

# Medicaid Managed Care: Efficiency, Medical Loss Ratio, and Quality of Care

## Abstract

The recent final rule on Medicaid managed care establishes the minimum medical loss ratio (MLR) requirement for Medicaid managed care and contains several provisions to strengthen delivery and payment reforms and improve efficiency and quality of care. In response, this research examines the quality of Medicaid managed care and the effect of MLR and efficiency. The results show that, Medicaid managed care is the lowest on the rating of health care compared to Medicare Advantage and private plans. However, Medicaid managed care is still delivering decent health care of acceptable quality. The medical services efficiency has an insignificant negative effect on the quality of care, as implies there should be room to improve medical services efficiency without significantly reducing the quality of care. MLR has a significant positive effect on the aggregate quality ratings. Nonetheless, the magnitude of the effect is very small. This indicates that a minimum MLR requirement of 80% or 85% does not make a huge difference on quality ratings. Other findings are that stock insurers have a significant lower aggregate quality rating than other types of insurers, but the size of the insurer has a significant positive effect on the quality of care.

**Keywords:** Medicaid managed care, quality of care, medical loss ratio, medical services efficiency

**JEL classification:** I13, I11, H51

## Medicaid Managed Care: Efficiency, Medical Loss Ratio, and Quality of Care

### 1 Introduction

Amendments to the Social Security Act ([Pub.L. 89–97](#), 79 [Stat. 286](#), Title XIX) in 1965 authorized the creation of two important programs, Medicare and Medicaid. Medicaid programs, designed to provide health coverage for low-income people, are available in all states, the District of Columbia, and the U.S. territories. Beginning in 2014, the Affordable Care Act (ACA) provides states the authority to expand Medicaid eligibility to individuals under age 65 in families with incomes below 138 percent of the Federal Poverty Level (FPL). Medicaid is the largest source of health coverage in the United States. According to the November 2017 report of the Centers of Medicare and Medicaid Services (CMS), 68 million individuals were enrolled in Medicaid, including eligible low-income adults, children, pregnant women, elderly adults and people with disabilities.

The Medicaid program is administered by states, according to federal requirements and is jointly funded by the federal government and states. The states generally pay for services through fee-for-service or managed care arrangements whereas the federal government pays the states a specified percentage of program expenditures, called the Federal Medical Assistance Percentage (FMAP). States pay providers directly for services under fee-for-service arrangements. Under managed care arrangements, states contract with and pay providers and health care organizations to deliver care through networks. Approximately 70% of Medicaid enrollees are served through managed care delivery systems, a health care delivery system organized to manage cost, utilization, and quality. Medicaid managed care provides for the delivery of health services through managed care organizations (MCOs) that accept a set payment per member per month (capitation) for these services.

By contracting with various types of MCOs to deliver Medicaid health services to their beneficiaries, states hope to reduce Medicaid program costs and better manage utilization of health services.

The ACA aims to provide Americans with better health security through comprehensive health insurance reforms that expand coverage, lower health care costs, and enhance the quality of care. The minimum medical loss ratio (MLR) requirement of the ACA limits the portion of premium dollars health insurers may spend on administration, marketing, and profits, hopefully providing quality care of better value to consumers. The MLR regulation took effect for private plans in 2011 (at least 80% for the individual and small group health insurance markets and 85% for the large group market) and Medicare in 2014 (85%). On April 25, 2016, the Centers for Medicare and Medicaid Services (CMS) issued final regulations that revise and significantly strengthen existing Medicaid managed care rules (CMS 2016a). The final rule establishes a minimum MLR standard for Medicaid managed care for the first time. The minimum MLR is 85%, the same standard that applies to Medicare Advantage and private large group plans. The new Medicaid MLR standard has been adopted for Medicaid managed care contracts that start on or after July 1, 2017. With the new final rule, the federal government seeks to “enable states to better manage and measure the quality of care” provided by Medicaid managed care plans. States will be required to implement a Quality Rating System (QRS) for each managed care plan. This QRS will be similar to the 5-star rating systems used for Medicare Advantage and marketplace plans. States have three years after this final guidance to begin rating managed care plans in their state (Albritton 2016).

