meanwhile, those over 60 tend to have the lowest debt levels, which may reflect greater financial stability from accumulated wealth or conservative spending habits post-retirement. However, this could also be skewed by their potentially limited access to credit. The occurrence of delinquencies peaks among those aged 40-50, suggesting challenges in managing debts amid financial commitments and stagnant income growth during these years. Furthermore, bankruptcy rates increase with age but so do Vantage scores—indicating an improvement in creditworthiness despite a subset of older adults experiencing severe financial difficulties.

Conclusion:

In conclusion, a closer look into debt levels among uninsured populations in Southern states suggests a significant policy direction: amplifying Medicaid coverage should be prioritized. Policymakers should also carefully consider a multitude of factors and create targeted policies aimed at reducing economic vulnerabilities and disparities prevalent among distinct demographic segments.

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Appendix:

Table 1: Number of each financial indicator by year for 2014-2019

	No. of Medical Debt Collection		Medical Debt Balance		No. of Non-Medical Debt Collection>$500	
Year	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**
2014	2.01	4.60	1459.31	6108.14	0.71	1.32
2015	1.98	4.51	1453.13	6045.95	0.68	1.27
2016	1.88	4.34	1404.50	5814.18	0.56	1.04
2017	1.89	4.43	1419.39	5923.88	0.56	1.02
2018	1.74	4.20	1255.01	5234.91	0.57	1.05
2019	1.57	3.84	1333.10	6141.69	0.55	1.05
	No. of 30-Days Delinquency		**No. of Bankruptcy Trades**		**Vantage Score**	
Year	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**
2014	0.56	1.70	0.12	0.94	574.65	95.45
2015	0.64	1.82	0.11	0.87	575.65	97.35
2016	0.66	1.86	0.09	0.76	578.33	97.87
2017	0.70	1.95	0.09	0.77	581.13	99.03
2018	0.69	1.94	0.09	0.82	587.63	97.70
2019	0.70	1.98	0.10	0.87	589.33	99.04

Table 2: Number of each financial indicator by Urban/Rural Status for 2014-2019

	No. of Medical Debt Collection		Medical Debt Balance		No. of Non-Medical Debt Collection>$500	
Year	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
2014	1.99	2.11	6107.07	6111.43	0.74	0.58

2015	1.97	2.01	5972.21	6376.98	0.70	0.56
2016	1.85	2.01	5722.93	6214.89	0.58	0.47
2017	1.86	2.05	5789.31	6513.04	0.59	0.46
2018	1.70	1.97	4995.41	6236.64	0.59	0.46
2019	1.53	1.81	6116.47	6254.71	0.58	0.45

	No. of 30-Days Delinquency		**No. of Bankruptcy Trades**		**Vantage Score**	
Year	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
2014	0.55	0.61	0.12	0.12	573.31	580.87
2015	0.63	0.68	0.11	0.11	574.23	582.20
2016	0.65	0.70	0.09	0.09	577.13	583.76
2017	0.69	0.73	0.08	0.10	580.04	586.20
2018	0.68	0.74	0.09	0.10	586.83	591.36
2019	0.70	0.72	0.10	0.11	588.52	593.18

Paper 2: Medicaid Expansion and Non-Medical Debt: Evidence From Louisiana, 2014–2019

Abstract:

Objectives: To identify the association between Medicaid expansion and non-medical debt.

Methods: Employing a difference-in-differences methodology, we analyzed changes in non-medical debt and other financial indicators between individuals who acquired coverage through Medicaid expansion in Louisiana and those residing in Southern states that did not expand Medicaid. We linked a cohort of individuals who obtained Medicaid as a result of Louisiana's expansion (n = 196,556) with their corresponding medical debt data extracted from credit reports. This group was then juxtaposed with a randomly chosen subset of credit reports from individuals situated in zip codes of Southern states without Medicaid expansion, characterized by high uninsured rates (n = 581,679). The study spanned from July 2014 to July 2019.

Results: In comparison to individuals living in other non-expansion states, those in Louisiana exhibited a higher debt burden prior to Medicaid expansion, with about 40% of those who would go on to gain Medicaid coverage having at least one non-medical debts over $500, versus 32% in non-expansion states. By mid-2019, three years after Louisiana's Medicaid expansion, this value had declined by 5.76% compared to the pre-Medicaid period. There was also a 10.96% reduction in the number of 30-days delinquencies, and an increase of 2.9 points in the vantage score, which assesses creditworthiness for lending decisions.

Conclusions: Medicaid expansion in Louisiana led to a reduction in the non-medical debt burden among those who gained coverage. Our findings carry significant implications for

policymakers in the other states that have not expanded Medicaid, many of which are in the Southern United States.

Introduction:

The Affordable Care Act (ACA) was intended to improve healthcare access and affordability. As a key component of the ACA, several states have expanded their Medicaid eligibility criteria and millions have gained Medicaid coverage as a result[1]. Health insurance serves as a financial buffer for households by reducing medical expenses and facilitating consumption smoothing during periods of illness or job loss[2]. Several studies have concluded that gaining Medicaid coverage improves financial wellbeing through mechanisms such as reducing medical debt burden and rates of medical collections[3-19]. However, as medical debt has declined and financial resilience has improved as a result of Medicaid expansion, newly insured households may also experience improved access to credit and feel less need to self-insure[19-21]. Therefore, whether gaining Medicaid coverage alleviates household non-medical debt and other indicators of financial health in the same way it has for medical debt remains a critical, yet understudied, aspect of coverage expansions.

Using linked Medicaid enrollment and credit report data for those gaining coverage following Louisiana's Medicaid expansion, we examine the effect of Medicaid coverage on non-medical debt including delinquencies, collections, charge offs (delinquent accounts that lenders write off as bad debt), trade balances, and credit scores. Louisiana remains the only state in the "Deep South" to have expanded Medicaid eligibility under the ACA, having done so in July 20161, and as a result, the uninsured rate in Louisiana fell by more than half1. Further, Louisiana

serves as a compelling setting for an analysis of the Medicaid/debt relationship for two notable reasons. First, of the 10 states that have yet to expand Medicaid eligibility under the ACA, seven are in the South Census Region along with Louisiana. As such, expansion-related changes in Louisiana could serve as a reasonable benchmark for potential changes in the remaining non-expansion states were they to expand Medicaid eligibility. Second, household debt burdens in Louisiana were comparatively low in the pre-Medicaid expansion period, meaning that any effects of gaining Medicaid coverage on non-medical debt in Louisiana may represent lower bounds when translated to the remaining non-expansion states[22].

Few studies have examined the relationship between Medicaid expansion and non-medical debt. Brevoort et al. (2020) found no evidence of changes in non-medical collections following Medicaid expansion[17]. However, Finkelstein et al. observed in the Oregon Health Insurance Experiment that the Treatment on the Treated (TOT) for both non-medical debt collection balance and medical debt collection balance concurrently decreased[7]. Hu et al.'s findings align with those of Finkelstein et al., albeit with a 25% reduction in the magnitude of the treatment effect[8]. Hu suggested that the discrepancies in findings could stem from the fact that Medicaid enrollment is frequently recorded with substantial error in surveys[8].

Therefore, an important contribution of our study is our ability to link individual debt outcomes to Medicaid enrollment records. Most studies of the effects of Medicaid coverage on financial well-being have not been able to identify who actually gained coverage as a result of Medicaid expansion. Instead, they used probabilistic eligibility or self-reported surveys to approximate those likely to have gained Medicaid coverage following expansion, which could result in measurement error in treatment exposure[4,23]. For example, compared to administrative records, survey-based Medicaid coverage data has shown error rates as high as 35%,

underscoring the risks of relying on self-reported information[23]. Probabilistic eligibility measures based on income, family size, and other demographic parameters may not fully capture the complexity and dynamics of Medicaid enrollment. Research has shown that prior to Medicaid expansion, approximately 62.6 percent of eligible adults between the ages of 19 and 64 participated in Medicaid. But in Arkansas and Louisiana, only 43.0 percent of eligible individuals actually enrolled in Medicaid[24]. This divergence between eligibility and enrollment can be attributed to various factors such as individual knowledge about the program, perceived need for health insurance, and administrative barriers[24]. Therefore, individuals who are predicted to have a higher probability of Medicaid enrollment may differ systematically from those with lower predicted probabilities, which can introduce selection bias if there are unobserved characteristics or factors that influence both the likelihood of Medicaid enrollment and the outcomes of interest.

In contrast, administrative Medicaid enrollment data provide an accurate measure of individuals who actually gained Medicaid coverage, leading to more precise and robust estimates of Medicaid expansion's impact on financial well-being. The research conducted in Michigan by Miller, Finkelstein, et al. also utilized a data set that combined credit reports and Medicaid administrative enrollment information. Their findings illustrated that gaining Medicaid coverage was associated with fewer unpaid bills, medical bills, and instances of poor credit history[7,9]. However, the Oregon Medicaid Experiment matched 68.5% of adults earning under the FPL to a credit report, which underpowered their conclusion[7]. And in the case of study of Michigan, despite their use of administrative enrollment data, the researchers relied on variation in individuals' month of Medicaid enrollment to identify changes in financial well-being[9]. This

approach could be problematic if the timing of Medicaid enrollment is correlated with other events that may affect beneficiary finances (e.g., a medical incident).

Unlike studies using simulated or self-reported Medicaid eligibility, our study used administrative Medicaid enrollment data from the Louisiana Department of Health, which enabled us to obtain data on individuals who actually gained Medicaid coverage in July 2016 to determine Medicaid eligibility. And different from the work in Michigan, we evaluated changes in the non-medical debt burden for individuals who received Medicaid coverage in Louisiana, contrasting them with similar individuals in states that did not expand Medicaid. By incorporating this control group, we increased the probability that the findings are reflecting changes in non-medical debt burden and other financial indicators attributable to Medicaid expansion, rather than unobserved confounding factors associated with the timing of enrollment.

Additionally, previous research has indicated that individuals with chronic health conditions are more likely to experience financial hardship, accumulate medical debt, and file for bankruptcy than those without such conditions[1,6-8]. Yet, comprehensive research exploring the relationship between various chronic health conditions and debt burden in the context of the ACA Medicaid expansion is scarce. Therefore, our study addresses this gap using de-identified credit report data linked to administrative enrollment records to contrast individuals in Louisiana, who benefited from Medicaid expansion, with those in states without Medicaid expansion.

Our results indicate that Medicaid expansion in Louisiana led to a reduction in the non-medical debt burden among those who gained coverage. Approximately 40% of those gaining Medicaid coverage in Louisiana had at least one non-medical debt over $500 prior to expansion, but by mid-2019, three years after Louisiana's Medicaid expansion, this value had declined by 5.76% compared to the pre-Medicaid period. There was also a 10.96% reduction in the number

of 30-day delinquencies, and an increase of 2.9 points in the vantage score, which assesses creditworthiness for lending decisions. The effect of gaining Medicaid coverage on reducing the debt burden was notably greater among individuals in our data who suffered from a chronic health condition. Our findings carry significant implications for policymakers in the other states that have not expanded Medicaid, many of which are in the Southern United States.

Method:

Data Source, Variables and Study Population:

We used Medicaid enrollment records from the Louisiana Department of Health to identify individuals aged 18-64 who acquired Medicaid coverage in July 2016. Nearly everyone who gained coverage through Louisiana's Medicaid expansion early-on did so in the first month due to Louisiana's system-assisted enrollment1. We then linked these individuals to their credit report data obtained through Experian Information Solutions, assigning a randomized identifier to each beneficiary and ensuring the elimination of personal information to maintain anonymity. The credit report data includes several indices of financial indicators, of which, we focus on non-medical debt collection, 30-day delinquencies, charge-off trades, bankruptcy trades, revolving trades, total trades, and the VantageScore, a measure of credit-worthiness developed jointly by the three major credit reporting agencies in the U.S. In all cases, the word "trade" refers to a record that has the information about the terms and payment history of a consumer's account with a credit grantor. A 30-day delinquency marks a payment overdue by at least one month, often a preliminary indicator of financial strain. A charge-off trade is an account with a balance that a lender no longer expects to be repaid and writes off as a bad debt. Bankruptcy trades involve debts encompassed within a bankruptcy filing, signifying a legal acknowledgment of insolvency which impacts multiple credit accounts. Revolving trades represent tradelines where

the balance can be carried over from month to month, and the available credit replenishes as payments are made (e.g., credit cards). These measures, from initial delinquency to legal discharge of debt, along with the revolving nature of certain credits, collectively contribute to the comprehensive picture of an individual's credit health[20]. See Table 1 for a list of study outcomes.

