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The Impact of Medicaid Expansion, Diversity and the ACA Primary Care Fee Bump on the Performance of Medicaid Managed Care

Charles C. Yang, Ph.D.

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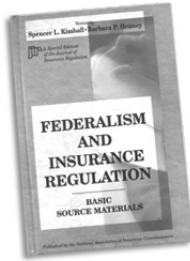
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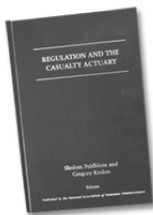
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The Impact of Medicaid Expansion, Diversity and the ACA Primary Care Fee Bump on the Performance of Medicaid Managed Care

Charles C. Yang, Ph.D.*

Abstract

In response to the policy changes to Medicaid, this research examines the impact of Medicaid expansion, diversity, and the Medicaid fee bump on Medicaid managed care. It aims to provide insights to health insurers, consumers, regulators and policymakers regarding profitability, better services, reducing expenses and improving efficiency. The results indicate that Medicaid expansion increases the profit efficiency of Medicaid managed care, but it has no significant impact on medical service efficiency or composite efficiency. The diversity of business lines, product types or payment methods does not create economies of scope for Medicaid profitability, medical service efficiency or composite efficiency. However, the diversity of product types is associated with more ambulatory encounters, while the diversity of payment methods reduces medical and administrative expenses. The Medicaid fee bump does not increase medical expenses or the utilization of medical services, and it has no significant impact on profitability or composite efficiency. "Medicaid lower reimbursement" should not be a big concern for Medicaid managed care in terms of profitability, medical services, expenses or overall efficiency. Another finding was that offering more preferred provider organization (PPO) plans improves the performance in profits, services and expenses; and managed care organizations (MCOs) also serving

*Associate Professor, Department of Finance, College of Business, Florida Atlantic University: cyang1@fau.edu.

Medicare beneficiaries perform better in Medicaid managed care. In addition, capitation and contractual fee payments both enhance composite efficiency. The value-based payments do not have a significant impact on expenses or efficiency, but they are associated with more ambulatory encounters.

Introduction

Medicaid programs, designed to provide health coverage for low-income people, are available in all states, Washington, DC, and the U.S. territories. Medicaid is the largest source of health coverage in the U.S. According to the June 2018 report of the federal Centers for Medicare & Medicaid Services (CMS) (2018a), 66.9 million individuals were enrolled in Medicaid. States have increasingly used managed care to deliver services to Medicaid beneficiaries (Garfield et al., 2018). Medicaid managed care has become the nation's dominant delivery system for Medicaid enrollees, and it covers around 68% of all Medicaid beneficiaries (CMS, 2018b).[1] This research examines the factors affecting the performance of Medicaid managed care, including Medicaid expansion; the diversity of business lines, product types and payment methods; and the Medicaid fee bump This research aims to provide insights to health insurers, consumers, regulators and policymakers through the analysis of various performance evaluations of profit, expense, service and efficiency measures. The performance analyses should reveal potential moves and strategies to: 1) increase profits and profit efficiency from the perspective of insurers; 2) reduce medical costs and expenses; 3) provide better medical services; and 4) enhance medical service efficiency from the perspective of consumers, regulators and policymakers. The empirical evidence of this research should provide important implications to policymakers and regulators on achieving the three overarching aims of health care: better care, better health and lower costs (CMS, 2016a).

States establish and administer their own Medicaid programs, and they determine the type, amount, duration and scope of services within broad federal guidelines. To help achieve the major objective of universal health coverage, the federal Affordable Care Act (ACA) provides states the authority to expand Medicaid eligibility to all individuals under age 65 in families with incomes below 138% of the Federal Poverty Level (FPL). As of 2018, there are 33 states, including Washington DC, that have expanded Medicaid (KFF, 2018). Furthermore, Section 1115 Medicaid waivers provide states an avenue to test new approaches in Medicaid. States can obtain comprehensive Section 1115 waivers to make broad changes in Medicaid eligibility, benefits and cost-sharing, and provider payments. States can also obtain narrower waivers to focus on specific services or populations (Musumeci et al., 2018). By November 2018, 46 Medicaid waivers across 38 states had been approved (Medicaid waiver tracker: *www.kff.org*). In the recent literature regarding the take-up behavior of the new Medicaid eligibles due to Medicaid expansion, Courtemanche et al. (2017), Frean et al. (2017), and Kaestner et al. (2017) all examine the coverage effects of Medicaid expansion of the ACA, and they found that Medicaid expansion

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1. Hurley and Somers (2003) review the evolution of Medicaid managed care and the challenges that it has had to overcome. They indicate that most states believe "the conversion of Medicaid to managed care has been a right step in the right direction to gain more control and accountability from the health care marketplace."

significantly increased Medicaid coverage. As for the utilization of medical services, Simon et al. (2017) find evidence consistent with the increased use of certain forms of preventive care, while Jones et al. (2015) document an increase in Medicaid encounters from 2013 to 2014. These studies investigate the impact of Medicaid expansion from the perspective of individual beneficiaries. However, the take-up of these new Medicaid beneficiaries (probably with dissimilar utilization patterns of medical services) might also affect the performance of the insurer, such as profitability and efficiency.[2] This motivates the current research to examine the impact of Medicaid expansion on the performance of Medicaid managed care. An earlier study by McCue et al. (1999) analyzes the operating characteristics and financial performance of commercial health maintenance organizations (HMOs) in the Medicaid market from 1992 to 1996. Inversely, this current research contributes to the literature by focusing on the impact of the recent Medicaid policy changes—i.e., Medicaid expansion and Medicaid fee bump—on Medicaid managed care, using a comprehensive set of performance measures.

Nearly every state uses some form of managed care for its Medicaid program, such as comprehensive managed care, primary care case management, and limited-benefit plans (Palmer et al., 2018). The dominant model of Medicaid managed care is comprehensive managed care, which is available in 39 states, including Washington DC. States contract with MCOs to provide comprehensive managed care to Medicaid beneficiaries and pay the MCO a fixed monthly premium or "capitation rate" for each enrollee (Garfield et al., 2018). In 2016, the CMS issued a final rule on Medicaid managed care, the first overhaul of Medicaid managed care regulations in more than a decade. The CMS final rule advanced the Administration's efforts to modernize the health care system to deliver better care, smarter spending and healthier people (CMS, 2016b). It strengthened states' efforts in terms of delivery system reform such as adopting value-based purchasing approaches and using incentive and withhold arrangements. In the literature, Yang (2014) compares the medical service efficiency of different payment methods, product types and business lines from the societal perspective. Nonetheless, the diversity impact of business lines, payment methods and product types has not been examined, nor the impact of a specific payment method, business line or product type on the performance of Medicaid managed care. In contrast to economies of scale that arise from more volume, economies of scope are efficiencies formed by variety, the diversity of products or services, or even various payment methods. This current research investigates and provides

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2. As stated, Medicaid managed care has become the nation's dominant delivery system for Medicaid enrollees, and it covers around 68% of all Medicaid beneficiaries (CMS, 2018b). In addition to the differential risk characteristics, utilization of medical services, and medical costs/expenses of the new Medicaid eligibles, the research design of this current article also takes into consideration the impact of the enrollment and take-up behaviors of Medicaid beneficiaries and insurers. Specifically, this research analyzes the sample of insurers who voluntarily enroll the Medicaid expansion beneficiaries, thus obtaining different market shares. For example, no matter if the new risks are profitable or not, there would not be much of an impact on the insurer's profitability if the take-up or enrollment rate is low.

empirical evidence on how MCOs and other health insurers may improve their performance by selecting the optimal mix or portfolio of business lines, product types and payment methods to achieve economies of scope.

The Medicaid program is administered by states according to federal requirements, and it is jointly funded by the federal government and the states. President Donald Trump and Republican Party leaders have been considering fundamental changes to Medicaid's financing structure in order to achieve substantial federal budgetary savings. For example, the American Health Care Act of 2017 (AHCA) proposed to convert federal Medicaid matching funds to a per capita cap or a block grant. The Congressional Budget Office (CBO) estimates that the AHCA's Medicaid financing changes would reduce federal Medicaid spending by $756 billion from 2017 to 2026 (Rudowitz et al., 2017). With such Medicaid financing proposals, states would have to focus more on Medicaid program savings. Wiener et al. (2017) discuss some strategies to reduce Medicaid spending such as premiums, cost sharing, and alternative payment models. They also argue that the use of accountable care organizations (ACOs), episode-based payments, and global budgets is still new in Medicaid; and rigorous evaluations are too limited to support the expectation that these models can reduce total Medicaid spending. Therefore, it is imperative to examine the factors affecting expenses and cost efficiency in order to uncover potential moves for cost reductions and efficiency improvement for Medicaid managed care and health insurers in general.