President Trump and GOP leaders have been considering fundamental changes to Medicaid’s financing structure to make federal funding for Medicaid more predictable and achieve substantial

federal budgetary savings. For example, the American Health Care Act of 2017<sup>1</sup> (AHCA or Trumpcare) 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 2016 (Rudowitz, Antonisse, and Musumeci 2017).

Medicaid financing changes may resurface in the future. If such proposed legislation is enacted into law, states would have to come up with some strategies to achieve Medicaid program savings and improve cost efficiency, such as payment and delivery system reforms to align Medicaid managed care with the goal of high-value care that improves beneficiary outcomes while controlling costs (CMS 2016b). There is widespread agreement that the provision of health services in the United States suffers from high levels of waste and inefficiency, and the goal of improved efficiency in health care should be a central feature of any reform effort (Antos and Capretta 2017). However, economic efficiency might result in lower quality of care and patient dissatisfaction.

In response to the new MLR standard, the Medicaid financing proposals, and the CMS final rule on Medicaid quality of care, this research is designed to examine the impact of MLR and efficiency on the quality of care for the Medicaid managed care plans. Specifically, this current research innovatively links Medicaid's health plan survey data with financial statement data and use various quality measures as dependent variables to estimate the effect of efficiency and MLR by conducting a series of regression analyses. To the best of our knowledge, this current research is the first of its

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<sup>1</sup> Senate amendments in the reconsolidation conference between the house and senate would have renamed it the Better Care Reconciliation Act of 2017 (BCRA) but these renaming amendments were rejected.

kind to examine the impact of efficiency and MLR on Medicaid's quality of care. This research should provide some important insights on Medicaid regulation, performance and quality improvement.

This article proceeds as follows. Some recent related studies are reviewed in the next section. Section 3 introduces the Medicaid quality measures on patient experiences and satisfaction. Section 4 discusses the methodology, quality and financial data, variables, and hypotheses. Section 5 presents some descriptive statistics and univariate analyses of quality measures, MLR, and medical services efficiency and compares the quality ratings of Medicaid managed care, Medicare Advantage, and private plans. Section 6 presents the regression results of the effect of medical services efficiency and MLR on Medicaid's quality of care, and Section 7 concludes.

## **2 Literature review**

Medicaid has undergone many changes and modifications over its more than 50 years history. Buchmueller, Ham, and Shore-Sheppard (2016) provide a comprehensive review of the history and structure of the Medicaid program and the economic research on the impact of Medicaid on a broad range of outcomes. Related to the topics examined in this research, this section presents a review of some recent studies on MLR, efficiency and cost savings, and quality of care. With regard to the MLR regulation, Karaca-Mandic, Abraham, and Simon (2015) evaluate whether the MLR is a good target measure for regulation by comparing the two components of the price–cost margin between markets that are more competitive versus those that are not. They find that insurers with monopoly power have lower MLRs, but no evidence that insurers' administrative expenses are lower in more concentrated insurance markets. Their results indicate that the MLR could serve as a target measure of market power in regulating the individual market for health insurance but with notable limited ability to capture product and firm heterogeneity. McCue, Hall, and Liu (2013) gauge the impact of

medical loss ratio regulation on the financial performance of health insurers. They find that, in the individual market, for-profit insurers reduced their median administrative cost ratio and operating margin by more than two percentage points each, resulting in a seven-percentage-point increase in their median medical loss ratio; financial ratios changed much less for insurers in the small- and large-group markets. Harrington (2013) analyzes the MLR regulations' potential unintended consequences and incentive effects, such as higher medical costs and premiums for some insurers, and discusses modifications and alternatives to the MLR regulations to help achieve their stated goals with less potential for adverse effects.