The administrative Medicaid enrollment data also encompasses individual characteristics such as age, education level, sex, chronic health condition, and zip code. By integrating the zip code information with the 2015 American Community Survey, we were able to ascertain each individual's urbanicity, as well as the racial and ethnic composition, median rent levels, homeownership rates, and median household income of the areas corresponding to their zip codes.

In addition to the credit report data for Louisiana Medicaid expansion enrollees, we obtained credit reports from a random draw of approximately 1.4 million individuals residing in zip codes characterized by high uninsurance rates in states that, as of July 1, 2019, had not adopted Medicaid expansion. These states included Alabama, Florida, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, and Tennessee. Zip codes were classified as having a high uninsurance rate if, according to the 2015 American Community Survey, the proportion of uninsured individuals in that zip code exceeded the state's 75th percentile for zip code–level uninsurance rates. We used this data to construct a control group consisting of individuals likely to acquire coverage should their states adopt Medicaid expansion.

We collected data each June from 2014 to 2019 (spanning 25 months before Medicaid expansion in Louisiana and 36 months thereafter). Ultimately, we excluded individuals who moved out of their state of residence during the sample period to mitigate variation in exposure to diverse state policies, as well as anyone with missing credit information during any wave of

the study period. These criteria resulted in a final sample of 196,556 individuals who gained Medicaid coverage through Louisiana's Medicaid expansion (1,170,230 person-years), and 581,679 individuals in our non-expansion control states (3,523,370 individual-years).

In addition to our primary analyses, we conducted a sensitivity analysis to verify the robustness of our results. Since the control group comprised individuals residing in zip codes where the uninsured rate exceeded the state's 75th percentile for zip code-level uninsurance rates, we restricted our treatment group in the sensitivity analysis to include only those gaining Medicaid coverage in Louisiana who resided in zip codes where the uninsured rate surpassed Louisiana's 75th percentile for zip code-level uninsurance rates. These modification resulted in a final sample of 48,464 individuals who gained Medicaid coverage through Louisiana's Medicaid (290,784 person-years), and the same 581,679 individuals in non-expansion control states (3,523,370 person-years).

Statistical Analysis:

We used a difference-in-difference methodology (DiD) to estimate the effect of gaining Medicaid coverage on non-medical debt for enrollees in Louisiana. The DiD model can be represented as follows:

$$Y_{ist} = \alpha + \pi_1 Lousiana_i + \pi_2 Post_t + \pi_3 (Louisiana_i \times Post_t) + X_{it}\beta + Z_{st}\gamma + \delta_s + \varphi_t + \varepsilon_{ist}$$

Where Y_{ist} represents the outcome for individual i, living in state s, in year t. $Louisiana_i$ is an indicator variable that equals 1 if the individual gained Medicaid coverage through Louisiana's Medicaid expansion (treatment group) and 0 if they resided in one the non-expansion sample states (control group). $Post_t$ is an indicator variable that equals 1 for the post-expansion period

(2017-2019) and 0 for the pre-expansion period (2014-2016). $Louisiana_i \times Post_t$ is an interaction term that captures the average effect of gaining Medicaid coverage in Louisiana relative to those living in non-expansion states. X_{it} is a vector of individual controls that includes age, education level, sex, and urbanicity. Z_{st} is a vector of zip code and state level control variables that includes zip code race and ethnicity composition, zip code median rent levels, zip code house ownership rates, zip code median household income, and state level unemployment and poverty rates. δ_s and φ_t represent state and year fixed effects, respectively. ε_{ist} is an error term, accounting for unobserved factors that vary over time and across individuals. All models were estimated using ordinary least squares (OLS) estimation, with standard errors (SEs) clustered at the state level to account for potential correlation in unobserved state-specific error terms.

Inverse Probability Treatment Weighting:

The validity of the DiD approach necessitates that outcome measures for the treatment and control groups would have followed similar trends in the absence of treatment (i.e., the parallel trends assumption). While this assumption is inherently untestable, researchers typically provide suggestive evidence of whether it holds by examining pre-intervention outcome trends for both groups. To this end, we plotted unadjusted trends in each outcome measure for both the treatment and control groups and identified several instances where the parallel trends assumption was likely violated (see Appendix Figure 1). To address this issue, we applied an inverse probability of treatment weighting (IPTW) procedure that calculated weights based on the inverse probability of receiving treatment conditional on age, sex, education level, rurality, and zip code race and ethnicity composition. We refrained from adding baseline means of study outcomes to the weighting procedure as this has been shown to introduce bias through mean

regression[26-28]. The objective of the IPTW procedure was to create comparable groups for the DID analysis by balancing on observed covariates. Table 1 summarizes baseline characteristics for the matched and unmatched samples and the standardized difference between treatment sand control groups before and after matching.

After implementing the IPTW technique, we observed a notable reduction in standardized differences across all study outcomes and socio-demographic variables, with the exception of the "some college" category of educational attainment. This improvement in the standardized differences across outcomes could, to a certain extent, enhance the comparability and reliability of our subsequent DID analyses[29-30]. However, despite the IPTW procedure, we continued to encounter evidence that the parallel trends assumption may be violated (see Appendix Figure 2). Appendix Figure 2 presents the results of the preliminary DID analysis through an event study. The figure illustrates estimates that capture the temporal variation in the association between Medicaid expansion and each financial outcome. However, the results of the event study indicate that the pre-period estimates violate the pre-trend assumption. For example, in the top four pictures, during the pre-period, the upward sloping line indicates that the relative change in each study outcome is approaching zero for the treatment group compared to the control group. If we were to interpret the DID estimates, we would underestimate the true impact of Medicaid expansion in the post-period.

Table1: Baseline Characteristics of Individuals by ACA Medicaid Expansion Status pre-post Matching

	Before Matching	After Matching

	Louisiana	Non-expansion States	Standardized Difference	Louisiana	Non-expansion States	Standardized Difference
Study Outcomes						
Number of Non-Medical Debt Collection>$500	0.69	0.53	0.14	0.69	0.54	0.09
Any Non-Medical Debt Collection>$500	0.40	0.32	0.17	0.40	0.32	0.09
Number of 30-Days Delinquency	0.75	0.57	0.09	0.75	0.60	0.05
Any 30-Days Delinquency	0.23	0.19	0.11	0.23	0.20	0.05
Number of Charge-off Trades	0.77	0.60	0.15	0.77	0.62	0.08
Any Charge-off Trade	0.43	0.34	0.19	0.43	0.36	0.09
Number of Bankruptcy Trades	0.15	0.15	0.00	0.15	0.15	0.00
Any Bankruptcy Trade	0.04	0.04	0.02	0.04	0.04	0.003
Revolving Trade Balance (log)	6.78	7.26	-0.18	6.78	7.24	-0.09
Any Revolving Trade	0.30	0.35	-0.12	0.30	0.34	-0.05
Total Trade Balance (log)	9.09	9.32	-0.10	9.09	9.39	-0.06
Vantage Score	557.3	574.7	-0.19	557.3	571.6	-0.08
Individual Characteristics						
Age	36.8	38.3	-0.13	36.8	36.9	-0.004
Female (%)	62.6	48.6	0.28	62.6	62.1	0.006
Education (%)						
Less Than High School	17.2	19.7	-0.06	17.2	18.4	-0.02
High School	37.7	33.2	0.09	37.7	35.2	0.03
Some College	26.4	26.6	-0.004	26.4	27.2	-0.01
College	18.8	20.5	-0.04	18.8	19.1	-0.01
State Characteristics						
Rurality (%)	19.2	22.6	-0.08	19.2	21.1	-0.03
Race: Share of Black (%)	39.5	36.0	0.13	39.5	42.1	-0.06
Median Rent ($)	839.8	876.1	-0.002	839.7	822.0	0.00
House Ownership (%)	63.5	53.8	0.65	63.5	62.9	0.02
Median Household Income ($)	46066.7	40664.5	0.42	46065.0	44881.7	0.02
State Unemployment Rate (%)	6.3	5.7	1.07	6.3	5.8	0.40
State Poverty Rate (%)	20.6	15.8	2.87	20.6	15.9	1.95

Note. Our analytic sample included 196,556 Medicaid expansion beneficiaries in Louisiana and 581,679 individuals from high-uninsured zip codes in non-expansion states. We observed each of these individuals once per year from 2014 through 2019 for a total of 4,669,410 person-year observations. The baseline period was 2014–2016.

Another commonly implemented solution to addressing evidence of non-parallel trends is to include unit-specific time trends in the regression model. In our case, that would entail adding

a state-specific time trend term to the previous equation. The modified regression equation would then be specified as follows:

$$Y_{it} = \alpha + \pi_1 Lousiana_i + \pi_2 Post_t + \pi_3 (Louisiana_i \times Post_t) + X_{it}\beta + Z_{st}\gamma + \delta_s \times \varphi_t + \delta_s + \varphi_t + \varepsilon_{it}$$

This equation extends previous equation by incorporating an interaction term between state and year. Here, δ_s represents the various states, and φ_t denotes the years from 2014 to 2019 respectively. This step is often employed in DID analyses to account for underlying trends unique to each state. However, this approach failed to address pre-trend issues. Detailed event study coefficients and standard deviations are available in the appendix.

Partialing Out Pre-Trends Issue

Different from the method of just adding state-specific trends as control, Meer and West and Wolfers highlighted that this approach may lead to an underestimation of a policy's true impact[31-32]. They argued that if a policy change impacts not just the level of an outcome at a specific point but alters its growth rate over time, including state-specific time trends can be problematic. This is because these trends might absorb not only the pre-existing growth patterns but also the very changes that the policy is causing. When controlling for these state-specific trends, it might attribute the changes caused by the policy to just another part of the ongoing, expected local trend. Therefore, to overcome this limitation, we adopt the method of partialing out pre-trend issues, which focuses only on controlling for pre-existing trend differences, ensuring that our analysis is not influenced by trend changes that occur in the post-period[31-32].

Therefore, to adhere more stringently to the pre-trend assumption crucial in DID analysis, we implemented a statistical approach to "partial out" the pre-trend issue[33]. This method involves

regressing outcome variable only on data up through the time period preceding the event, estimating the linear trend over the whole time period. Then insert the residuals into the DID model[33].

Results:

The results from our preferred specification are presented in Table 2 and the related event study estimates are plotted in Figure 1. Results typically indicate that gaining Medicaid coverage following Louisiana's Medicaid expansion was associated with improved financial well-being. For example, gaining Medicaid coverage was associated with an 5.76 percentage point reduction in the number of non-medical debts greater than $500 and a 10.96 percentage point reduction in the number of 30-day delinquencies. Figure 1 illustrates that, post-Medicaid expansion, there was an overall reduction in non-medical debt. But in the second year after the implementation of Medicaid, there was a slight, temporary increase in non-medical debt. There was an annual decline in 30-days delinquencies. Gaining Medicaid coverage was not associated with a statistically significant change in the average number of charge-off trades. However, event study estimates in Figure 1 indicate that charge-off trades were increasing for those gaining coverage compared to those in the control group and that this increase grew over the post-expansion period. Regarding the charge-off trades, the impact of Medicaid expansion was not significantly discernible in the first two years but became markedly significant in the third year, showing an increase in both the number of charge-off trades and any charge-off trade. Gaining Medicaid coverage was not associated with changes in the average number of bankruptcy trades, but bankruptcy is a rare outcome among this population. Only 4% of those gaining Medicaid

coverage in Louisiana had bankruptcy listed on their credit report in the pre-expansion sample period.