Medicaid cost reductions may be achieved through delivery and payment reforms or adopting the best practices of efficient peers. However, Medicaid has historically paid physicians lower fees than either private insurance or Medicare for the same services. To encourage provider participation and help ensure access to care in Medicaid, the ACA required states to pay certain physicians Medicaid fees at least equal to Medicare's for many primary care services in 2013 and 2014 (Medicaid fee bump). The federal government funded the full cost of the fee increase. The ACA required that qualified physicians in Medicaid managed care also receive the full benefit of the fee increase. Polsky et al. (2015) examine appointment availability after increases in Medicaid primary care; Callison and Nguyen (2018) evaluate the effect of Medicaid fee changes on health care access, utilization and spending; and Alexander and Schnell (2018) discuss the impact of the Medicaid primary care rate increase on access and health, all for individual Medicaid beneficiaries. However, Decker (2018) investigates the association between the Medicaid fee bump and physician participation in Medicaid, but she finds no such relation. Supposedly, the Medicaid fee bump should affect medical costs/expenses; the utilization of medical services; and, in turn, the efficiency of insurers. This current research examines the impact of the fee bump on the performance of Medicaid managed care (not individuals or providers) to inform the decision of increasing or reducing expenses for MCOs and regulators.

Specifically, this current research conducts a series of regression analyses on a comprehensive set of performance measures of Medicaid managed care: profit measures, service measures and expense measures. These performance measures consist of single-variable measures such as underwriting gains/losses, two-variable

ratio measures such as medical loss ratio, as well as efficiency measures. The traditional single-variable and ratio measures are commonly used to evaluate insurers. The efficiency measure combines more than two variables and provides a more complete evaluation of the insurer. Yang and Lin (2017) indicate that financial ratios are not effective indicators of the efficiency of health insurers. They suggest a combination of efficiency measures and financial ratios be adopted to satisfy all stakeholders. The efficiency measures are generated using the data envelopment analysis (DEA) models[3] from the insurer's and the societal perspective. A composite efficiency measure is also included, which combines the two perspectives to accommodate the interests of different stakeholders and avoid the potentially biased regulatory decisions from focusing on medical services alone (without profits) (Yang and Lin, 2017). The difference-in-differences (DiD) component of the regression models is utilized to analyze the impact of Medicaid expansion by comparing the pre-expansion and post-expansion periods. This research examines the diversity impact and test economies, or diseconomies, of scope for Medicaid managed care. The Gini-Simpson index is adopted to measure the diversity in business lines, product types and payment methods. The impact of the specific payment method, product type or business line is also discussed. Furthermore, this article examines the impact of the Medicaid fee bump by comparing the two fee-bump years with the year before in terms of utilization, profitability, expenses and efficiency of Medicaid managed care. Additionally, this current research also presents some descriptive and univariate analyses of the performance of Medicaid managed care.

This article proceeds as follows. Data and research design are presented in the next section. The article then presents descriptive and univariate analyses of performance measures and insurer characteristic variables. After that, the article discusses underwriting profit, profit ratio and profit efficiency of Medicaid managed care; examines the utilization of medical services and medical service efficiency of Medicaid managed care; analyzes the composite efficiency of Medicaid managed care; and presents the analysis of expenses, medical loss ratio and expense ratio, and the impact of the Medicaid fee bump. The final section concludes the article with a summary of the findings.

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3. DEA is a mathematical programming frontier approach to estimating the relative efficiency of a homogeneous set of peer entities called decision making units (DMUs). Different from financial ratios, DEA is a multi-input, multi-output efficiency measurement technique that generalizes the classical single input, single output approach. The relative efficiency is measured by the DEA efficiency score, which is the optimal ratio of the weighted sum of outputs over the weighted sum of inputs, which is obtained by solving the DEA optimization programs. The interested reader is referred to Cooper et al. (2007) for details and references.

Data and Research Design

As stated, this research examines the factors affecting the performance of Medicaid managed care, including Medicaid expansion, diversity, the Medicaid fee bump, business lines, product types, and payment methods. The data used in this research come from the health insurers' financial statements filed with the NAIC. Most states expanded Medicaid in 2014, and the Medicaid fee bump applied in 2013 and 2014. Therefore, we use four years of annual data from 2012 to 2015, two years before (2012 and 2013) and two years after (2014 and 2015) the Medicaid expansion.[4]

We estimate regression models with the DiD component. The DiD component compares changes in the performance of the insurers in the treatment states to that of the insurers in the control states. The pre-expansion period is 2012–2013, and the post-expansion period is 2014–2015. For each of the performance measures, we estimate the following regression:

$$Y_{ist} = \alpha + \beta_1 (MedicaidExpansion_s * Post_t) + \beta_2 BusinessLines_{ist} + \beta_3 ProductTypes_{ist}$$
$$+ \beta_4 PaymentMethods_{ist} + \beta_5 Diversity_{ist} + \gamma X_{ist} + \eta State_s + \delta Year_t + \varepsilon$$

where Y_{ist} represents a performance measure for insurer (i) in state (s) during year (t). *Year* is a vector of year dummy variables, and *State* is a vector of state dummy variables. X_{ist} is the vector of the control variables of some insurer characteristics: insurer organization type, group affiliation, number of states the insurer serves, and insurer size. Organization type is a dummy variable: 1 for stock insurers, and 0 for others. Group affiliation is also a dummy variable: 1 if the insurer is affiliated with a group, and 0 for unaffiliated insurers. A dummy variable is included for the number of states the insurer serves: 1 if the insurer operates in only one state. The size of the insurer is measured by the logarithm of the insurer's enrollment (total member months).

MedicaidExpansion is a binary variable equal to 1 if the insurer offers Medicaid managed care plans in an expansion state, and 0 if the insurer's Medicaid managed care business is in a non-expansion state.[5] *Post* is a binary variable equal to 1 if the time period is after the expansion, and 0 if the time period

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4. A longer term most likely invites more confounding factors for the DiD analysis. Most of the Medicaid expansion studies use the data up to 2014, with just one treatment year. This current research uses two treatment years (2014 and 2015), and it includes the states that expanded Medicaid in 2015. Two more states adopted Medicaid expansion in 2016. For a robustness check, all the regression analyses are also conducted using the data for 2012–2016. The results are not significantly different from those using the data for 2012–2015. Therefore, they are not presented in the article, but they are available upon request.

5. Almost all insurers only offer Medicaid managed care plans in the state of domicile. Very few insurers serve out-of-state Medicaid beneficiaries. For each of the several insurers who serve multiple states, the state with most of its Medicaid business is selected as its state.

is prior to the expansion of the state.[6] As indicated by Simon et al. (2017) and Jones et al. (2015), Medicaid expansion results in more utilization of medical services. Therefore, it is expected that Medicaid expansion should have a positive impact on medical costs and medical expenses. However, a sicker or healthier population does not necessarily lead to higher or lower profitability or efficiency of the insurer. For example, Medicaid expansion may incur more premiums, expenses and medical services, which actually leaves the impact on underwriting profits (the difference between premiums and expenses) and medical service efficiency (the ratio of weighted medical services over weighted expenses) undetermined. Accordingly, the sign/significance of the impact of Medicaid expansion on profitability and efficiency is uncertain.

The year dummy variables are included to evaluate the impact of the Medicaid fee bump on the performance of Medicaid managed care. As stated, the Medicaid fee bump was applied to increase Medicaid reimbursements to providers aiming for better care and better health for Medicaid beneficiaries. Alexander and Schnell (2018) find that increasing Medicaid payments to primary care doctors is associated with improvements in access and self-reported health. Callison and Nguyen (2018) indicate that increased primary care reimbursement leads to higher utilization of medical services for Medicaid enrollees. Therefore, it is expected that the Medicaid fee bump should have a positive impact on the utilization of medical services, and correspondingly, incur more medical expenses. Similar to Medicaid expansion, the sign/significance of the impact of the Medicaid fee bump on profitability and efficiency is undetermined.

Diversity is the vector of the diversity indexes of business lines, product types and payment methods. This research adopts the Gini-Simpson index to measure diversity. A higher value of the Gini-Simpson index indicates a higher diversity. The Gini-Simpson index is a transformation of the Simpson index, which is also known as the Herfindahl index or the Herfindahl-Hirschman index (HHI). Specifically, the Gini-Simpson index equals:

$$1 - \lambda = 1 - \sum_{i=1}^{R} p_i^2$$

where λ is the Simpson index. R is richness (the total number of types in the dataset). p_i is the proportional abundance of each type. Proportional abundances are by definition constrained to values between zero and unity, hence $\lambda \geq 1/R$, which is reached when all types are equally abundant. The diversity variables are

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6. Either the *MedicaidExpansion* and *Post* or the state and year dummy variables can be included in the expansion research. In most other Medicaid expansion studies, the state/area dummy variables and the year dummy variables are adopted, instead of the *MedicaidExpansion* and *Post* variables (Simon et al., 2017; Kaestner et al., 2017; and Courtemanche et al., 2017). In this current research, the state dummy variables are included to control for the differential Medicaid designs of each state. To compare the impact of the Medicaid fee bump among the two fee bump years and other years, year dummy variables have to be included in our research.

used to evaluate economies of scope, in contrast to economies of scale. Economies of scope are formed by variety, not volume. The insurer might generate efficiencies by diversifying product types, payment methods and business lines. Cummins et al. (2010) analyze whether it is advantageous to diversify by offering both life-health and property-liability insurance while showing that life-health insurers realize both cost and revenue scope diseconomies. Yang (2014) finds that some specific business line, product type or payment method is superior to others as far as efficiency is concerned. Therefore, it is expected that diversity should not have a positive impact on profitability or efficiency. However, a diversified portfolio caters to the differential needs of customers and providers, such as indemnity plans and fee-for-service payments, which is expected to have a positive impact on the utilization and supply of medical services, and correspondingly, medical expenses.