Some studies have examined Medicaid efficiency and cost savings. Health insurance efficiency can be evaluated from different perspectives. Yang and Lin (2017) examine three efficiency measures of health insurers: the operating efficiency from the perspective of the insurer to generate profits, the medical services efficiency from the perspective of the society to provide health care services, and the composite efficiency to accommodate the two perspectives as above. As to the efficiency of Medicaid, Yang (2014) compares five business lines of health insurance from the societal prospective and finds that Medicaid is the second most efficient after Medicare supplement. This provides support to offering coverage and further supports expansion of Medicaid to enhance health from the societal efficiency perspective (more medical services with fewer resources inputs). On the other hand, from the perspective of generating profits, Brockett, Golden, and Yang (2018) show that Medicaid is the least efficient.

States have turned to Medicaid managed care plans to cut costs and gain more budget predictability. Duggan and Hayford (2013) find that the effects of shifting Medicaid recipients from fee-for-service into Medicaid managed care vary significantly across states as a function of the generosity of the

state's baseline Medicaid provider reimbursement rates, consistent with the finding that managed care achieves savings largely through reduced prices rather than lower quantities. In an earlier study, Duggan (2004) estimate the effect of Medicaid managed care by exploiting county-level mandates introduced in the state of California which required most Medicaid recipients to enroll in a managed care plan. Duggan's (2004) results demonstrate that the switch from fee-for-service to managed care was associated with a substantial increase in government spending but no corresponding improvement in infant health outcomes. These findings cast doubt on the hypothesis that Medicaid managed care could reduce the strain on government budgets.

Health care delivery and patient experience with health care remain significant challenges. Patient-centered care has gained renewed focus as an essential model for ensuring the quality of patient care. With regard to Medicaid's quality of care, O'Shea and Moffit (2017) argue that Medicaid fails to provide timely access to care, and in many cases provides lower quality care. However, Paradise (2017) indicate that Medicaid is a cost-effective program, Medicaid beneficiaries have robust access to care overall, and rates of access to care and satisfaction with care among Medicaid enrollees are comparable to rates for people with private insurance. Cunningham and Nichols (2005) show that high Medicaid acceptance rates by physicians in a community are more important than fee levels in affecting enrollees' access to medical care. Although high fee levels increase the probability that individual physicians will accept Medicaid patients, high fee levels do not necessarily lead to high levels of physician Medicaid acceptance in an area. Their results suggest that a broad range of factors need to be considered to increase access to physicians for Medicaid enrollees. Decker (2007) analyzes the relationship between Medicaid physician fees and the quality of medical care of Medicaid patients. These results imply that higher Medicaid fees increase the number of private physicians who see Medicaid patients, and higher fees lead to visit times with physicians that are more comparable

to visit times with private pay patients. Polsky et al. (2015) examine the effect on access to primary care of increased Medicaid reimbursements for primary care services in 2013 and 2014 and find that increased Medicaid reimbursement to primary care providers was associated with improved appointment availability for Medicaid enrollees without generating longer waiting times. This addresses a key provision of Affordable Care Act.

Some researchers have explored the coverage expansion of ACA provisions. For example, Frea, Gruber, and Sommers (2017) assess the coverage effect of Medicaid expansion, premium subsidies, and the individual mandate of the ACA. They find that coverage was moderately responsive to price subsidies, with larger gains in state-based insurance exchanges than the federal exchange. The individual mandate's exemptions and penalties had little impact on coverage rates. Even in non-expansion states the ACA law increased Medicaid among individuals gaining eligibility under the ACA, and among previously-eligible populations (the so-called “woodwork effect” designating that previously eligible individuals were coming out of the “woodwork” to apply for coverage), with no resulting reductions in private insurance. However, much of the focus of the ACA remains on issues such as health care cost controls and quality of care.