Additionally, gaining Medicaid coverage was associated with a significant increase of 2.01 percentage points in any revolving trade, yet there were no significant improvements in revolving trade balance and total trade balance. Lastly, gaining Medicaid coverage was associated with a 2.87 points improvement in average vantage scores.

In the sensitivity analysis, the treatment group was refined to include only Medicaid enrollees from Louisiana residing in zip codes where the uninsured rate exceeded Louisiana's 75th percentile for zip code-level uninsurance rates. This adjustment resulted in a 75.3% reduction in the size of the treatment group. Baseline means for various financial indicators within the new treatment group showed a slight decrease compared to the original figures for almost all study outcomes except the number of bankruptcy trades. However, the trajectory of the impact of Medicaid expansion on these financial indicators remained essentially unchanged from the primary analysis. Medicaid expansion continued to reduce the number of non-medical debt collections, 30-days delinquency, and total trade balance, while increasing the number of charge-off trades, any revolving trade, and the Vantage score. These findings affirm the validity of our conclusions regarding the beneficial impacts of Medicaid expansion on financial health indicators. For more detailed event study coefficients and standard deviations, please refer to the appendix Table1 and Table2.

Table2: Difference-in-Difference Model Estimates for Impact of Medicaid Expansion vs Non-expansion on each Financial Indicators, Adjusted for Pre-Trend Issues

Study Outcomes	LA Pre-intervention Mean	LA Post-intervention Mean	DID
Number of Non-Medical Debt Collection>$500	0.69	0.63	-0.0576***
S.D.			(0.0065)
Any Non-Medical Debt Collection>$500	0.40	0.38	-0.0324***
S.D.			(0.0024)
Number of 30-Days Delinquency	0.75	0.85	-0.1096***
S.D.			(0.0067)
Any 30-Days Delinquency	0.23	0.25	-0.0208***
S.D.			(0.0027)
Number of Charge-off Trades	0.76	0.74	0.0275
S.D.			(0.0195)
Any Charge-off Trade	0.43	0.42	0.0209**
S.D.			(0.0077)
Number of Bankruptcy Trades	0.15	0.13	0.0053
S.D.			(0.0101)
Any Bankruptcy Trade	0.04	0.04	0.0004
S.D.			(0.0017)
Revolving Trade Balance (log)	6.78	7.16	-0.0335
S.D.			(0.0396)
Any Revolving Trade	0.30	0.35	0.0201***
S.D.			(0.0048)
Total Trade Balance (log)	9.09	9.42	-0.0483
S.D.			(0.0486)
Vantage Score	557.3	564.2	2.8710***
S.D.			(0.8052)

Note. Study size was n = 4,669,410. Controls included individual age, education level, sex, urbanity, zip code-based share of race, zip code-based median rent level, zip code-based house ownership, zip-code based median household income, state unemployment rate and state poverty rate. All models included individual and year fixed effects, and standard errors are clustered at the state level.

*** Coefficient is statistically significant at 0.001 level.

** Coefficient is statistically significant at 0.01 level.

* Coefficient is statistically significant at 0.05 level.

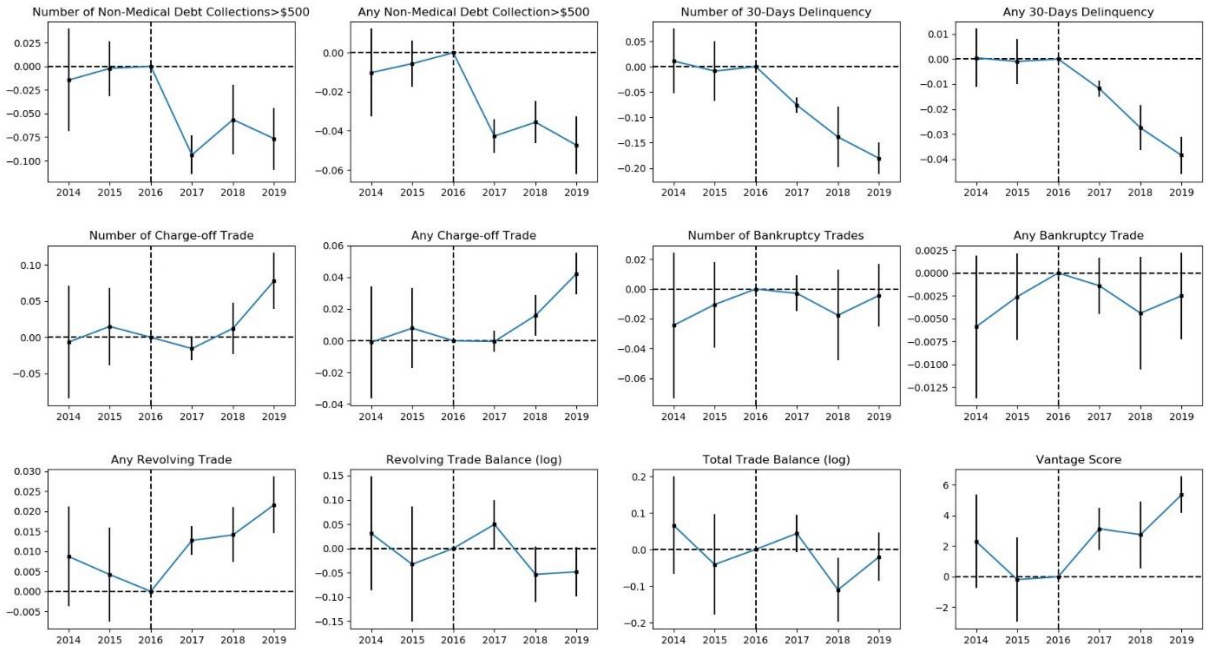

Figure 1. Event Study Trends of the Effect of Medicaid Expansion on Study Outcomes after IPTW Matching, Partial out Pre-Trend Issues, 2014-2019

Note. The control group is composed of a random sample of individuals living in zip codes with high uninsurance rates in Southern non-expansion states. Both the Louisiana and control samples follow a balanced panel of the same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

Discussion:

This study examined the impact of gaining Medicaid coverage following Louisiana's Medicaid expansion on non-medical debt and a range of other financial indicators. Combining inverse probability of treatment weighting (IPTW) and difference-in-differences (DID) approaches, our findings indicate that gaining Medicaid coverage significantly reduces the

number of non-medical debt collections and 30-days delinquencies, while also enhancing individual vantage scores. Further, improvements in financial health associated with gaining Medicaid coverage were more pronounced for enrollees suffering from a chronic condition including asthma, depression, diabetes, hypertension, chronic obstructive pulmonary disease, and congestive heart failure. These results affirm the positive role of Medicaid coverage in improving personal financial wellbeing.

However, it was observed that Medicaid expansion did not significantly influence the number of bankruptcy trades, the total trade balance, or the revolving trade balance. Intriguingly, there was an increase in any revolving trade. One plausible explanation for this could be that while Medicaid expansion reduces immediate financial stresses (evidenced by reduced debt collections and delinquencies), it may simultaneously enable individuals to access more revolving credit sources. This could be due to improved credit scores or perceived financial stability from reduced medical debt, leading to greater confidence in managing revolving credit. And regarding why the number of bankruptcy trades did not significantly improve, it is because that, even among low-income groups, bankruptcy is a rare outcome. Hence, we may not expect to find effects there.

Moreover, we found an increase in the number of charge-off trades and the likelihood of any charge-off trade in the third year following Medicaid expansion. Charge-off trades happen when a lender determines that a debt is unlikely to be collected after a prolonged period of delinquency. This increase, despite a reduction in the number of 30-days delinquencies, might be attributable to several factors. It's possible that while short-term financial behaviors improved (as indicated by reduced delinquencies), some individuals might still struggle with longer-term debt management, leading to eventual charge-offs. But by the third year, creditors realized that despite

the overall improvement in debt conditions facilitated by the Medicaid expansion, some debts remained irrecoverable. Consequently, these debts were likely deemed truly uncollectible and had to be written off. This could also reflect a lag effect where the initial financial relief provided by Medicaid expansion takes time to translate into more stable long-term financial health.

Limitation:

One of the primary study limitations stems from constraints in data accessibility. We could not construct a control group comprising individuals who would have been eligible for Medicaid had their respective states implemented the expansion. To approximate potential eligibility, we identified individuals residing in zip codes with notably high rates of uninsurance. This methodological choice implies that the insurance status of individuals in our control group remains unknown. However, this limitation would not introduce bias into our estimates unless changes in insurance status in the non-expansion states were systematically related to Louisiana's Medicaid expansion. There is little evidence to suggest such a systematic relationship. Further, we implemented an inverse probability of treatment weighting procedure that gave more weight to individuals in our control group with characteristics similar to those in our treatment group.

Another limitation of our study is that we were only able to measure the association between gaining Medicaid coverage and financial health for Louisiana residents. However, like Louisiana, most states that have not yet expanded Medicaid eligibility under the ACA are situated in the Southern United States and these states have population demographics similar to those in Louisiana. Therefore, our estimates can serve as a useful reference for policymakers contemplating Medicaid expansion to assess its next-stage applicability.

Conclusion:

In conclusion, the expansion of Medicaid coverage has demonstrated significant effects in reducing non-medical debt and other financial indicators not directly related to medical debt. This study systematically explores the broader implications of enhanced healthcare accessibility on the overall financial health of individuals.

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Appendix:

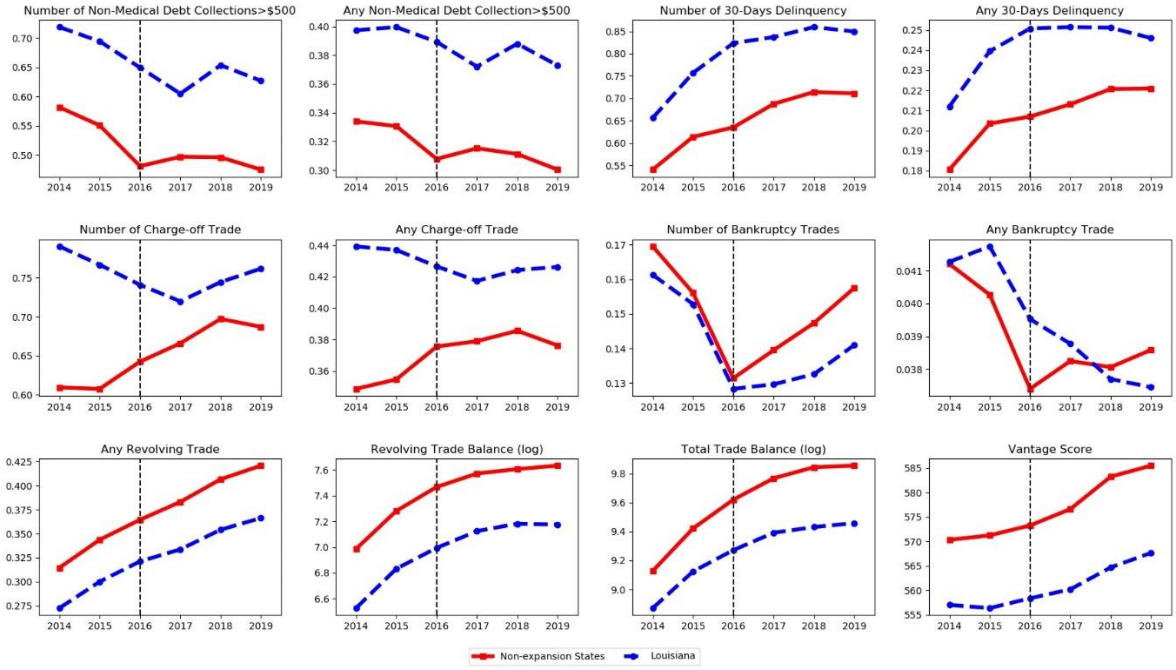

Figure 1: Financial Outcomes in Louisiana vs Southern Non-expansion States, Raw Trend, 2014–2019

Note. The control group is composed of a random sample of individuals living in zip codes with high uninsurance rates in Southern non-expansion states. Both the Louisiana and control samples follow a balanced panel of the same individuals over time.