BusinessLines, ProductTypes and *PaymentMethods* represent the vectors of variables of business lines, product types and payment methods. By the NAIC, payment methods include capitation payments, contractual fee payments, fee-for-service payments, bonus/withhold – fee-for-service, bonus/withhold – contractual fee payments, non-contingent salaries, and aggregate cost arrangements. For a payment method, the measure is its percentage of the total payments. The NAIC classifies health insurance into comprehensive (hospital and medical) – individual, comprehensive (hospital and medical) – group, Medicare supplement, Federal Employees Health Benefits (FEHB) plan, Medicare, and Medicaid. The product types include HMOs, provider service organizations (PSOs), PPOs, point of service (POS) and indemnity only. They are all measured by their percentage of the total enrollment.

The description of the independent variables is presented in Table 1 on page 10. Most insurers do not use all the payment methods or operate in all the business lines, and they do not offer all the different types of plans. There is also some multicollinearity among the variables of payment methods, product types and business lines. Therefore, only some of them are included in the regression models.

There are four groups of performance measures: profit measures, service measures, expense measures and composite measures. These measures consist of single variables, ratios and efficiency measures. This research adopts a comprehensive set of performance measures to accommodate the preferences of different stakeholders. For example, the insurers may focus more on profit measures, of which some might prefer the single variable measure (underwriting profit) while others might favor the ratio measure (combined ratio) or the efficiency measure (profit efficiency). All the performance measures are presented in Table 2 on page 11. Underwriting profit is the net underwriting gain/loss in the insurer's financial statements. The single variable measures (underwriting profit, ambulatory encounters, hospital patient days, hospital and medical expenses, and claim adjustment and administrative expenses) are all calculated on the per member per year basis.

To be consistent with the other two profit measures (underwriting profit and profit efficiency) of which a higher value indicates more profitability, combined ratio is transformed to profit ratio: profit ratio = 1 – combined ratio. The profit ratio is the underwriting profit divided by the earned premium. In contrast to profit ratio, medical loss ratio and expense ratio are two "indirect" profitability measures. They are actually relative expense measures of hospital and medical expenses, as well as claim adjustment and administrative expenses, with regard to the earned premium. Therefore, they are included in "expense measures."

Table 1:
Description of Independent Variables

Variables		Description
Size of the insurer		Logarithm of member months
Group affiliation		Dummy, 1 for group insurers and 0 for others
Organization type		Dummy, 1 for stock insurers and 0 for others
Number of states the insurer serves		Dummy, 1 for single-state insurers and 0 for others
MedicaidExpansion*Post		Equal to 1 if the insurer is in the expansion state and in the post-expansion year, 0 otherwise
Diversity index of business lines		Gini-Simpson index of business lines
Diversity index of product types		Gini-Simpson index of product types
Diversity index of payment methods		Gini-Simpson index of payment methods
Payment methods	Capitation payments	Capitation payments (% of total payments)
	Contractual fee payments	Contractual fee payments (% of total payments)
	Fee-for-service	Fee-for-service payments (% of total payments)
	Bonus/withhold – fee-for-service	Bonus/withhold – fee-for-service-payments (% of total payments)
	Bonus/withhold – contractual fee payments	Bonus/withhold – contractual fee payments (% of total payments)
	Non-contingent salaries	Non-contingent salaries (% of total payments)
	Aggregate cost arrangements	Aggregate cost arrangements (% of total payments)
Product types	Health maintenance organizations (HMOs)	HMO enrollment (% of total enrollment)
	Provider service organizations (PSOs)	PSO enrollment (% of total enrollment)
	Preferred provider organizations (PPOs)	PPO enrollment (% of total enrollment)
	Point of service (POS)	POS enrollment as % of total enrollment
	Indemnity only	Indemnity enrollment (% of total enrollment)
Business lines	Comprehensive – individual	Comprehensive (individual) enrollment (% of total enrollment)
	Comprehensive – group	Comprehensive (group) enrollment (% of total enrollment)
	Medicare supplement	Medicare supplement enrollment (% of total enrollment)
	Federal Employees Health Benefits (FEHB) plan	FEHB plan enrollment (% of total enrollment)
	Medicare Advantage	Medicare Advantage enrollment (% of total enrollment)
	Medicaid managed care	Medicaid managed care enrollment (% of total enrollment)
Year (Y2013, Y2014, Y2015)		Year dummy variables, year 2012 is the reference year
State		State dummy variables, Texas is the reference state

Table 2:
Performance Measures for Medicaid Managed Care

Profit measures	Underwriting profit
	Profit ratio
	Profit efficiency
Service measures	Ambulatory encounters
	Hospital patient days
	Medical service efficiency
Expense measures	Hospital and medical expenses
	Claim adjustment and administrative expenses
	Medical loss ratio
	Expense ratio
Composite measure	Composite efficiency

The definitions of the efficiency measures (profit efficiency, medical service efficiency, and composite efficiency) are similar to those of Yang and Lin (2017). The efficiency scores are generated by the input-oriented variable returns-to-scale (VRS) DEA models[7] that are translation invariant to outputs. Different from Yang and Lin (2017), capital and surplus, investment expenses, and investment incomes are not included in the DEA inputs or outputs because they are not available by the line of business of the insurer (Brockett et al., 2018). The profit efficiency measures the insurer's efficiency in generating profits and the medical service efficiency evaluates the insurer's efficiency in providing medical services. The composite efficiency combines both profit and medical service efficiency. The inputs and outputs of the DEA efficiency models are presented in Table 3 on page 12.

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7. Two alternative model orientations are available in DEA to determine the relative efficiency of DMUs: input-oriented in which the inputs are minimized conditional on the level of outputs and output-oriented in which the outputs are maximized conditional on input usage. Two scale assumptions are generally employed: constant returns-to-scale (CRS) and VRS. CRS reflects the fact that output will change by the same proportion as inputs are changed; VRS reflects the fact that production technology may exhibit increasing, constant and decreasing returns-to-scale (Cooper et al., 2007).

Table 3:
Inputs and Outputs of Data Envelopment Analysis (DEA) Efficiency Models

DEA efficiency models	Inputs	Outputs
Profit efficiency	Total hospital and medical expenses	Underwriting profit
	Claim adjustment expenses	
	General administrative expenses	
Medical service efficiency	Total hospital and medical expenses	Total member months
	Claim adjustment expenses	Ambulatory encounters
	General administrative expenses	Hospital patient days
Composite efficiency	Total hospital and medical expenses	Underwriting profit
	Claim adjustment expenses	Total member months
	General administrative expenses	Ambulatory encounters
		Hospital patient days

Descriptive and Univariate Analyses

Medicaid expansion is voluntary with states. As of 2018, 33 states, including Washington DC, have expanded Medicaid (KFF, 2018). Most of them (27) adopted the Medicaid expansion in 2014. Three states expanded Medicaid in 2015. Five states that expanded Medicaid by 2015 also have prior full expansions for parents and childless adults (Kaestner et al., 2017), so they are excluded from the treatment group. Therefore, to examine the impact of Medicaid expansion, there are initially 25 states in the treatment group and 26 states in the control group. As stated, not all states offer Medicaid managed care. Three states in the treatment group and 10 states in the control group have no insurers (with Medicaid managed care) in the whole time period (2012–2015). They are also excluded from analyses.

The final sample includes 22 states in the treatment group, 16 states in the control group, and 682 insurer-years (insurers) with Medicaid managed care. 395 insurers are in the expansion states and 287 insurers are in the non-expansion states. 164 of the 682 insurers are in the treatment group. That is, there are 164 insurers that are in the expansion states and also in the post-expansion year(s). 75% of the 682 insurers are stock insurers, 88% are single-state insurers, and 80% are affiliated with a group. There are 165 insurers in 2012, 165 in 2013, 176 in 2014 and 176 in 2015.[8]

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8. It is worth noting that some insurers enter or exit from the Medicaid managed care market overtime. (See Long and Yemane (2005) for an examination of factors that affect an insurer's decision to exit from the Medicaid managed care market.) In the sample of this current research, 126 insurers were participating in all four years of 2012–2015, which accounted for 76% of all the MCOs in 2012, 76% in 2013, 72% in 2014 and 72% in 2015. In order to capture the possible impact of Medicaid expansion and the fee bump, this current research analyzes all the involved insurers in the sample years. It does not just consider the insurers who were participating each year.