### **3 Medicaid managed care quality measures**

Customer satisfaction/experience and clinical measures are commonly adopted to rate health plan quality. In evaluating the quality of Medicaid managed care plans, this research uses the quality measures of customer experience and satisfaction generated by the health plan surveys of the Consumer Assessment of Healthcare Providers and Systems (CAHPS). CAHPS surveys ask consumers and patients to report on and evaluate their health care experiences. Surveys cover topics important to consumers and focus on those aspects of quality that consumers are best qualified to

assess. The CAHPS program is funded and overseen by the Agency for Healthcare Research and Quality (AHRQ), a government organization. AHRQ and its grantees and contractors develop and maintain the CAHPS surveys; they do not administer any of the surveys to patients or require use of the surveys. The surveys are administered by qualified vendors. Detailed information of the CAHPS program is available at <https://www.ahrq.gov/cahps/index.html>.

The three most widely used CAHPS surveys are:

- **The CAHPS health plan survey**, which asks enrollees in commercial plans, Medicaid, Children's Health Insurance Programs (CHIP), and Medicare about their experiences with health plan services and ambulatory care.
- **The CAHPS clinician and group survey (CG-CAHPS)**, which asks patients to report on their experiences with primary or specialty care received from providers and their staff in ambulatory settings.
- **The CAHPS hospital survey (HCAHPS)**, which asks patients about the care delivered during an inpatient stay at a hospital facility

The CAHPS Health Plan Survey is a tool for collecting standardized information on enrollees' experiences with health plans and their services. It was designed to support consumers in assessing the performance of health plans and choosing the plans that best meet their needs. Health plans can also use the survey results to identify their strengths and weaknesses and target areas for improvement. Since its launch in 1997, this survey has become the national standard for measuring and reporting on the experiences of consumers with their health plans. The CAHPS Health Plan Survey generates two types of results for reporting purposes (AHRQ 2015):

- **Rating measures** are based on items that use a scale of 0 to 10 to measure respondents'

assessment of their health plan and the quality of care received over a specified period of time. This measure is sometimes referred to as the “global rating” or “overall rating.”

- **Composite measures** (also known as reporting composites) combine results for closely related items that have been grouped together. The calculation of CAHPS survey composites uses a proportional scoring method, which basically generates a proportion for each response option. Firstly, calculate the proportion of patient responses in each response category for each item in a composite. Then combine these proportions for all items in a composite, that is, calculate the average proportion responding to each category across the questions in the composite.

Specifically, the Health Plan Survey produces the following eight measures:

- Getting needed care (composite of 2 items)
- Getting care quickly (composite of 2 items)
- How well doctors communicate (composite of 4 items in the Adult Survey; composite of 5 items in the Child Survey)
- Health plan customer service (composite of 2 items)
- Enrollees’ rating of their health plan (1 item)
- Enrollees’ rating of their health care (1 item)
- Enrollees’ rating of their personal doctor (1 item)
- Enrollees’ rating of their specialist (1 item)

Descriptions of these measures and lists of the survey questions included in each measure are

provided in Table 1 for the Adult Survey of the CAHPS Health Plan 5.0 (AHRQ 2015).