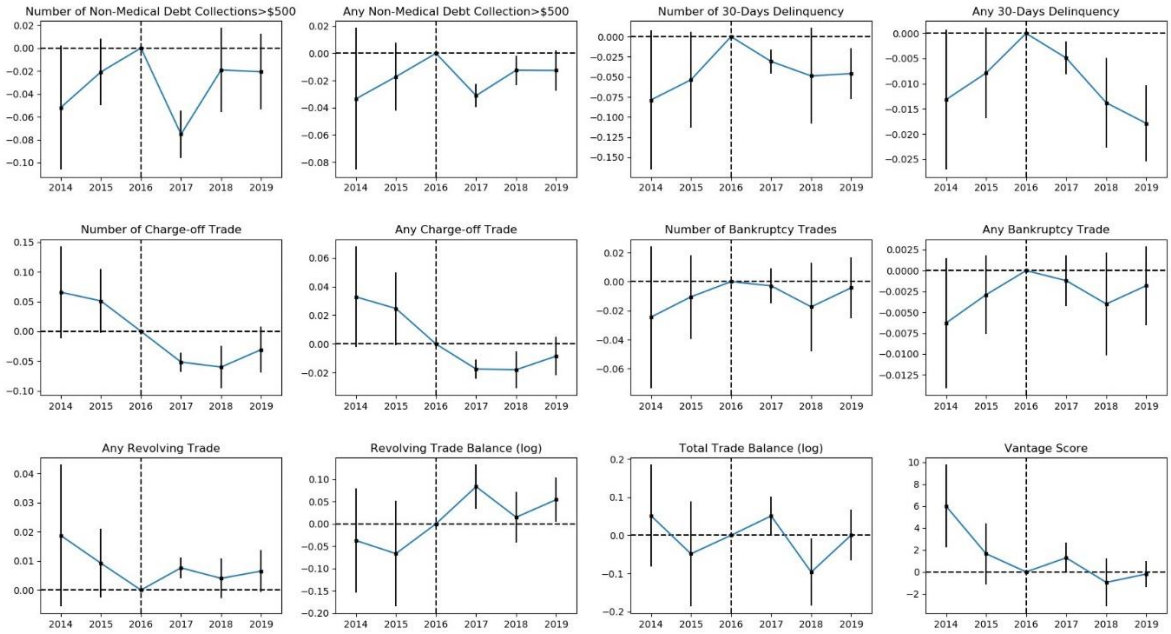

Figure 2. Event Study of the Effect of Medicaid Expansion on Study Outcomes after IPTW Matching, 2014-2019

Note. The control group is composed of a random sample of individuals living in zip codes with high uninsurance rates in Southern non-expansion states. Both the Louisiana and control samples follow a balanced panel of the same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

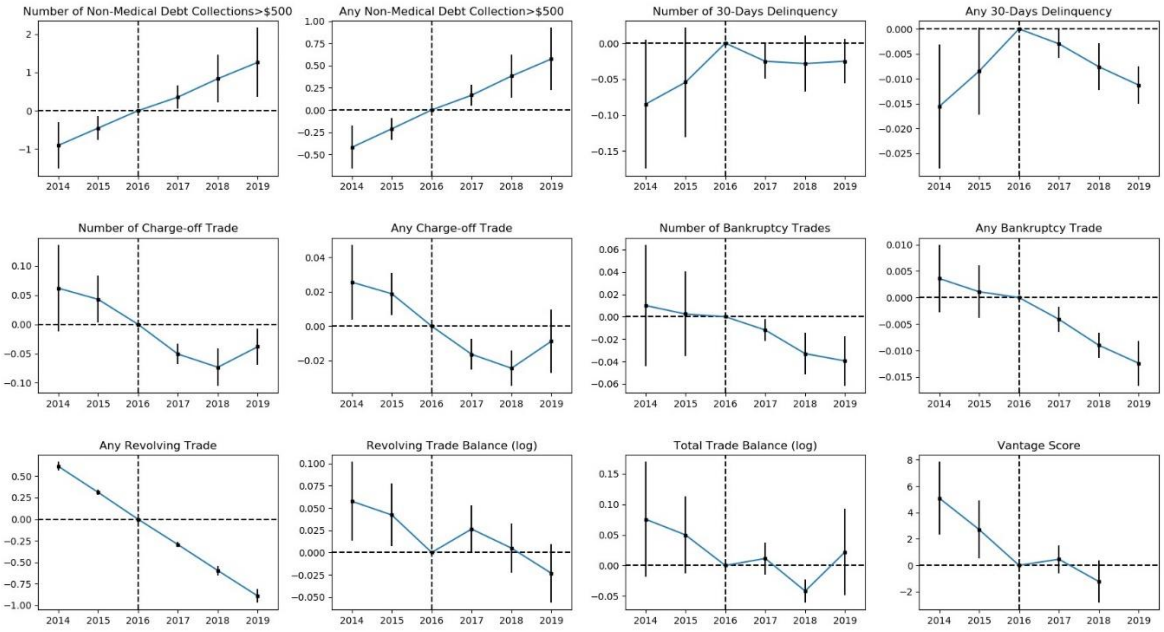

Figure 3: Event Study of the Effect of Medicaid Expansion Impact on Study Outcomes after IPTW Matching, Controlled for Specific-State Year Trends, 2014-2019

Note. Due to collinearity, the vantage score value for the year 2019 is missing.

Table 1: The Effect of Medicaid Expansion on the Number of Non-Medical Collections and Other Financial Indicators for Enrollees in LA vs Non-Expansion States, 2014–2019 (Adjusted for Pre-trend Issues)

VARIABLES	Number of Non-Medical Debt Collection>$500	Any Non-Medical Debt Collection>$500	Number of 30-Days Delinquency	Any 30-Days Delinquency
treat#2014.year	-0.0146	-0.0102	0.0111	0.0005
	(0.0230)	(0.0095)	(0.0268)	(0.0049)
treat#2015.year	-0.0022	-0.0056	-0.0088	-0.0010
	(0.0123)	(0.0050)	(0.0252)	(0.0038)
treat#2017.year	-0.0938***	-0.0427***	-0.0759***	-0.0118***
	(0.0087)	(0.0037)	(0.0063)	(0.0014)

treat#2018.year	-0.0564***	-0.0356***	-0.1388***	-0.0275***
	(0.0155)	(0.0046)	(0.0253)	(0.0038)
treat#2019.year	-0.0766***	-0.0474***	-0.1808***	-0.0385***
	(0.0139)	(0.0063)	(0.0133)	(0.0032)
Louisiana Baseline Mean	0.69	0.40	0.75	0.23

VARIABLES	Number of Charge-off Trades	Any Charge-off Trade	Number of Bankruptcy Trades	Any Bankruptcy Trade
treat#2014.year	-0.0066	-0.0010	-0.0244	-0.0059
	(0.0328)	(0.0149)	(0.0207)	(0.0033)
treat#2015.year	0.0149	0.0079	-0.0104	-0.0026
	(0.0227)	(0.0107)	(0.0122)	(0.0020)
treat#2017.year	-0.0156	-0.0005	-0.0029	-0.0014
	(0.0068)	(0.0028)	(0.0051)	(0.0013)
treat#2018.year	0.0123	0.0159*	-0.0176	-0.0044
	(0.0150)	(0.0054)	(0.0129)	(0.0026)
treat#2019.year	0.0780***	0.0423***	-0.0043	-0.0025
	(0.0165)	(0.0056)	(0.0089)	(0.0020)
Louisiana Baseline Mean	0.77	0.44	0.15	0.04

VARIABLES	Any Revolving Trade	Revolving Trade Balance (log)	Total Trade Balance (log)	Vantage Score
treat#2014.year	0.0087	0.0309	0.0660	2.3064
	(0.0053)	(0.0497)	(0.0566)	(1.2964)
treat#2015.year	0.0042	-0.0328	-0.0413	-0.1882
	(0.0050)	(0.0502)	(0.0583)	(1.1726)
treat#2017.year	0.0127***	0.0494	0.0437	3.1355***
	(0.0015)	(0.0210)	(0.0215)	(0.5837)
treat#2018.year	0.0141***	-0.0535	-0.1106**	2.7489*
	(0.0029)	(0.0244)	(0.0371)	(0.9262)
treat#2019.year	0.0216***	-0.0482	-0.0204	5.3590***
	(0.0030)	(0.0213)	(0.0281)	(0.5083)
Louisiana Baseline Mean	0.30	6.78	9.09	557.3

Note. The values in parentheses represent standard deviations. Study size was n = 4,669,410. The 1-month before expansion group was omitted from analysis. b values are from interaction terms between an indicator for Louisiana Medicaid expansion enrollment and survey periods. Controls included individual age, education level, sex, urbanity, zip code-based share of race, zip code-

based median rent level, zip code-based house ownership, zip-code based median household income, state unemployment rate and state poverty rate. All models included individual and year fixed effects, and standard errors are clustered at the state level.

*** Coefficient is statistically significant at 0.001 level.

** Coefficient is statistically significant at 0.01 level.

* Coefficient is statistically significant at 0.05 level.

Sensitivity Analysis:

Table 2: The Effect of Medicaid Expansion on Financial Indicators for Enrollees Exceeding the State's 75th Percentile for Zip Code–level Uninsurance rates in LA vs Non-Expansion States, 2014–2019 (Adjusted for Pre-trend Issue)

VARIABLES	Number of Non-Medical Debt Collections>$500	Any Non-Medical Debt Collection>$500	Number of 30-Days Delinquency	Any 30-Days Delinquency
treat#2014.year	-0.0156	-0.0107	0.0097	0.0004
	(0.0230)	(0.0074)	(0.0263)	(0.0048)
treat#2015.year	-0.0019	-0.0069	0.0137	0.0063
	(0.0123)	(0.0050)	(0.0245)	(0.0037)
treat#2017.year	-0.0754***	-0.0391***	-0.1081***	-0.0160***
	(0.0087)	(0.0037)	(0.0062)	(0.0013)
treat#2018.year	-0.0392**	-0.0323***	-0.1651***	-0.0296***
	(0.0155)	(0.0045)	(0.0252)	(0.0038)
treat#2019.year	-0.0501***	-0.0413***	-0.2149***	-0.0384***
	(0.0141)	(0.0064)	(0.0131)	(0.0032)
Louisiana Baseline Mean	0.68	0.40	0.73	0.23

VARIABLES	Number of Charge-off	Any Charge-off	Number of Bankruptcy	Any Bankruptcy

	Trades	Trade	Trades	Trade
treat#2014.year	-0.0076	-0.0014	-0.0240	-0.0057
	(0.0327)	(0.0149)	(0.0203)	(0.0033)
treat#2015.year	0.0078	0.0059	-0.0114	-0.0024
	(0.0227)	(0.0107)	(0.0120)	(0.0021)
treat#2017.year	-0.0279***	-0.0054	-0.0002	-0.0004
	(0.0068)	(0.0028)	(0.0050)	(0.0013)
treat#2018.year	-0.0104	0.0051	-0.0088	-0.0016
	(0.0151)	(0.0055)	(0.0129)	(0.0027)
treat#2019.year	0.0486*	0.0285***	0.0033	0.0006
	(0.0167)	(0.0056)	(0.0089)	(0.0021)
Louisiana Baseline Mean	0.76	0.44	0.17	0.05

VARIABLES	Any Revolving Trade	Revolving Trade Balance (log)	Total Trade Balance (log)	Vantage Score
treat#2014.year	0.0099	0.0330	0.0690	2.5616
	(0.0049)	(0.0490)	(0.0571)	-1.1559
treat#2015.year	0.0056	-0.0275	-0.0255	0.0488
	(0.0050)	(0.0501)	(0.0593)	(1.1919)
treat#2017.year	0.0168***	0.0707*	0.0435	4.7562***
	(0.0014)	(0.0213)	(0.0213)	(0.5078)
treat#2018.year	0.0216***	-0.0313	-0.1088*	5.9723***
	(0.0027)	(0.0239)	(0.0381)	(0.8376)
treat#2019.year	0.0336***	-0.0662*	-0.0398	9.1742***
	(0.0028)	(0.0205)	(0.0280)	(0.3088)
Louisiana Baseline Mean	0.28	6.80	9.03	556.2

Note. The values in parentheses represent standard deviations. Study size was n = 3,814,154. The 1-month before expansion group was omitted from analysis. b values are from interaction terms between an indicator for Louisiana Medicaid expansion enrollment and survey periods. Controls included individual age, education level, sex, urbanity, zip code-based share of race, zip code-based median rent level, zip code-based house ownership, zip-code based median household income, state unemployment rate and state poverty rate. All models included individual and year fixed effects, and standard errors are clustered at the state level.