Table 4:
Summary Statistics of Business Lines, Product Types,
Payment Methods and Diversity Indexes

Variable	Min	Max	Median	Mean	StDev
Comprehensive – individual	0.0%	79.7%	0.1%	5.2%	9.5%
Comprehensive – group	0.0%	89.6%	0.0%	12.5%	22.2%
Medicare supplement	0.0%	14.8%	0.0%	0.2%	1.2%
Federal employees health benefits (FEHB) plan	0.0%	24.4%	0.0%	0.6%	2.3%
Medicare	0.0%	94.9%	0.2%	6.3%	12.9%
Medicaid	0.3%	100.0%	88.4%	75.2%	29.8%
Business line diversity index	0.00	0.77	0.20	0.25	0.23
Health maintenance organization (HMO)	0.0%	100.0%	100.0%	90.3%	26.0%
Provider service organization (PSO)	0.0%	0.0%	0.0%	0.0%	0.0%
Preferred provider organization (PPO)	0.0%	100.0%	0.0%	3.3%	14.9%
Point of service (POS)	0.0%	100.0%	0.0%	1.7%	8.0%
Indemnity only	0.0%	54.8%	0.0%	0.5%	4.4%
Product type diversity index	0.00	0.69	0.00	0.05	0.14
Capitation payments	0.0%	100.0%	4.5%	13.2%	20.2%
Fee-for-service payments	0.0%	100.0%	4.0%	11.4%	19.7%
Contractual fee payments	0.0%	100.0%	82.1%	71.4%	28.8%
Bonus/withhold – fee-for-service	0.0%	5.6%	0.0%	0.0%	0.4%
Bonus/withhold – contractual fee payments	0.0%	72.1%	0.0%	2.0%	7.9%
Non-contingent salaries	0.0%	59.3%	0.0%	0.7%	4.2%
Aggregate cost arrangements	0.0%	47.0%	0.0%	0.4%	3.5%
Payment method diversity index	0.00	0.74	0.26	0.28	0.19

The descriptive statistics of business lines, product types, payment methods and diversity indexes are presented in Table 4. With regard to business lines, on average, Medicaid managed care accounts for 75.2% of the total enrollment. The second biggest line is comprehensive – group, which only represents 12.5%. The average diversity of business lines is 0.25 (out of the possible highest value of 0.83) and some insurers have a diversity index as high as 0.77. For product types, the diversity is very low, and the average diversity is only 0.05. More than 90% of the enrollees have an HMO plan. PPO plans only account for 3.3% and very few insurers offer POS plans. Regarding payment methods, the average diversity is at a similar level to business lines, with a value of 0.28 (out of the possible highest value of 0.88). Contractual fee payments account for 71.4%. The value-based payment method (bonus/withhold – contractual fee payments) only represents 2%. As stated, the variables with very few values are not included in the regression models: PSO, bonus/withhold – fee-for-service, non-contingent salaries, and aggregate cost arrangements. There is also some multicollinearity among the variables. The variables with a high variance inflation factor (bigger than 5) are excluded due to multicollinearity: comprehensive – group, Medicaid, and fee-for-service payments (Menard, 1995).

Table 5 presents the summary statistics of earned premiums, expenses, underwriting profit, medical loss ratio, expense ratio, and profit ratio of Medicaid managed care. The claim adjustment expenses and general administrative expenses account for 3.4% and 8.5% of the earned premium. It is worth noting that the financial performance of Medicaid managed care is highly variable among the insurers. For example, the underwriting profit per member per year ranges from -$2,728.6 to $18,213.9. The average underwriting profit per member per year is $67.80; however, the standard deviation is $796.60. Furthermore, the average profit ratio is 0.8%, but the standard deviation is as high as 7.9%.

Table 5:
Summary Statistics of Some Performance Measures of Medicaid Managed Care (Per Member Per Year, the Dollar Amount is in 2015 Texas Dollars)

Variable	Min	Max	Median	Mean	StDev
Earned premium ($)	489.3	51253.1	4092.9	4667.6	3313.2
Hospital and medical expenses ($)	424.6	30255.8	3601.0	4044.4	2646.0
Claim adjustment expenses ($)	1.6	1582.6	125.0	156.7	141.1
General administrative expenses ($)	4.3	3530.4	325.5	398.7	317.7
Underwriting profit ($)	-2728.6	18213.9	66.7	67.8	796.6
Medical loss ratio	55.9%	129.1%	87.0%	87.2%	8.1%
Expense ratio	0.2%	37.7%	11.8%	12.1%	4.3%
Profit ratio	-42.8%	35.5%	1.6%	0.8%	7.9%

To illustrate the profit variation within a state, the profit ratio of Medicaid managed care by state is presented in Table 6 on page 15. The state average profit ratio ranges from -5.5% to 8.6%. However, within a state, the range can be as high as more than 70%. For example, the profit ratio ranges from -36.5% to 35.5% in Wisconsin in the years 2012–2015.

The average profit ratio of the insurers in the expansion states is 1%, higher than that of the non-expansion states (0.5%), even though the difference is not very significant; the p-value of the two-sample two-tailed t test is 0.392. The average medical loss ratio in the expansion states is almost the same as that of the non-expansion states (87.1% vs. 87.2%); the p-value is 0.960. However, the average amount of hospital and medical expenses per member per year in the expansion states is $4,321, significantly more than that of the non-expansion states ($3,664); the p-value is 0.001.

Table 6:
Summary Statistics of Profit Ratio of Medicaid Managed Care

State		# of insurers	Min	Max	Median	Mean	StDev
Expansion states	AZ	3	1.3%	4.0%	2.0%	2.4%	1.4%
	CA	1	4.5%	4.5%	4.5%	4.5%	N/A*
	CO	6	-4.5%	2.2%	-1.3%	-1.3%	2.7%
	DC	10	-4.5%	17.9%	4.0%	3.8%	6.3%
	HI	10	-35.1%	6.2%	0.3%	-5.5%	14.2%
	IA	4	-8.3%	3.6%	-3.8%	-3.1%	5.1%
	IL	24	-31.5%	9.9%	-0.6%	-3.3%	10.0%
	IN	9	-1.4%	3.8%	1.4%	1.2%	1.6%
	KY	19	-34.1%	19.9%	2.7%	2.6%	13.3%
	LA	14	-10.4%	6.3%	-0.6%	-1.6%	4.8%
	MA	22	-9.3%	19.9%	-0.8%	0.2%	6.7%
	MD	12	-11.1%	7.8%	2.2%	0.1%	6.8%
	MI	53	-21.4%	22.5%	1.0%	1.5%	5.6%
	MN	19	-9.3%	10.9%	3.8%	3.0%	4.4%
	ND	2	-0.2%	0.4%	0.1%	0.1%	0.4%
	NH	5	-12.7%	6.8%	-6.5%	-4.7%	7.2%
	NJ	18	-11.7%	13.1%	1.2%	1.3%	5.7%
	NM	17	-9.0%	8.7%	1.7%	1.3%	4.1%
	NV	8	3.5%	15.7%	6.1%	8.6%	4.7%
	NY	27	-25.2%	10.3%	-2.0%	-1.5%	7.5%
	OH	24	1.2%	14.9%	4.8%	5.3%	3.6%
	OR	7	-4.0%	8.4%	2.0%	2.7%	4.0%
	PA	40	-7.7%	14.9%	0.4%	0.7%	4.1%
	RI	7	-1.1%	5.6%	2.2%	1.7%	2.6%
	WA	21	-10.6%	14.8%	0.5%	0.8%	6.3%
	WV	13	-5.5%	15.6%	9.1%	7.7%	5.9%
	Total	395	-35.1%	22.5%	1.5%	1.0%	7.1%
Non-expansion states	FL	54	-16.4%	22.9%	-0.4%	-0.1%	8.6%
	GA	12	-3.2%	6.4%	1.5%	1.8%	3.0%
	KS	12	-15.2%	11.1%	-5.1%	-2.1%	8.3%
	MO	14	-25.9%	27.8%	3.1%	0.5%	11.5%
	MS	5	-4.4%	5.8%	-1.2%	0.3%	4.2%
	NE	12	-14.8%	7.7%	3.7%	1.6%	6.1%
	SC	18	-9.5%	11.1%	4.2%	2.8%	6.1%
	TN	12	2.4%	20.2%	3.9%	6.2%	5.4%
	TX	71	-42.8%	12.9%	1.0%	0.0%	7.9%
	UT	7	1.4%	12.7%	3.1%	4.5%	3.9%
	VA	19	-10.0%	8.7%	2.3%	1.8%	4.9%
	WI	51	-36.5%	35.5%	0.9%	-1.3%	12.6%
	Total	287	-42.8%	35.5%	1.9%	0.5%	8.9%
Total		682	-42.8%	35.5%	1.6%	0.8%	7.9%

*In the sample, there is only one insurer in California.