*** Coefficient is statistically significant at 0.001 level.

** Coefficient is statistically significant at 0.01 level.

* Coefficient is statistically significant at 0.05 level.

Paper 3: Medicaid Expansion and Debt Burden for Chronic Health Patients: Evidence from Louisiana, 2014–2019

Abstract:

Objectives: To identify the effect of Medicaid expansion on reducing debt burden for enrollees with chronic diseases.

Methods: We used difference-in-differences design to compare changes in medical and non-medical debt for those with chronic health conditions in Louisiana, who benefited from Medicaid expansion, with those without chronic health condition. We matched individuals who gained Medicaid coverage in Louisiana and had at least one chronic health condition (n = 67,042) to credit report data on medical/non-medical debt and compared them with those gaining Medicaid coverage in Louisiana but have no chronic health condition (n = 129,514). The study spanned July 2014 through July 2019.

Results: One year after Louisiana Medicaid expansion, medical collections briefly rose before declining by 48.34 percentage points, by the third post-expansion year for enrollees with chronic health conditions. There was also a 2.34% decrease in the number of non-medical debt collections greater than $500 and a 6.78% reduction in the number of 30-days delinquencies, and an increase of 1.53 points in the vantage score.

Conclusions: The effect of gaining Medicaid coverage on reducing the debt burden was notably greater among individuals who suffered from a chronic health condition. Our findings advocate for the continued support and potential expansion of Medicaid to further address the intricate interplay between health and financial stability, particularly for those grappling with chronic health challenges.

Introduction:

The Affordable Care Act (ACA) was intended to improve healthcare access and affordability. Prior to the ACA, many individuals with chronic conditions faced barriers to obtaining comprehensive healthcare due to cost and eligibility restrictions[1]. Chronic health conditions, such as diabetes, hypertension, and heart disease, are prevalent among low-income individuals and can contribute significantly to the medical and non-medical debt burden[2-4]. The cost of treating and managing chronic conditions can be substantial, leading to high out-of-pocket costs and increased financial strain[2-4]. Previous research has indicated that individuals with chronic health conditions are more likely to experience financial hardship, accumulate medical debt, and file for bankruptcy than those without such conditions[2-7]. Yet, comprehensive research exploring the relationship between chronic health conditions and debt burden in the context of the ACA Medicaid expansion is scarce. Therefore, our study addresses this gap using de-identified credit report data linked to administrative enrollment records to contrast individuals with chronic health conditions in Louisiana, who benefited from Medicaid expansion, with those without chronic health condition.

A significant contribution of our research is the linkage of individual debt outcomes with Medicaid enrollment data. Unlike many studies exploring Medicaid's impact on financial health, which lack direct identification of individuals who actually obtained Medicaid coverage due to expansion, our approach circumvents this issue. Previous studies often relied on estimates of probabilistic eligibility or self-reported data to identify individuals likely covered by Medicaid post-expansion, potentially introducing errors in assessing treatment exposure. There could be systematic differences between individuals predicted to enroll in Medicaid and those who do not,

potentially leading to selection bias due to unaccounted influences on Medicaid enrollment and the researched outcomes[8-9].

Our study stands out by utilizing administrative data for Medicaid enrollment, offering a precise measure of individuals who truly gained Medicaid coverage, thereby enabling more accurate assessments of the expansion's effects on financial health for certain subgroups. Particularly, our research aims to investigate whether the effects of Medicaid expansion differ between individuals with chronic health conditions and those without such conditions. By ensuring that our study population comprises individuals who have indeed benefited from Medicaid expansion, we aim to isolate and accurately attribute any observed differences in outcomes to the effects of Medicaid expansion itself, rather than to other potential unobserved confounding factors.

Our results indicate that the effect of gaining Medicaid coverage on reducing the debt burden was notably greater among individuals who suffered from a chronic health condition. In comparison to individuals without any chronic health condition, chronic health patients exhibited a higher debt burden prior to Medicaid expansion, with about 69% of those who would go on to gain Medicaid coverage having at least one medical debts, versus 55% of those healthy group. By mid-2019, three years after Louisiana’s Medicaid expansion, this value had declined by 48.34% compared to the pre-Medicaid period. There was also a 2.34% decrease in the number of non-medical debt collection greater than $500 and a 6.78% reduction in the number of 30-days delinquencies, and an increase of 1.53 points in the vantage score, which assesses creditworthiness for lending decisions. Our findings advocate for the continued support and potential expansion of Medicaid to further address the intricate interplay between health and financial stability, particularly for those grappling with chronic health challenges.

Method:

Data Source, Variables and Study Population:

Utilizing Medicaid enrollment data from the Louisiana Department of Health, we identified individuals aged 18-64 who gained Medicaid coverage in July 2016, with a significant majority obtaining coverage in the first month facilitated by Louisiana's system-assisted enrollment process. These individuals' data were subsequently correlated with their credit report information provided by Experian Information Solutions. To ensure privacy, each beneficiary was assigned a randomized identifier, and personal details were removed. The analysis focused on several financial health indicators, including medical and non-medical debt collections, occurrences of 30-day delinquencies, charge-off trades, bankruptcy filings, revolving trade, total trade, and Vantage Scores—a creditworthiness scale devised by the major U.S. credit reporting agencies. Each "trade" denotes an account's terms and payment records with a creditor. A 30-day delinquency indicates a payment missed by at least a month, a charge-off signifies a lender's write-off of an uncollectible balance as bad debt, while bankruptcy trades reflect accounts included in bankruptcy filings, denoting recognized insolvency. Revolving trades describe accounts with balances that can extend over multiple months with payments renewing available credit, such as credit cards. These indicators collectively provide a nuanced view of an individual's financial status, detailed in Table 1, presenting a broad spectrum of credit health outcomes.

The administrative Medicaid enrollment data encompasses individual characteristics such as age, education level, sex, chronic health condition, and zip code. By integrating the zip code

information with the 2015 American Community Survey, we were able to ascertain each individual's urbanicity, as well as the racial and ethnic composition, median rent levels, homeownership rates, and median household income of the areas corresponding to their zip codes.

In the study, the treatment group was comprised of individuals who gained Medicaid coverage in Louisiana and had at least one chronic health condition (defined as a diagnosis of at least one of the following conditions within the first 6 months of Medicaid enrollment: Asthma, Depression, Diabetes, Hypertension, Chronic obstructive pulmonary disease, Congestive heart failure). The control group included those gaining Medicaid coverage in Louisiana with no chronic health condition. The sample consisted of 67,042 individuals in the treatment group and 129,514 in the control group observed annually from 2014 to 2019.

It is noteworthy that due to data limitations, the control group for the analysis of chronic conditions was restricted to include only these six chronic diseases. However, this does not imply that the individuals in the control group may not possess other conditions.

Statistical Analysis:

We used a differences-in-differences methodology (DiD) to estimate the changes in debt burden for enrollees with chronic diseases relative to enrollees without chronic diseases in Louisiana. The DiD model can be represented as follows:

$$Y_{it} = \alpha + \pi_1 Chronic_i + \pi_2 Post_t + \pi_3 (Chronic_i \times Post_t) + X_{it}\beta + Z_t\gamma + \varphi_t + \varepsilon_{ist}$$

Where Y_{it} the outcome variable (debt burden) for individual i at time t, $Chronic_i$is a dummy variable that equals 1 if the individual i has at least one chronic health condition (treatment group) and 0 if they have no chronic health condition (control group). $Post_t$ is a dummy variable that equals 1 for the post-expansion period and 0 for the pre-expansion period, and $Chronic_i \times Post_t$ is an interaction term that captures the DiD estimator ($\pi 3$), which is the average effect for chronic health patients gaining Medicaid coverage in Louisiana.

X_{it} is a vector of control variables for individuals and includes age, education level, sex, urbanicity. Z_t is a vector of control variables measured at the zip code and includes zip code race and ethnicity composition, zip code median rent levels, zip code house ownership rates, zip median household income. φ_t represents year fixed effects. ε_{it} is an error term, accounting for unobserved factors that vary over time and across individuals.

Inverse probability of treatment weighting:

The credibility of the DiD methodology requires that, in the absence of intervention, the outcome trends for both treatment and control groups would have paralleled each other, a condition known as the parallel trends assumption. In pursuing this verification, we plotted the unadjusted trends for each study outcome across both treatment and control groups, identifying instances that potentially violated the parallel trends criterion (refer to Appendix Figure 1 for details). To mitigate such discrepancies, we employed an inverse probability of treatment weighting (IPTW) strategy, deriving weights from the reciprocal likelihood of treatment assignment, predicated on variables including age, sex, education, urbanity status, and the racial and ethnic composition of each individual's zip code area. We deliberately limited the inclusion of further variables to avoid the risk of regression toward the mean[10]. The purpose of IPTW was to foster groups that were comparable for the DiD analysis through the balance of observable

covariates. Table 1 presents a summary of baseline characteristics for both matched and unmatched samples, alongside the standardized differences between treatment and control groups pre- and post-matching.

After implementing the IPTW technique, we observed a notable reduction in standardized differences across all the socio-demographic variables and most study outcomes. This improvement in the standardized differences across outcomes could, to a certain extent, enhance the comparability and reliability of our subsequent DID analyses[11-12]. However, it is noteworthy that for the variables of the number of non-medical debt collections over $500, any non-medical debt collection over $500, any revolving trade, total trade balance, and Vantage score, the standardized difference between the treatment and control groups actually increased after implementing IPTW. This increase is attributable to the significant rise in the average age of the matched control group during the IPTW process. For instance, with the number of non-medical debt collections over $500, there exists a significant negative correlation with age, leading to a smaller figure for the control group when its average age is raised, thereby amplifying the disparity with the treatment group. Similarly, the Vantage score, which has a significant positive correlation with age, showed an increased difference between the control and treatment groups as the average age of the control group was elevated. Consequently, for these five variables, additional analyses were conducted without the use of IPTW. Detailed event study figures and coefficients can be found in Appendix, figures 2 and table 2.

Table1: Baseline Characteristics of Individuals by Chronic Health Condition Status pre-post Matching

	Before Matching			After Matching		
	Enrollees with at Least 1 Chronic Health Condition	**Enrollees with no Chronic Health Condition**	**Standardized Difference**	**Enrollees with at Least 1 Chronic Health Condition**	**Enrollees with no Chronic Health Condition**	**Standardized Difference**
Study Outcomes						
Number of Medical Debt Collection	4.56	2.38	0.35	4.56	2.49	0.32
Any Medical Debt Collection	0.69	0.55	0.30	0.69	0.56	0.28
Number of Medical Debt Collection>$500	1.72	0.87	0.27	1.72	0.89	0.26
Medical Debt Balance (log)	5.08	3.82	0.35	5.08	3.86	0.33
Number of Non-Medical Debt Collection>$500	0.75	0.65	0.08	0.75	0.63	0.10
Any Non-Medical Debt Collection>$500	0.42	0.38	0.08	0.42	0.37	0.10
Number of 30-Days Delinquency	0.81	0.72	0.05	0.81	0.79	0.01
Any 30-Days Delinquency	0.25	0.23	0.04	0.25	0.24	0.02
Number of Charge-off Trades	0.86	0.72	0.11	0.86	0.75	0.09
Any Charge-off Trade	0.47	0.42	0.11	0.47	0.42	0.11
Number of Bankruptcy Trades	0.20	0.12	0.07	0.20	0.17	0.02
Any Bankruptcy Trade	0.06	0.03	0.11	0.06	0.05	0.04
Revolving Trade Balance (log)	6.84	6.76	0.03	6.84	6.86	-0.01
Any Revolving Trade	0.26	0.32	-0.12	0.26	0.33	-0.16
Total Trade Balance (log)	9.08	9.09	-0.01	9.08	9.14	-0.03
Vantage Score	552.0	560.0	-0.10	552.0	571.1	-0.22
Individual Characteristics						
Age	42.3	33.9	0.78	42.3	42.6	-0.02
Female (%)	62.3	61.8	0.05	62.3	62.0	0.03
Education (%)						
Less Than High School	17.8	16.8	0.03	17.8	17.9	-0.004

High School	42.0	35.4	0.13	42.0	41.3	0.01
Some College	24.0	27.7	-0.08	24.0	24.4	-0.01
College	16.2	20.1	-0.10	16.2	16.3	-0.002
State Characteristics						
Rurality (%)	21.9	17.8	0.10	21.9	21.9	-0.00
Race: Share of Black (%)	39.1	39.6	-0.02	39.1	39.2	-0.004
Median Rent ($)	820.1	849.7	-0.17	820.1	819.3	0.004
House Ownership (%)	64.1	63.2	0.06	64.1	63.9	0.01
Median Household Income ($)	45346.1	46434.8	-0.07	45346.1	45297.9	0.003

Note. Our analytic sample included 67,042 Medicaid expansion beneficiaries with at least one chronic health condition in Louisiana and 129,514 Medicaid expansion beneficiaries with no chronic health condition in Louisiana. We observed each of these individuals once per year from 2014 through 2019 for a total of 1,179,336 person-year observations. The baseline period was 2014–2016.

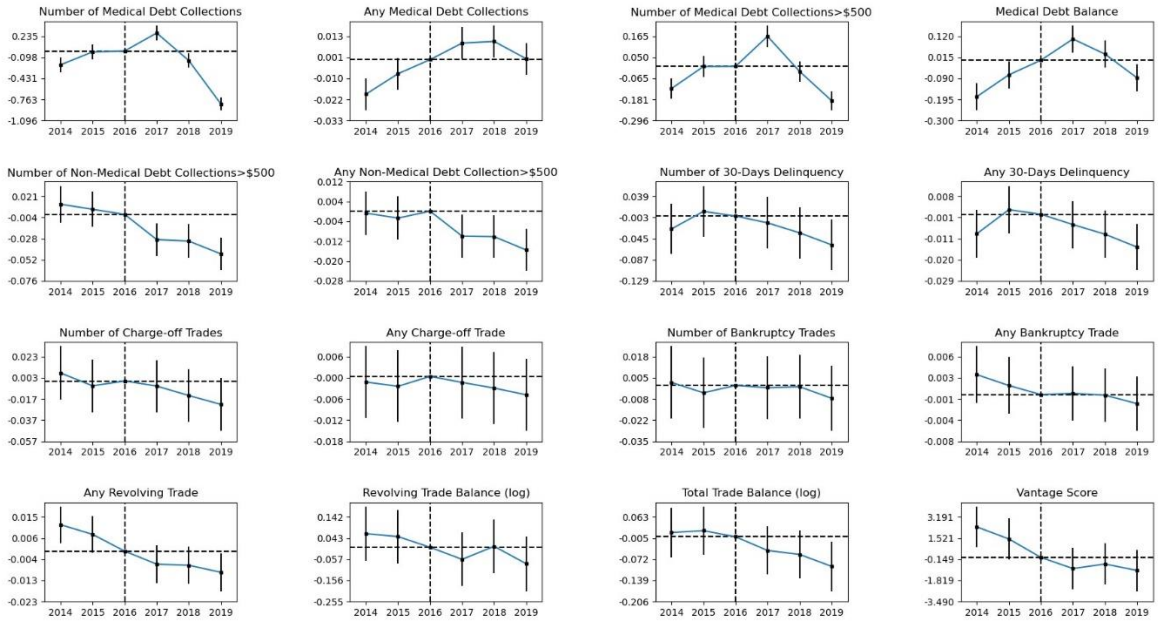

Figure 1. Event Study Trends of the Effect of Medicaid Expansion on Study Outcomes for Enrollees with vs without Chronic Condition after IPTW, 2014-2019

Note. The treatment group comprised Medicaid beneficiaries with at least one chronic health condition and the control group is composed of Medicaid beneficiaries with no chronic health condition in Louisiana. Both the treatment and control samples follow a balanced panel of the same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

Figure 1 displays the outcomes of the preliminary DiD analysis through an event study, showcasing the temporal dynamics in the relationship between Medicaid expansion and various financial indicators for people with chronic health conditions. The event study's findings reveal significant negative coefficients for several indicators, such as medical debt collection, during the pre-intervention period. This pattern raises doubt on the validity of the pre-trend parallel trends assumption. Notably, the graphs in the top four demonstrate an ascending trajectory during the pre-treatment period, suggesting that the relative change in each study outcome are converging towards 0 for the treatment cohort relative to the control group. Should these DiD estimations be analyzed, it might lead to an underestimation of Medicaid expansion's authentic effect in the subsequent period.

Partialing Out Pre-Trends Issue

To conform more rigorously to the pre-trend assumption in DiD analysis, we employed a statistical approach to partial out the pre-trend issues[13]. This procedure entails conducting a regression of the outcome variable on data up through the time period before the intervention, estimating the linear trend across the entire time period. Subsequently insert the residuals into the

DID model. This approach focuses only on controlling pre-existing trend differences, ensuring that our analysis is not influenced by trend changes that occur in the post-period[14].

Results:

We implemented the method to partialling out pre-trends issues, with the results of the DID analysis presented in Table 2 and the time-varying event study depicted in Figure 2. It was observed that compared to enrollees without any chronic health condition, chronic health patients gaining Medicaid coverage following the expansion in Louisiana correlated with a significant reduction of 48.34 percentage points in the number of medical debts, a decrease of 2.34 percentage points in the number of non-medical debts over $500, and a reduction of 6.78 percentage points in the 30-days delinquencies. But no significant changes were observed in charge-off trades and bankruptcy trades. In line with intuitive expectations, Medicaid expansion significantly enhanced individuals' 1.53 Vantage score, demonstrating an improvement in their financial well-being.

Figure 2 illustrates the event study trends of the effect of Medicaid Expansion for enrollees with and without chronic health conditions. The results corroborated that, compared to solely utilizing IPTW matching, the method of partialling out the pre-trends more effectively enables us to satisfy the parallel trends assumption. And the findings indicate that, compared to non-chronic disease patients, Medicaid expansion had a more notable effect on reducing the financial burden for those with chronic illnesses. We observe that, following Medicaid expansion, there is a year-over-year decline in the number of medical debt collections, any medical debt collection, the number of medical debt collections exceeding $500, and the overall

medical debt balance. However, it is noteworthy that in the first-year post-expansion, the coefficients for both the number of medical debt collections and the number of medical debt collections over $500 are significantly greater than zero. This indicates that, in the first year following the expansion, individuals with chronic health conditions experienced a higher burden of medical debt compared to those without chronic health conditions. Nevertheless, from the second year onwards, the medical debt burden for individuals with chronic health conditions significantly decreases year over year. For more detailed event study coefficients and standard deviations, please refer to Table1 in appendix.

Table2: DiD model estimates for the Effect of Medicaid Expansion on Study Outcomes for Enrollees with vs without Chronic Condition, Partial out Pre-Trend Issues, 2014-2019

Study Outcomes	Pre-intervention Mean	Post-intervention Mean	DID
Number of Medical Debt Collection	4.56	3.89	-0.4834***
S.D.			(0.0271)
Any Medical Debt Collection	0.69	0.65	-0.0131***
S.D.			(0.0021)
Number of Medical Debt Collection>$500	1.72	1.67	-0.1586***
S.D.			(0.0137)
Medical Debt Balance (log)	5.08	4.77	-0.1720***
S.D.			(0.0164)
Number of Non-Medical Debt Collection>$500	0.75	0.63	-0.0234***
S.D.			(0.0048)
Any Non-Medical Debt Collection>$500	0.42	0.38	-0.0122***
S.D.			(0.0021)
Number of 30-Days Delinquency	0.81	0.84	-0.0678***
S.D.			(0.0124)
Any 30-Days Delinquency	0.25	0.24	-0.0198***
S.D.			(0.0025)
Number of Charge-off Trades	0.86	0.79	-0.0034

S.D.			(0.0062)
Any Charge-off Trade	0.47	0.45	-0.0044
S.D.			(0.0025)
Number of Bankruptcy Trades	0.20	0.16	0.0004
S.D.			(0.0053)
Any Bankruptcy Trade	0.06	0.05	0.0029
S.D.			(0.0022)
Revolving Trade Balance (log)	6.84	7.03	0.0146
S.D.			(0.0311)
Any Revolving Trade	0.26	0.29	0.0042
S.D.			(0.0031)
Total Trade Balance (log)	9.08	9.21	-0.0551
S.D.			(0.0291)
Vantage Score	552.0	556.8	1.5310***
S.D.			(0.3968)

Note. Study size was n = 1,179,336. Controls included individual age, education level, sex, urbanity, zip code-based share of race, zip code-based median rent level, zip code-based house ownership, zip-code based median household income. All models included individual and year fixed effects.

*** Coefficient is statistically significant at 0.001 level.

** Coefficient is statistically significant at 0.01 level.

* Coefficient is statistically significant at 0.05 level.

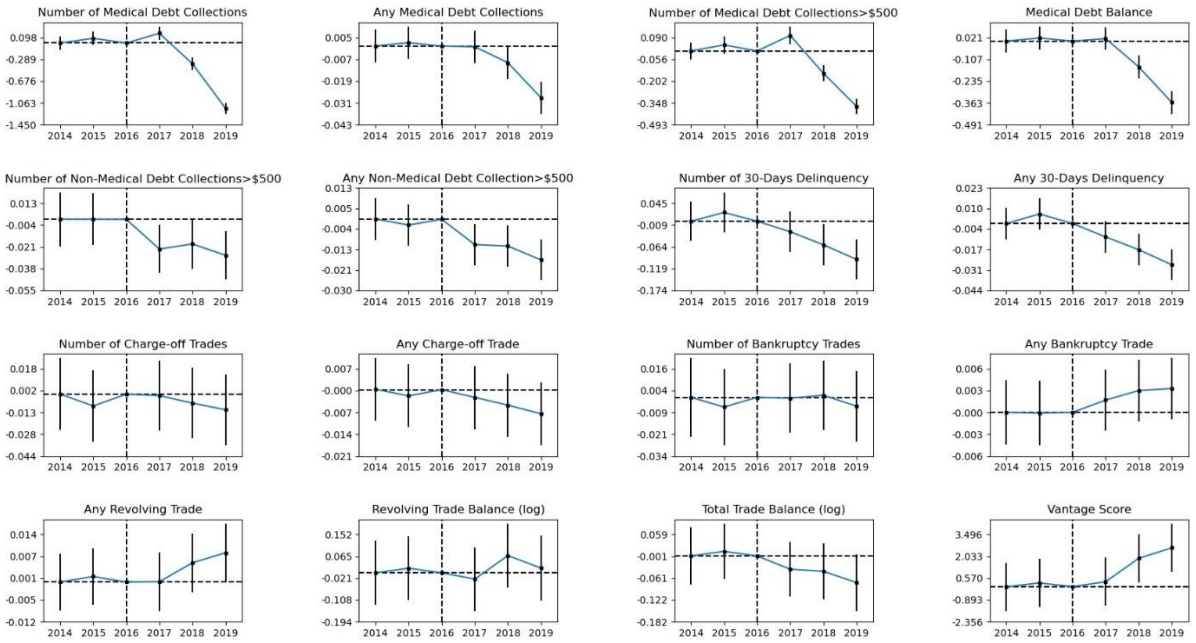

Figure 2. Event Study Trends of the Effect of Medicaid Expansion on Study Outcomes for Enrollees with vs without Chronic Condition, Partial out Pre-Trend Issues, 2014-2019

Note. The treatment group comprised Medicaid beneficiaries with at least one chronic health condition and the control group is composed of Medicaid beneficiaries with no chronic health condition in Louisiana. Both the treatment and control samples follow a balanced panel of the same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

For the variables number of non-medical debt collections over $500, any non-medical debt collection over $500, any revolving trade, total trade balance, and Vantage score, after implementing Inverse Probability of Treatment Weighting, an increase in the standardized difference between the treatment and control groups was observed. Therefore, I additionally conducted a DID analysis specifically for these five variables, which also partialled out the pre-

trend issue, but without prior IPTW matching of the treatment and control groups. The outcomes varied slightly from those obtained with IPTW matching. Without prior IPTW, the results indicated that Medicaid expansion does not significantly reduce the number of non-medical debt collections >$500 or any non-medical debt collection >$500 for individuals with chronic illnesses, while any revolving trade significantly increased. The total trade balance and Vantage score showed similar results to those using IPTW.