The summary statistics of the utilization of medical services (ambulatory encounters and hospital patient days) by year are presented in Table 7 on page 16. The average number of ambulatory encounters per member per year is 12.19 in 2013, 11.66 in 2014 and 11.25 in 2015, insignificantly different from that of 2012 (11.56); the p-values are 0.545 in 2013, 0.906 in 2014 and 0.723 in 2015. This indicates that the ACA Medicaid fee bump in 2013 and 2014 might not have a significant positive effect on the utilization of medical services of Medicaid

managed care. Additionally, the average number of hospital patient days is 0.94, 0.94 and 0.98 in 2013, 2014 and 2015, respectively—also insignificantly different from that of 2012 (1.01). The p-values are 0.760 in 2013, 0.689 in 2014 and 0.886 in 2015.

To compare the expansion and non-expansion states, it shows that the average number of ambulatory encounters per member per year in expansion states is significantly bigger than that of the non-expansion states (12.05 vs. 11.12); the p-value is 0.07. However, the average number of hospital patient days in the expansion states is not significantly different from that of the non-expansion states (0.96 vs. 0.98); the p-value is 0.894.

Table 7:
Summary Statistics of the Medical Service Utilization of
Medicaid Managed Care

Year	Ambulatory encounters			Hospital patient days		
	Median	Mean	StDev	Median	Mean	StDev
2012	9.83	11.56	9.65	0.59	1.01	1.78
2013	9.91	12.19	9.03	0.55	0.94	2.20
2014	9.84	11.66	6.79	0.60	0.94	1.02
2015	9.87	11.25	5.96	0.61	0.98	1.17

The correlation among the performance measures is presented in Table 8 on page 17. We can see that medical service efficiency and profit efficiency are not closely related, similar to the results of Yang and Lin (2017). This indicates that it should be advisable to include composite efficiency in evaluating the overall efficiency of Medicaid managed care. As discussed, the composite efficiency takes into consideration both medical service efficiency and profit efficiency. It is highly related to medical service efficiency and moderately related to profit efficiency (the correlation coefficients are 0.88 and 0.62).

It also shows that profit ratio and medical loss ratio are highly related; the correlation coefficient is -0.86. Hospital and medical expenses are also highly related to claim adjustment and administrative expenses; the correlation coefficient is 0.78. However, none of the other pairs of performance measures are closely related. Therefore, most of the performance measures are not redundant.

The descriptive and univariate analyses of the efficiency measures are presented in the following sections.

Table 8:
Correlation Among Performance Measures of Medicaid Managed Care

	Composite efficiency	Medical service efficiency	Profit efficiency	Medical loss ratio	Expense ratio	Profit ratio	Hospital and medical expenses	Claim adjustment and administrative expenses	Underwriting profit	Ambulatory encounters
Medical service efficiency	0.88									
Profit efficiency	0.62	0.35								
Medical loss ratio	-0.26	0.03	-0.38							
Expense ratio	-0.09	-0.07	0.03	-0.32						
Profit ratio	0.32	0.01	0.38	-0.86	-0.21					
Hospital and medical expenses	-0.27	-0.33	-0.03	0.07	-0.11	-0.01				
Claim adjustment and administrative expenses	-0.26	-0.32	-0.01	-0.22	0.44	-0.01	0.78			
Underwriting profit	0.23	-0.02	0.35	-0.49	-0.13	0.57	0.33	0.20		
Ambulatory encounters	0.05	0.04	-0.05	0.01	-0.10	0.04	0.55	0.46	0.27	
Hospital patient days	0.09	0.08	0.03	-0.03	0.06	0.00	0.09	0.12	-0.01	-0.16

Profit Efficiency, Profit Ratio and Underwriting Profit

Profitability is the primary goal of all business ventures, including health insurers. This section analyzes the factors affecting profit measures of Medicaid managed care: profit efficiency, profit ratio and underwriting profit. Underwriting profit is the underwriting gain/loss per member per year, and profit ratio is the ratio of the underwriting profit over the earned premium. Profit efficiency is generated by using the most efficient mix of expenses/costs given a certain underwriting profit level. Some summary statistics of the profit efficiency are presented in Table 9 on page 18.

The average profit efficiency is 0.13 for all the MCOs. By the two-sample two-tailed t test, the average profit efficiency of expansion states (0.12) is significantly lower than that of the non-expansion states (0.15); the p-value is 0.039. Furthermore, there is some significant difference among the states. The average state profit efficiency ranges from 0.03 to 0.34.

Table 9:
Summary Statistics of Profit Efficiency of Medicaid Managed Care

State		Min	Max	Median	Mean	StDev
Expansion states	AZ	0.03	0.14	0.06	0.08	0.06
	CA	0.21	0.21	0.21	0.21	N/A*
	CO	0.03	0.22	0.09	0.10	0.07
	DC	0.02	0.45	0.11	0.15	0.13
	HI	0.02	0.13	0.06	0.06	0.04
	IA	0.05	0.91	0.08	0.28	0.42
	IL	0.00	0.79	0.04	0.10	0.16
	IN	0.01	0.10	0.03	0.04	0.03
	KY	0.01	1.00	0.10	0.26	0.30
	LA	0.00	0.19	0.02	0.03	0.05
	MA	0.00	0.55	0.06	0.10	0.13
	MD	0.01	0.37	0.07	0.12	0.11
	MI	0.01	1.00	0.10	0.15	0.21
	MN	0.01	0.49	0.10	0.12	0.11
	ND	0.04	0.10	0.07	0.07	0.04
	NH	0.02	1.00	0.14	0.34	0.42
	NJ	0.00	0.39	0.05	0.09	0.10
	NM	0.00	0.25	0.04	0.06	0.07
	NV	0.07	0.49	0.16	0.24	0.16
	NY	0.01	0.30	0.04	0.08	0.08
	OH	0.03	0.40	0.13	0.15	0.10
	OR	0.03	0.26	0.10	0.13	0.09
	PA	0.00	0.44	0.02	0.07	0.10
	RI	0.01	0.13	0.04	0.05	0.05
	WA	0.01	1.00	0.06	0.16	0.29
	WV	0.04	0.47	0.24	0.23	0.14
	Total	0.00	1.00	0.06	0.12	0.17
Non-expansion states	FL	0.00	0.89	0.07	0.16	0.22
	GA	0.00	0.17	0.03	0.06	0.06
	KS	0.01	0.32	0.02	0.09	0.13
	MO	0.01	1.00	0.06	0.18	0.29
	MS	0.01	0.12	0.01	0.05	0.06
	NE	0.06	0.19	0.09	0.10	0.04
	SC	0.01	0.25	0.12	0.11	0.08
	TN	0.06	0.60	0.09	0.17	0.17
	TX	0.00	0.56	0.08	0.12	0.14
	UT	0.07	0.29	0.09	0.12	0.08
	VA	0.03	0.30	0.11	0.11	0.07
	WI	0.00	1.00	0.16	0.22	0.21
	Total	0.00	1.00	0.09	0.15	0.18
Total		0.00	1.00	0.08	0.13	0.17

*In the sample, there is only one insurer in California.

The regression estimates of the impact on underwriting profit, profit ratio and profit efficiency are presented in Table 10. The results show that Medicaid expansion has an insignificant positive impact on underwriting profit and profit ratio. In other words, MCOs are not making significantly more profits from covering the newly eligible Medicaid beneficiaries. In contrast, Medicaid expansion has a significant positive impact on the profit efficiency of Medicaid managed care. The results imply that enrolling the newly eligible Medicaid beneficiaries should be beneficial to the insurer as far as profit efficiency is concerned. The insurers are also not suffering losses judging from the other two profit measures of underwriting profit and profit ratio.

Table 10:
Regression Estimates of the Impact on Underwriting Profit, Profit Ratio
and Profit Efficiency of Medicaid Managed Care

Independent variables	Underwriting profit	Profit ratio	Profit efficiency
	Coefficient	Coefficient	Coefficient
Medicaid expansion*post	134.537	0.001	0.034*
Stock insurer	-33.166	0.031***	0.022
Single-state insurer	153.731	0.007	0.033
Group affiliation	-142.416	-0.015	-0.020
Log of Medicaid member months	-86.446	0.007	-0.179***
Comprehensive – individual	46.599	0.009	0.134*
Medicare supplement	5172.557	0.731**	-0.231
Federal employees	-4358.284***	-0.625***	-0.523*
Medicare	1586.456***	0.130***	0.171***
Diversity index of business lines	89.852	-0.009	-0.044
Health maintenance organization (HMO)	-36.821	0.005	-0.057
Preferred provider organization (PPO)	183.049	0.026	0.120**
Point of service (POS)	-184.570	0.021	-0.123
Indemnity only	-628.157	-0.214**	-0.368**
Diversity index of product types	-293.254	0.046	0.067
Capitation payments	-241.785	0.036	0.039
Contractual fee payments	457.794***	0.072***	0.083***
Bonus/withhold – contractual fee payments	211.009	0.050	-0.137
Diversity index of payment methods	126.840	-0.017	0.058
Y2013	-134.064	-0.004	-0.020
Y2014	-156.366	-0.001	0.001
Y2015	-76.273	0.013	0.007
R^2	0.114	0.232	0.413
Adjusted R^2	0.030	0.159	0.357

Other variables included: state fixed effects.
Variables excluded due to very few values and multicollinearity: PSO, bonus/withhold—fee-for-service, non-contingent salaries, aggregate cost arrangements, comprehensive—group, Medicare, and fee-for-services payments.
***$p<0.01$, **$p<0.05$, *$p<0.10$.