For other study outcomes beyond these five variables, the results were consistent whether IPTW was used or not. However, some variables did not meet the parallel pre-trend assumption required for DID analysis without IPTW. To maintain methodological consistency, DID results obtained without IPTW were not used. Specific coefficients and standard deviations are provided in Table 2 in the appendix.

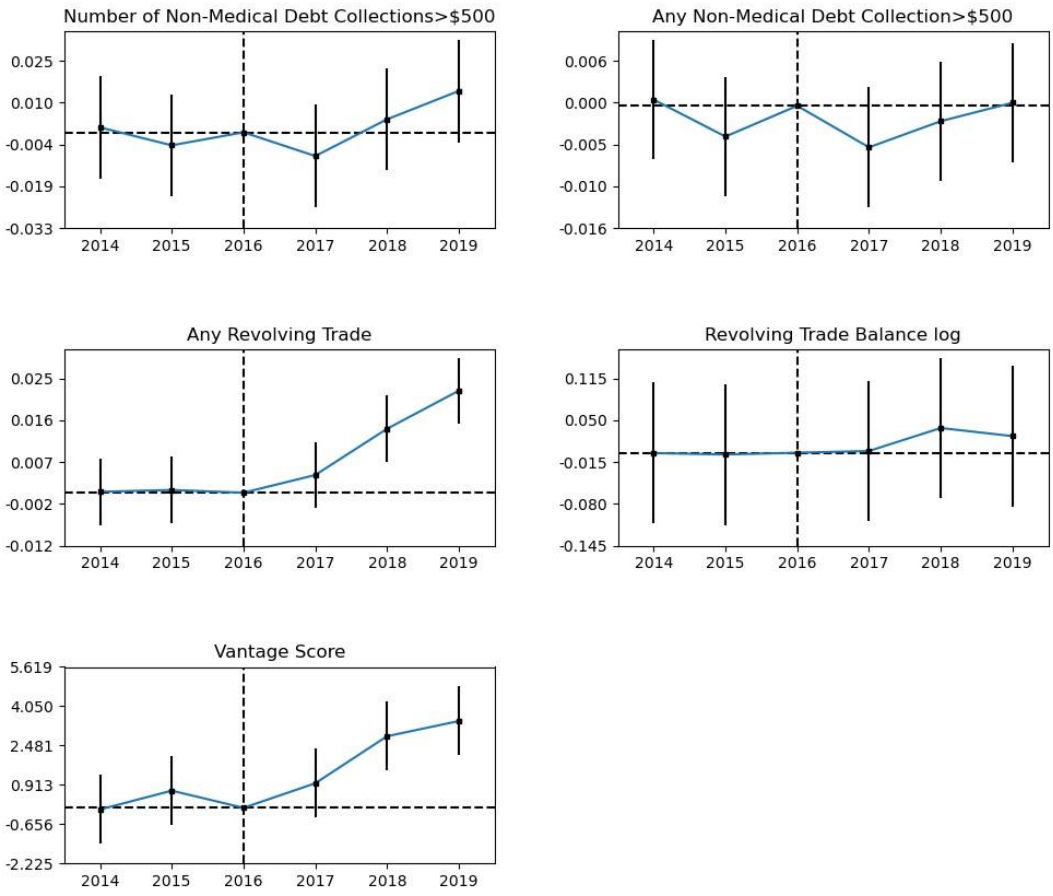

Figure 3. Event Study Trends of the Effect of Medicaid Expansion on Study Outcomes for Enrollees with vs without Chronic Condition, Partial out Pre-Trend Issues, No IPTW, 2014-2019

Note. The treatment group comprised Medicaid beneficiaries with at least one chronic health condition and the control group is composed of Medicaid beneficiaries with no chronic health condition in Louisiana. Both the treatment and control samples follow a balanced panel of the same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

Discussion:

The interplay between Medicaid expansion and its efficacy in diminishing the debt burden, especially among individuals with chronic health conditions, emerges as a critical focal point for understanding the financial implications of healthcare policies. Notably, individuals grappling with chronic diseases are disproportionately affected by higher debt burdens, attributable to their frequent and costly interactions with the healthcare system[2-4]. This demographic's extensive healthcare needs not only precipitate elevated medical expenses but also hinder their ability to secure comprehensive insurance coverage, thereby exacerbating their susceptibility to financial strain[2-7]. Our study examined the impact of Medicaid expansion on the financial debt burden for enrollees with chronic diseases relative to enrollees without chronic diseases in Louisiana. Employing Inverse Probability of Treatment Weighting (IPTW) and Difference-in-Differences (DID) analysis, augmented by partialling out pre-trends issues, our findings suggest that compared to enrollees without chronic illnesses, Medicaid expansion has a more positive impact on improving the financial health of enrollees with chronic conditions. These results affirm the positive role of Medicaid expansion in improving personal financial wellbeing.

Interestingly, the study also reveals an initial increase in the burden of medical debt for individuals with chronic conditions in the first year following Medicaid expansion. This initial surge warrants a nuanced discussion, as it suggests a temporal lag in the realization of Medicaid expansion's financial benefits. Patients with chronic conditions may have deferred necessary treatments prior to Medicaid expansion due to cost constraints or lack of insurance coverage[5-7]. Upon obtaining Medicaid, they might seek out previously unaffordable treatments, leading to an initial surge in medical debt. This "pent-up demand" phenomenon could explain the observed

increase in debt during the expansion's first year[15-21]. Also, in the initial phase, patients with chronic conditions are likely to undergo more diagnostic testing and commence treatment plans essential for managing and controlling their conditions[19-21]. These necessary activities might temporarily elevate medical debt, although they contribute to reducing the need for emergency medical services and associated costs in the long term. However, over time, continuous access to healthcare facilitated by Medicaid helps patients with chronic diseases better manage their conditions, diminishing the demand for emergency and high-cost medical services. This contributes to the reduction in medical debt observed in the second and third years post-expansion, emphasizing the importance of sustained coverage.

Limitation:

Due to constraints within our dataset, our treatment group is comprised solely of individuals who secured Medicaid coverage in Louisiana and had been diagnosed with at least one chronic health condition (specifically defined as having received a diagnosis of Asthma, Depression, Diabetes, Hypertension, Chronic Obstructive Pulmonary Disease, or Congestive Heart Failure within the first six months of Medicaid enrollment). Consequently, our dataset limits the scope of chronic diseases to these six conditions. This means individuals with other chronic conditions, not encompassed within this definition, could inadvertently be categorized into the control group, which is defined as individuals without any chronic diseases. This limitation likely leads to an underestimation of the effect of Medicaid expansion on reducing the debt burden for enrollees with chronic diseases. By potentially categorizing individuals with other chronic conditions into the control group, the analysis may not fully capture the extent of the financial burden experienced by the broader population of individuals with chronic diseases.

Consequently, the comparison between the treatment and control groups might not accurately reflect the full differential impact of Medicaid expansion, as it omits a segment of the population that could also benefit from Medicaid coverage. However, our results demonstrate that Medicaid expansion has a more pronounced effect on reducing the debt burden for patients with chronic diseases. Should these outcomes be underestimated, it further substantiates the positive role of Medicaid expansion in alleviating financial strain. This underestimation would imply that the actual benefits of Medicaid expansion are even greater than our findings suggest, reinforcing the significance of such policy measures in providing substantial financial relief to those with chronic conditions.

Conclusion:

In conclusion, our study provides compelling evidence that Medicaid expansion in Louisiana has significantly contributed to reducing the financial debt burden among enrollees with chronic health conditions, enhancing their financial well-being, and potentially facilitating better access to necessary healthcare services. These findings advocate for the continued support and potential expansion of Medicaid to further address the intricate interplay between health and financial stability, particularly for those grappling with chronic health challenges.

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Appendix:

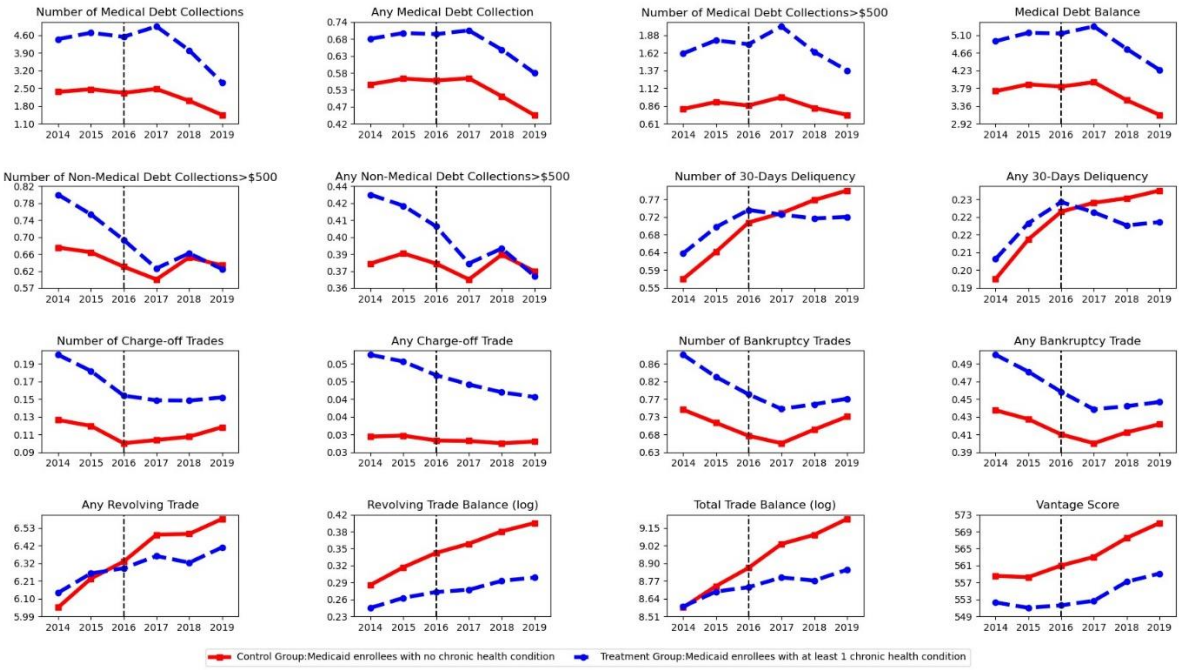

Figure 1: Financial Outcomes for Medicaid Beneficiaries with at Least One Chronic Health Condition vs Without Chronic Health Condition, Raw Trend, 2014–2019

Note. The treatment group comprised Medicaid beneficiaries with at least one chronic health condition and the control group is composed of Medicaid beneficiaries with no chronic health condition in Louisiana. Both the treatment and control samples follow a balanced panel of the

same individuals over time. The vertical line represents the last observation before Medicaid expansion in Louisiana.