The diversity of business lines, product types, or payment methods does not have a significant impact on any of the three profit measures. This implies that diversity does not create economies of scope for Medicaid profitability. This provides some insights into the operation of Medicaid managed care. As for specific business lines, Medicare Advantage has a significant positive impact on underwriting profit, profit ratio and profit efficiency, while FEHB plans have a significant negative impact on these three profit measures. Therefore, higher profitability of Medicaid managed care is associated with more shares in Medicare but less in FEHB plans.

Regarding specific product types, PPO plans have a significant positive impact on profit efficiency and an insignificant positive impact on both underwriting profit and profit ratio. However, indemnity plans are the opposite with an insignificant negative impact on underwriting profit and a significant negative impact on both profit ratio and profit efficiency. Therefore, in terms of profit, it should be beneficial to the MCOs to offer more PPO plans while reducing the share of indemnity plans.

As for specific payment methods, contractual fee payments have a significant positive impact on underwriting profit, profit ratio and profit efficiency. This indicates that more contractual fee payments should be used for higher profitability of Medicaid managed care no matter which profit measure is adopted. Surprisingly, the widely promoted value-based payments (bonus/withhold payments) of the health care (and Medicaid) delivery and payment reforms actually do not have a significant positive impact on any of the three profit measures. The bonus/withhold payments have a negative impact, though insignificant, on profit efficiency.

Medical Service Efficiency and Medical Service Utilization

Medicaid is a societally-oriented governmental program designed to provide medical services with reasonable medical costs to society members. Accordingly, this section analyzes the utilization of medical services and the medical service efficiency from a societal perspective. The two utilization measures are ambulatory encounters and hospital patient days (per member per year). The medical service efficiency is obtained using the two services and enrollment as the outputs, and then hospital and medical expenses, claim adjustment expenses, and administrative expenses as the inputs. The summary statistics of the medical service efficiency are presented in Table 11 on page 21.

The average medical service efficiency is 0.31 for all the MCOs. By the two-sample two-tailed t test, the average composite efficiency of expansion states (0.31) is not significantly different from that of the non-expansion states (0.31); the p-value is 0.978. However, there is some significant difference among the states. The average state composite efficiency ranges from 0.14 to 0.87.

Table 11:
Summary Statistics of Medical Service Efficiency of
Medicaid Managed Care

State		Min	Max	Median	Mean	StDev
Expansion states	AZ	0.53	1.00	0.77	0.77	0.23
	CA	0.31	0.31	0.31	0.31	N/A*
	CO	0.20	1.00	1.00	0.87	0.33
	DC	0.23	0.37	0.27	0.28	0.05
	HI	0.07	0.26	0.21	0.16	0.08
	IA	0.36	0.97	0.40	0.53	0.29
	IL	0.08	1.00	0.31	0.38	0.27
	IN	0.17	1.00	0.32	0.44	0.28
	KY	0.13	1.00	0.22	0.32	0.27
	LA	0.08	0.25	0.19	0.19	0.04
	MA	0.20	0.33	0.25	0.26	0.04
	MD	0.15	0.55	0.20	0.23	0.11
	MI	0.14	1.00	0.24	0.33	0.25
	MN	0.10	0.26	0.14	0.17	0.05
	ND	0.18	0.31	0.25	0.25	0.10
	NH	0.15	1.00	0.51	0.47	0.35
	NJ	0.17	0.68	0.25	0.30	0.14
	NM	0.09	0.24	0.14	0.14	0.04
	NV	0.19	0.48	0.24	0.27	0.10
	NY	0.16	0.44	0.26	0.27	0.08
	OH	0.13	1.00	0.20	0.30	0.23
	OR	0.15	0.41	0.25	0.28	0.09
	PA	0.12	1.00	0.17	0.38	0.34
	RI	0.14	0.70	0.18	0.27	0.21
	WA	0.19	1.00	0.25	0.34	0.23
	WV	0.18	0.46	0.25	0.27	0.09
	Total	0.07	1.00	0.23	0.31	0.23
Non-expansion states	FL	0.06	0.69	0.23	0.27	0.14
	GA	0.23	0.36	0.24	0.26	0.04
	KS	0.10	1.00	0.13	0.25	0.29
	MO	0.16	1.00	0.22	0.28	0.19
	MS	0.12	0.57	0.14	0.22	0.19
	NE	0.17	0.27	0.21	0.22	0.03
	SC	0.13	1.00	0.18	0.29	0.25
	TN	0.16	0.45	0.17	0.21	0.09
	TX	0.13	1.00	0.32	0.35	0.18
	UT	0.18	0.38	0.23	0.28	0.09
	VA	0.19	0.72	0.27	0.33	0.16
	WI	0.13	0.87	0.38	0.40	0.18
	Total	0.06	1.00	0.26	0.31	0.18
Total		0.06	1.00	0.24	0.31	0.21

*In the sample, there is only one insurer in California.

The regression estimates of the impact on medical service efficiency, ambulatory encounters, and hospital patient days are presented in Table 12 on page 23. The results show that Medicaid expansion has an insignificant positive impact on ambulatory encounters and a significant positive impact on hospital patient days; i.e., Medicaid expansion increases ambulatory encounters (insignificantly) and hospital patient days (significantly). The possible explanation is that the newly eligible Medicaid beneficiaries might have started to get medical services that they had postponed because of no coverage before. Different from the two service measures, which evaluate service utilization alone without considering costs, the medical service efficiency incorporates both services and costs/expenses. The results indicate that Medicaid expansion has an insignificant negative impact on the medical service efficiency of Medicaid managed care. This implies that Medicaid expansion beneficiaries might incur relatively more costs/expenses. (This is analyzed in more detail in the expenses section of this article.)

The diversity of business lines, product types or payment methods does not have a significant effect on medical service efficiency. This suggests that diversity does not create economies of scope for the medical service efficiency of Medicaid managed care. However, the diversity of product types has a significant positive impact on ambulatory encounters and a significant negative impact on hospital patient days; i.e., a more diversified portfolio of product types is associated with more ambulatory encounters but fewer hospital patient days. The diversity of payment methods has a significant negative impact on ambulatory encounters and an insignificant positive impact on hospital patient days. This implies that payment methods should not be diversified so much as far as the service measures are concerned.

Among business lines, Medicare has a significant positive impact on both service utilization measures, but it has an insignificant impact on medical service efficiency; i.e., Medicaid beneficiaries receive more medical services when the insurer also serves Medicare customers. This is consistent with the profit analysis. Medicare supplement plans have a significant negative impact on medical service efficiency. However, FEHB plans have a significant positive impact on medical service efficiency, as is inconsistent with the impact on Medicaid profitability. The results indicate that MCOs score a higher medical service efficiency with more FEHB plans and fewer Medicare supplement plans.

Regarding product types, indemnity plans have a significant negative impact on medical service efficiency but an insignificant impact on ambulatory encounters and hospital patient days. Thus, the share of indemnity plans should be reduced for a higher medical service efficiency without significantly affecting the utilization of medical services. PPO plans have a significant positive impact on ambulatory encounters and medical service efficiency, and an insignificant impact on hospital patient days. Accordingly, MCOs should offer more PPO plans from the perspective of medical services. HMO plans have an inconsistent impact on the service measures: a significant positive impact on ambulatory encounters, a significant negative impact on medical service efficiency, and an insignificant

impact on hospital patient days. For higher medical service efficiency, the share of HMO plans should be reduced.

Table 12:
Regression Estimates of the Impact on Utilization (Ambulatory Encounters and Hospital Patient Days) and Medical Service Efficiency of Medicaid Managed Care

Independent variables	Ambulatory encounters per member per year	Hospital patient days per member per year	Medical service efficiency
	Coefficient	Coefficient	Coefficient
Medicaid expansion*post	0.207	0.441*	-0.015
Stock insurer	0.779	-0.212	0.001
Single-state insurer	-0.851	-0.032	-0.040
Group affiliation	-2.557***	0.281	-0.092***
Log of Medicaid member months	-0.042	-0.165	-0.031*
Comprehensive – individual	2.103	-0.438	-0.107
Medicare supplement	-41.944	8.954	-2.642***
Federal employees	13.028	-4.391	0.765*
Medicare	7.219**	1.698***	-0.004
Diversity index of business lines	-3.210	0.314	-0.037
Health maintenance organization (HMO)	4.392**	-0.581	-0.105**
Preferred provider organization (PPO)	9.977***	-0.716	0.466***
Point of service (POS)	0.870	-0.391	-0.081
Indemnity only	-10.478	0.897	-0.396*
Diversity index of product types	5.618*	-1.146*	-0.051
Capitation payments	-1.670	-0.715	0.157***
Contractual fee payments	1.822	-0.110	0.056
Bonus/withhold – contractual fee payments	9.423*	-0.594	-0.036
Diversity index of payment methods	-8.145***	0.526	-0.042
Y2013	0.638	-0.074	-0.001
Y2014	0.255	-0.261	-0.009
Y2015	-0.014	-0.179	-0.007
R²	0.256	0.139	0.351
Adjusted R²	0.185	0.057	0.289

Other variables included: state fixed effects.
Variables excluded due to very few values and multicollinearity: PSO, bonus/withhold—fee-for-service, non-contingent salaries, aggregate cost arrangements, comprehensive—group, Medicaid, and fee-for-services payments.
***p<0.01, **p<0.05, *p<0.10.

As for payment methods, their impacts on service measures are inconsistent with their impacts on Medicaid profitability. Capitation payments have a significant positive impact on medical service efficiency and an insignificant impact on ambulatory encounters and hospital patient days; contractual fee payments have no significant impact on all three service measures while contractual fee payments are significantly favorable for Medicaid profitability. Therefore, more capitation payments are associated with higher medical service efficiency.

Interestingly, the value-based payments (bonus/withhold) have a significant positive impact on ambulatory encounters and an insignificant impact on hospital patient days and medical service efficiency. Considering that bonus/withhold payments have no significant impact on the profitability of Medicaid managed care, they should continue to be promoted for more ambulatory encounters without significantly affecting the other two service measures.

Analyses of Composite Efficiency of Medicaid Managed Care

Profit efficiency and medical service efficiency are evaluated from perspectives of different stakeholders, and they are not highly correlated. Neither profit efficiency or medical service efficiency is a good measure of the overall efficiency of health insurers (Yang and Lin, 2017). The composite efficiency combines both profit efficiency and medical service efficiency. It incorporates profit, medical services and expenses, and it should be an appropriate measure of the overall performance of health insurers. Some summary statistics of the composite efficiency of Medicaid managed care are presented in Table 13 on page 25. The average composite efficiency is 0.38 for all the MCOs. By the two-sample two-tailed t test, the average composite efficiency of expansion states (0.38) is not significantly different from that of the non-expansion states (0.38); the p-value is 0.897. However, there is some significant difference among the states. The average state composite efficiency ranges from 0.19 to 0.87.

The regression results of the factors affecting the composite efficiency are presented in Table 14 on page 26. Medicaid expansion has no significant impact on the overall efficiency of Medicaid managed care. It shows that the diversity of business lines has an insignificant negative impact on the composite efficiency of Medicaid managed care. This indicates that MCOs should not be engaged in a diverse portfolio of business lines as far as composite efficiency is concerned. It is not saying that the MCO should only serve Medicaid beneficiaries. The results show that the composite efficiency of Medicaid managed care will be improved by increasing the share of Medicare, which has a significant positive impact. On the contrary, the share of Medicare supplements should be reduced because it has a significant negative impact.

Table 13:
Summary Statistics of Composite Efficiency of Medicaid Managed Care

State		Min	Max	Median	Mean	StDev
Expansion states	AZ	0.54	1.00	0.77	0.77	0.23
	CA	0.55	0.55	0.55	0.55	N/A*
	CO	0.20	1.00	1.00	0.87	0.33
	DC	0.23	0.74	0.33	0.37	0.15
	HI	0.09	0.29	0.21	0.19	0.06
	IA	0.36	0.97	0.40	0.53	0.29
	IL	0.11	1.00	0.36	0.41	0.27
	IN	0.27	1.00	0.36	0.48	0.26
	KY	0.15	1.00	0.50	0.53	0.30
	LA	0.08	0.39	0.21	0.21	0.07
	MA	0.20	0.75	0.27	0.31	0.12
	MD	0.15	0.55	0.24	0.29	0.12
	MI	0.14	1.00	0.30	0.38	0.25
	MN	0.10	0.50	0.24	0.25	0.09
	ND	0.18	0.31	0.25	0.25	0.10
	NH	0.15	1.00	0.51	0.47	0.35
	NJ	0.17	0.84	0.34	0.38	0.16
	NM	0.11	0.34	0.17	0.19	0.07
	NV	0.27	0.84	0.38	0.48	0.21
	NY	0.16	0.49	0.33	0.32	0.10
	OH	0.19	1.00	0.36	0.44	0.23
	OR	0.18	0.49	0.37	0.34	0.11
	PA	0.12	1.00	0.18	0.40	0.34
	RI	0.15	0.76	0.25	0.32	0.21
	WA	0.19	1.00	0.31	0.37	0.22
	WV	0.19	0.59	0.49	0.44	0.14
	Total	0.08	1.00	0.30	0.38	0.24
Non-expansion states	FL	0.06	1.00	0.25	0.34	0.23
	GA	0.24	0.45	0.32	0.32	0.06
	KS	0.10	1.00	0.15	0.30	0.29
	MO	0.17	1.00	0.31	0.40	0.27
	MS	0.12	0.66	0.15	0.26	0.23
	NE	0.19	0.42	0.25	0.27	0.06
	SC	0.13	1.00	0.31	0.37	0.26
	TN	0.25	0.76	0.26	0.35	0.16
	TX	0.13	1.00	0.36	0.40	0.19
	UT	0.27	0.52	0.38	0.36	0.09
	VA	0.22	0.75	0.32	0.37	0.16
	WI	0.16	1.00	0.42	0.46	0.19
	Total	0.06	1.00	0.32	0.38	0.21
Total		0.06	1.00	0.31	0.38	0.23

*In the sample, there is only one insurer in California.

Table 14:
Regression Estimates of the Impact on Composite Efficiency of Medicaid
Managed Care

Independent variables	Coefficient
Medicaid expansion*post	0.022
Stock insurer	0.028
Single-state insurer	-0.001
Group affiliation	-0.107***
Log of Medicaid member months	-0.044**
Comprehensive – individual	-0.008
Medicare supplement	-2.413***
Federal employees	0.303
Medicare	0.141*
Diversity index of business lines	-0.029
Health maintenance organization (HMO)	-0.141***
Preferred provider organization (PPO)	0.469***
Point of service (POS)	-0.157
Indemnity only	-0.621***
Diversity index of product types	-0.011
Capitation payments	0.148***
Contractual fee payments	0.097**
Bonus/withhold – contractual fee payments	-0.103
Diversity index of payment methods	-0.030
Y2013	-0.015
Y2014	-0.015
Y2015	-0.001
R²	0.339
Adjusted R²	0.276

Other variables included: state fixed effects.
Variables excluded due to very few values and multicollinearity: PSO, bonus/withhold—fee-for-service, non-contingent salaries, aggregate cost arrangements, comprehensive —group, Medicaid, and fee-for-services payments.
***p<0.01, **p<0.05, *p<0.10.

The diversity of product types has an insignificant impact on the composite efficiency of Medicaid managed care. To enhance the composite efficiency of Medicaid managed care, MCOs should offer more PPO plans but reduce the share of HMOs and indemnity plans. This is because PPOs have a significant positive impact while HMOs and indemnity plans have a significant negative impact.

The diversity of payment methods has an insignificant negative impact. Capitation payments and contractual fee payments both have a significant positive impact on the composite efficiency of Medicaid managed care. Therefore, MCOs should increase the share in capitation and contractual fee payments to further increase the overall efficiency of Medicaid managed care. Surprisingly, the value-based payments (bonus/withhold) have a negative impact, though insignificant, on the overall efficiency of Medicaid managed care.

Hospital and Medical Expenses, Claim Adjustment and Administrative Expenses, and the ACA Primary Care Fee Bump

The National Quality Strategy (NQS) pursues three broad aims: better care, better health and lower costs (*www.ahrq.gov*). The CMS is working to build a health care delivery system that is better, smarter and healthier—a system that delivers improved care, spends health care dollars more wisely, and makes our communities healthier (CMS, 2016a). Furthermore, with the potential conversion of Medicaid financing to per capita cap or a block grant, states would have to focus more on cost savings and cost efficiency. In response, this section analyzes the factors affecting Medicaid expenses and expense ratios to uncover some potential moves for cost reductions of Medicaid managed care.

The regression results of the impact on expenses, medical loss ratio, and expense ratio are presented in Table 15 on page 28. The results show that Medicaid expansion does not have a significant impact on expenses, medical loss ratio, and expense ratio. Medicaid expansion increases both hospital and medical expenses, as well as claim adjustment and administrative expenses, though insignificantly. The expense increase might be relatively more than the service increase because Medicaid expansion, which has expenses as the input and services as the output, decreases medical service efficiency, though insignificantly.