Table 1: The Effect of Medicaid Expansion on the Study Outcomes for Enrollees with vs without Chronic Health Conditions in LA, 2014–2019 (Adjusted for Pre-trend Issue)

VARIABLES	Number of Medical Debt Collections	Any Medical Debt Collection	Number of Medical Debt Collections>$500	Medical Debt Balance (log)
treat#2014.year	0.0006	0.0001	0.0002	0.0005
	(0.0492)	(0.0037)	(0.0240)	(0.0282)
treat#2015.year	0.0944	0.0018	0.0598	0.0184
	(0.0497)	(0.0037)	(0.0347)	(0.0283)
treat#2017.year	0.1737***	-0.0004	0.1034***	0.0147
	(0.0501)	(0.0037)	(0.0250)	(0.0284)
treat#2018.year	-0.3680***	-0.0090*	-0.1490***	-0.1512***
	(0.0466)	(0.0037)	(0.0232)	(0.0283)
treat#2019.year	-1.1582***	-0.0280***	-0.3692***	-0.3599***
	(0.0416)	(0.0037)	(0.0217)	(0.0284)
Treatment Group Baseline Mean	4.56	0.69	1.72	5.08

VARIABLES	Number of Non-Medical Debt Collections>$500	Any Non-Medical Debt Collection>$500	Number of 30-Days Delinquency	Any 30-Days Delinquency
treat#2014.year	0.0001	0.0001	-0.0001	0.0000
	(0.0089)	(0.0037)	(0.0210)	(0.0044)
treat#2015.year	0.0001	-0.0024	0.0220	0.0063
	(0.0085)	(0.0037)	(0.0215)	(0.0044)
treat#2017.year	-0.0230***	-0.0106***	-0.0264	-0.0088
	(0.0079)	(0.0037)	(0.0217)	(0.0044)
treat#2018.year	-0.0191*	-0.0112***	-0.0591***	-0.0172***
	(0.0081)	(0.0037)	(0.0217)	(0.0044)
treat#2019.year	-0.0279***	-0.0170***	-0.0957***	-0.0271***
	(0.0080)	(0.0036)	(0.0215)	(0.0043)
Treatment Group Baseline Mean	0.75	0.42	0.81	0.25

VARIABLES	Number of Charge-off Trades	Any Charge-off Trade	Number of Bankruptcy Trades	Any Bankruptcy Trade
treat#2014.year	0.0001	0.0001	-0.0000	-0.0000
	(0.0108)	(0.0043)	(0.0096)	(0.0020)
treat#2015.year	-0.0083	-0.0020	-0.0056	-0.0001
	(0.0107)	(0.0043)	(0.0093)	(0.0020)
treat#2017.year	-0.0010	-0.0025	-0.0005	0.0018
	(0.0105)	(0.0043)	(0.0084)	(0.0019)
treat#2018.year	-0.0063	-0.0050	0.0012	0.0032
	(0.0106)	(0.0043)	(0.0085)	(0.0019)
treat#2019.year	-0.0110	-0.0078	-0.0051	0.0035
	(0.0106)	(0.0043)	(0.0086)	(0.0019)
Treatment Group Baseline Mean	0.86	0.47	0.20	0.06

VARIABLES	Any Revolving Trade	Revolving Trade Balance (log)	Total Trade Balance (log)	Vantage Score
treat#2014.year	-0.0000	-0.0000	-0.0002	-0.0088
	(0.0035)	(0.0541)	(0.0333)	(0.6845)
treat#2015.year	0.0016	0.0182	0.0126	0.2512
	(0.0035)	(0.0533)	(0.0325)	(0.6866)
treat#2017.year	0.0001	-0.0249	-0.0367	0.3310
	(0.0036)	(0.0534)	(0.0323)	(0.6870)
treat#2018.year	0.0056	0.0683	-0.0425	1.9000***
	(0.0036)	(0.0537)	(0.0325)	(0.6867)
treat#2019.year	0.0085	0.0186	-0.0735	2.6007***
	(0.0036)	(0.0544)	(0.0332)	(0.6891)
Treatment Group Baseline Mean	0.26	6.84	9.08	552.0

Note. The values in parentheses represent standard deviations. Study size was n = 1,179,336. The 1-month before expansion group was omitted from analysis. b values are from interaction terms between an indicator for Louisiana Medicaid expansion enrollment and survey periods. Controls included individual age, education level, sex, urbanity, zip code-based share of race, zip code-based median rent level, zip code-based house ownership, zip-code based median household income, state unemployment rate and state poverty rate. All models included individual and year fixed effects, and standard errors are clustered at the state level.

*** Coefficient is statistically significant at 0.001 level.

** Coefficient is statistically significant at 0.01 level.

* Coefficient is statistically significant at 0.05 level.

Table 2: The Effect of Medicaid Expansion on the Study Outcomes for Enrollees with vs without Chronic Health Conditions in LA, 2014–2019 (Adjusted for Pre-trend Issue but no IPTW)

VARIABLES	Number of Medical Debt Collections	Any Medical Debt Collection	Number of Medical Debt Collections>$500	Medical Debt Balance (log)
treat#2014.year	0.0065	0.0011	0.0021	0.0078
	(0.0372)	(0.0033)	(0.0190)	(0.0248)
treat#2015.year	0.0970**	-0.0007	0.0513***	0.0007
	(0.0372)	(0.0033)	(0.0190)	(0.0248)
treat#2017.year	0.1833***	0.0010	0.0890***	0.0111
	(0.0372)	(0.0033)	(0.0190)	(0.0248)
treat#2018.year	-0.3709***	-0.0061	-0.1685***	-0.1565***
	(0.0372)	(0.0033)	(0.0190)	(0.0248)
treat#2019.year	-1.1712***	-0.0236***	-0.3826***	-0.3667***
	(0.0372)	(0.0033)	(0.0190)	(0.0248)
Louisiana Baseline Mean	4.56	0.69	1.72	5.08

VARIABLES	Number of Non-Medical Debt Collections>$500	Any Non-Medical Debt Collection>$500	Number of 30-Days Delinquency	Any 30-Days Delinquency
treat#2014.year	0.0017	0.0008	0.0005	0.0002
	(0.0075)	(0.0033)	(0.0185)	(0.0039)
treat#2015.year	-0.0045	-0.0040	0.0233	0.0038
	(0.0075)	(0.0033)	(0.0185)	(0.0039)
treat#2017.year	-0.0082	-0.0054	-0.0156	-0.0066
	(0.0075)	(0.0033)	(0.0185)	(0.0039)
treat#2018.year	0.0045	-0.0020	-0.0494***	-0.0129***
	(0.0075)	(0.0033)	(0.0185)	(0.0039)

treat#2019.year	0.0143	0.0004	-0.0720***	-0.0189***
	(0.0075)	(0.0033)	(0.0184)	(0.0039)
Louisiana Baseline Mean	0.75	0.42	0.81	0.25

VARIABLES	**Number of Charge-off Trades**	**Any Charge-off Trade**	**Number of Bankruptcy Trades**	**Any Bankruptcy Trade**
treat#2014.year	0.0016	0.0009	-0.0001	-0.0000
	(0.0091)	(0.0038)	(0.0075)	(0.0015)
treat#2015.year	-0.0084	-0.0025	-0.0022	0.0002
	(0.0091)	(0.0038)	(0.0075)	(0.0015)
treat#2017.year	0.0021	-0.0021	0.0049	0.0005
	(0.0091)	(0.0038)	(0.0075)	(0.0015)
treat#2018.year	-0.0027	-0.0032	0.0055	0.0016
	(0.0091)	(0.0038)	(0.0075)	(0.0015)
treat#2019.year	-0.0094	-0.0044	0.0067	0.0023
	(0.0091)	(0.0038)	(0.0074)	(0.0015)
Louisiana Baseline Mean	0.86	0.47	0.20	0.06

VARIABLES	**Any Revolving Trade**	**Revolving Trade Balance (log)**	**Total Trade Balance (log)**	**Vantage Score**
treat#2014.year	0.0002	-0.0006	0.0003	-0.0656
	(0.0031)	(0.0463)	(0.0285)	(0.5826)
treat#2015.year	0.0006	-0.0028	-0.0003	0.6842
	(0.0031)	(0.0463)	(0.0285)	(0.5826)
treat#2017.year	0.0039	0.0026	-0.0247	0.9783
	(0.0031)	(0.0463)	(0.0285)	(0.5826)
treat#2018.year	0.0141***	0.0383	0.0143	2.8553***
	(0.0031)	(0.0463)	(0.0285)	(0.5826)
treat#2019.year	0.0225***	0.0257	0.0212	3.4609***
	(0.0031)	(0.0462)	(0.0285)	(0.5820)
Louisiana Baseline Mean	0.26	6.84	9.08	552.0

Note. The values in parentheses represent standard deviations. Study size was n = 1,179,336. The 1-month before expansion group was omitted from analysis. b values are from interaction terms between an indicator for Louisiana Medicaid expansion enrollment and survey periods. Controls

included individual age, education level, sex, urbanity, zip code-based share of race, zip code-based median rent level, zip code-based house ownership, zip-code based median household income, state unemployment rate and state poverty rate. All models included individual and year fixed effects, and standard errors are clustered at the state level.

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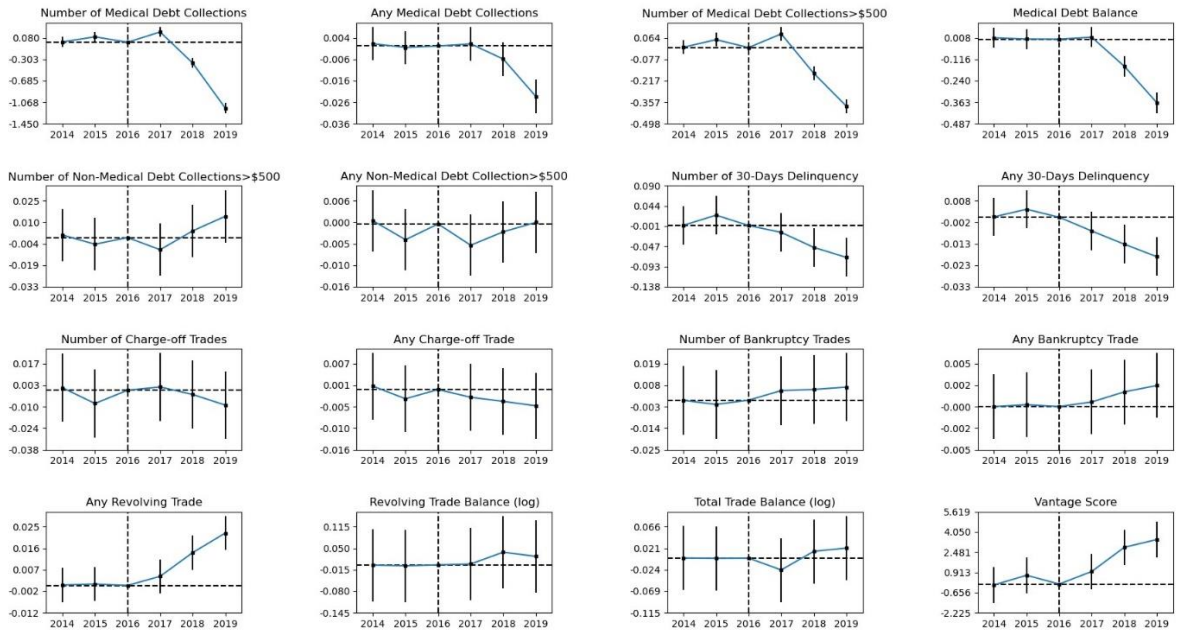

Figure 2. Event Study Trends of the Effect of Medicaid Expansion on Study Outcomes for Enrollees with vs without Chronic Condition, Partial out Pre-Trend Issues, No IPTW, 2014-2019

Note. The treatment group comprised Medicaid beneficiaries with at least one chronic health condition and the control group is composed of Medicaid beneficiaries with no chronic health

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