The diversity of business lines significantly reduces claim adjustment and administrative expenses (and expense ratio) probably due to economies of scope. However, considering its potential positive impact on hospital and medical expenses and the fact that claim adjustment and administrative expenses only account for a small portion of total expenses, the reduction in claim adjustment and administrative expenses from the diversity of business lines may not be highlighted. In other words, generally, a diverse portfolio of business lines may not be encouraged for the performance of Medicaid managed care.

Table 15:
Regression Estimates of the Impact on Hospital and Medical Expenses,
Claim Adjustment and Administrative Expenses, Medical Loss Ratio,
and Expense Ratio of Medicaid Managed Care

Independent variables	Hospital and medical expenses	Claim adjustment and administrative expenses	Medical loss ratio	Expense ratio
	Coefficient	Coefficient	Coefficient	Coefficient
Medicaid expansion* post	187.941	49.489	0.003	-0.004
Stock insurer	-382.737	4.515	-0.039***	0.008*
Single-state insurer	444.780	22.622	0.001	-0.009*
Group affiliation	620.591**	32.871	0.020**	-0.006
Log of Medicaid member months	-952.709***	-209.519***	0.012*	-0.018***
Comprehensive – individual	-80.430	191.942	-0.056	0.048***
Medicare supplement	11057.559	5015.434***	-1.245***	0.514***
Federal employees	-12253.351***	-2211.106***	0.584***	0.041
Medicare	1374.769	449.916***	-0.156***	0.025*
Diversity index of business lines	307.624	-193.129*	0.054**	-0.044***
Health maintenance organization (HMO)	1180.731**	259.974***	-0.023	0.018*
Preferred provider organization (PPO)	-1466.168*	-339.068***	0.018	-0.044***
Point of service (POS)	751.518	78.475	-0.003	-0.018
Indemnity only	2187.968	-335.061	0.301***	-0.087**
Diversity index of product types	74.602	245.570*	-0.082***	0.036**
Capitation payments	-1720.180***	-356.481***	0.000	-0.035***
Contractual fee payments	261.479	55.836	-0.060***	-0.012
Bonus/withhold – contractual fee payments	402.650	-103.521	0.023	-0.072***
Diversity index of payment methods	-1200.155*	-169.109*	0.008	0.009
Y2013	153.533	15.771	0.005	-0.002
Y2014	178.373	60.633	-0.008	0.009**
Y2015	235.570	79.144*	-0.021**	0.008*
R²	0.375	0.413	0.308	0.395
Adjusted R²	0.315	0.357	0.243	0.338

Other variables included: state fixed effects.
Variables excluded due to very few values and multicollinearity: PSO, bonus/withhold—fee-for-service, non-contingent salaries, aggregate cost arrangements, comprehensive—group, Medicaid, and fee-for-services payments.
***p<0.01, **p<0.05, *p<0.10.

The diversity of product types significantly increases claim adjustment and administrative expenses and insignificantly increases hospital and medical expenses. It also significantly reduces medical loss ratio but increases expense ratio. However, the magnitude of the impact on the ratios is very small. Therefore, a diverse portfolio of health plans is not beneficial to Medicaid managed care. The

diversity of payment methods significantly reduces both hospital and medical expenses, as well as claim adjustment and administrative expenses. This suggests that a more diverse payment portfolio is favorable in reducing expenses.

Generally, significant or not, the magnitude of the impact of business lines, product types and payment methods on medical loss ratio and expense ratio is very small and negligible. As far as the expenses of Medicaid managed care are concerned, MCOs should reduce the share of Medicare and Medicare supplements and increase the share of FEHB plans, offer more PPO plans and fewer HMO plans, and use more capitation payments. As for the value-based payments, bonus/withhold payments do not have a significant impact on reducing expenses.

As stated, to encourage provider participation and help ensure access to care in Medicaid, the ACA required states to pay certain physicians Medicaid fees at least equal to Medicare's for many primary care services in 2013 and 2014 (Medicaid fee bump). This is contrary to the efforts for cost reductions. This research is designed to analyze the impact of the Medicaid fee bump on expenses and all other performance measures of Medicaid managed care. Specifically, the year dummy variables are included to compare the two fee-bump years (2013 and 2014) with the year before the fee bump (2012), controlling other factors. The results of the impact of the Medicaid fee bump are included in Table 10 on page 19 (profitability), Table 12 on page 23 (medical services), Table 14 on page 26 (composite efficiency) and Table 15 on page 28 (expenses).

The results show that the fee bump does not significantly increase hospital and medical expenses or claim adjustment and administrative expenses. (See Table 15 on page 28.) The fee bump does not have a significant impact on medical loss ratio. It does affect the expense ratio significantly in 2014, but the magnitude of the impact is very small (only 0.009 percentage points higher than 2012).

The major objective of the Medicaid fee bump is to increase access to care for Medicaid beneficiaries. However, the results show that the Medicaid fee bump does not have a significant impact on any of the three service measures: ambulatory encounter, hospital patient days and medical service efficiency. (See Table 12 on page 23.)

With regard to the profitability of MCOs, the Medicaid fee bump does not have a significant impact on any of the three profit measures: underwriting profit, profit ratio and profit efficiency. (See Table 10 on page 19.) Finally, the Medicaid fee bump has no significant impact on the composite efficiency of Medicaid managed care either. (See Table 14 on page 26.)

The probable explanation is that Medicaid managed care might have been paying higher fees than the traditional fee-for-service Medicaid. Therefore, the claimed "Medicaid lower reimbursement" may not exist in Medicaid managed care. At least the results indicate that it should not be a big concern for Medicaid managed care for profitability, medical services, expenses or overall efficiency.

Conclusions

Medicaid is the largest source of health coverage in the U.S., and Medicaid managed care has become the nation's dominant delivery system for Medicaid enrollees. The ACA provides states the authority to expand Medicaid eligibility, and it required states to increase the Medicaid primary care payments in 2013 and 2014. The CMS final rule of 2016 advances the efforts to modernize the health care system to deliver better care, smarter spending and healthier people. In response to the policy changes to Medicaid, this research examines the factors affecting the performance of Medicaid managed care, including Medicaid expansion; the diversity of business lines, product types and payment methods; and the Medicaid fee bump. This research aims to provide insights to health insurers, consumers, regulators and policymakers regarding profitability, better services, reducing expenses and improving efficiency.

The results show that Medicaid expansion has a significant positive impact on the profit efficiency of Medicaid managed care. This implies that enrolling the newly eligible Medicaid beneficiaries should be beneficial to the insurer as far as profit efficiency is concerned. The diversity of business lines, product types or payment methods does not create economies of scope for Medicaid profitability. As for medical services, Medicaid expansion increases ambulatory encounters insignificantly and hospital patient days significantly. The results indicate that Medicaid expansion has an insignificant negative impact on the medical service efficiency of Medicaid managed care. The diversity of business lines, product types or payment methods does not create economies of scope for medical service efficiency. However, a more diversified portfolio of product types is associated with more ambulatory encounters, yet fewer hospital patient days. The results suggest that payment methods should not be diversified so much as far as medical services are concerned.

The composite efficiency incorporates profit, medical services and expenses; and it serves as a measure of the overall efficiency of health insurers. It shows that Medicaid expansion has no significant impact on the overall efficiency of Medicaid managed care. The diversity of business lines, product types or payment methods does not have a significant impact on composite efficiency either. Regarding expenses, Medicaid expansion has no significant effect on hospital and medical expenses or claim adjustment and administrative expenses. The diversity of business lines significantly reduces claim adjustment and administrative expenses. However, considering its potential positive impact on hospital and medical expenses, and that claim adjustment and administrative expenses only account for a small portion of the total expenses, a diverse portfolio of business lines may not be encouraged. A diverse portfolio of health plans also does not help to reduce expenses. The diversity of payment methods significantly reduces both hospital and medical expenses, as well as claim adjustment and administrative expenses.

The results indicate that the Medicaid fee bump actually does not significantly increase hospital and medical expenses or claim adjustment and administrative expenses of Medicaid managed care. The major objective of the Medicaid fee bump is to increase access to care for Medicaid beneficiaries. However, the results show that the Medicaid fee bump does not have a significant impact on any of the three service measures: ambulatory encounter, hospital patient days and medical service efficiency. Additionally, the Medicaid fee bump has no significant impact on profit measures or the composite efficiency of Medicaid managed care either. The probable explanation is that Medicaid managed care might have been paying higher fees than the traditional fee-for-service Medicaid. The results indicate that "Medicaid lower reimbursement" should not be a big concern for Medicaid managed care for profitability, medical services, expenses or overall efficiency.

Surprisingly, the value-based payments (bonus/withhold payments) do not have a significant impact on profitability, medical service efficiency, composite efficiency, or expenses. However, they do have a significant positive impact on ambulatory encounters. Therefore, bonus/withhold payments should continue to be promoted for more ambulatory encounters without significantly affecting other performance measures.

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