**Table 1** Quality measures and survey questions for the CAHPS Health Plan 5.0 Adult Survey

<b>Getting needed care</b>		
The survey asked enrollees how often it was easy for them to get appointments with specialists and get the care, tests, or treatment they needed through their health plan.		
Q9	Easy for respondent to get necessary care, tests, or treatment	<b>Response Options</b> <ul style="list-style-type: none"> <li>• Never</li> <li>• Sometimes</li> <li>• Usually</li> <li>• Always</li> </ul>
Q18	Respondent got appointment with specialists as soon as needed	
<b>Getting care quickly</b>		
The survey asked enrollees how often they got care as soon as needed when sick or injured and got non-urgent appointments as soon as needed.		
Q4	Respondent got care for illness/injury as soon as needed	<b>Response Options</b> <ul style="list-style-type: none"> <li>• Never</li> <li>• Sometimes</li> <li>• Usually</li> <li>• Always</li> </ul>
Q6	Respondent got non-urgent appointment as soon as needed	
<b>How well doctors communicate</b>		
The survey asked enrollees how often their personal doctor explained things clearly, listened carefully, showed respect, and spent enough time with them.		
Q12	Doctor explained things in a way that was easy to understand	<b>Response Options</b> <ul style="list-style-type: none"> <li>• Never</li> <li>• Sometimes</li> <li>• Usually</li> <li>• Always</li> </ul>
Q13	Doctor listened carefully to enrollee	
Q14	Doctor showed respect for what enrollee had to say	
Q15	Doctor spent enough time with enrollee	
<b>Health plan customer service</b>		
The survey asked enrollees how often customer service staff were helpful and treated them with courtesy and respect.		
Q22	Customer service gave necessary information/help	<b>Response Options</b> <ul style="list-style-type: none"> <li>• Never</li> <li>• Sometimes</li> <li>• Usually</li> <li>• Always</li> </ul>
Q23	Customer service was courteous and respectful	
<b>Enrollees' ratings</b>		
The survey asked enrollees for several ratings on a scale of 0 to 10, with 0 being the worst and 10 being the best.		
Q8	Rating of all health care	<b>Response Options</b>
Q16	Rating of personal doctor	

Q20	Rating of specialist	• 0-10
Q26	Rating of health plan	

Dedicated to improving health care quality, the National Committee for Quality Assurance (NCQA) and the Centers for Medicare and Medicaid Services (CMS) both administers some CAHPS Health Plan Surveys. CAHPS surveys are an integral part of CMS’ efforts to improve healthcare in the U.S. Many of the CMS patient experience surveys are in the CAHPS family of surveys. Others are developed following CAHPS principles. CMS has conducted the CAHPS Health Plan Survey with Medicare beneficiaries since 1998. The Medicare Survey includes versions for Medicare Advantage plans (including PPOs), Prescription Drug Plans, and the fee-for-service program.

Since 1990 when it was founded, NCQA has played a central role in driving quality improvement throughout the health care system. Three types of health plans are rated by NCQA: private plans that people enroll in through work or on their own; plans that serve Medicare beneficiaries in the Medicare Advantage program; and plans serving Medicaid beneficiaries. NCQA ratings are based on three types of quality measures: measures of clinical quality from NCQA’s Healthcare Effectiveness Data and Information Set (HEDIS); measures of consumer satisfaction using a modified version of the CAHPS Health Plan Survey; and results from NCQA’s review of a health plan’s health quality processes (i.e., performance on NCQA accreditation standards) (NCQA 2017).

#### **4 Data and Research Design**

The research in this paper links customer experience/satisfaction quality data with the insurer’s financial statement data and utilizes a series of regression analyses to estimate the effect of MLR and efficiency on the quality of care for the Medicaid managed care plans. The quality measure data are obtained from NCQA,<sup>2</sup> and the insurer’s financial statement data are obtained from the National Association of Insurance Commissioners (NAIC). The time period under consideration is 2007 – 2012 since only these six years of quality data are publicly available from NCQA.

For each of the quality variables, we estimate the following regression model:

$$Y_{ist} = \beta_0 + \beta_1 Efficiency + \beta_2 MLR + \gamma X_{ist} + \eta Year_t + \delta State_s + \varepsilon$$

where  $Y_{ist}$  represents the quality measure for insurer  $i$  domiciled in state  $s$  in year  $t$ . The coefficients of interest would be  $\beta_1$  and  $\beta_2$  which measure the impact of efficiency and MLR.  $Year$  is a vector of year fixed effects, and  $State$  is a vector of state fixed effects. A vector of control variables of insurer characteristics,  $X_{ist}$ , consists of the insurer organization type, group affiliation, number of states the insurer serves, insurer size, payment methods, number of different business lines and product types.

For this research, the quality composite measure is the proportion of “Usually and Always” responses (Usually + Always), while the global rating is the proportion of “8, 9, and 10” responses (8 + 9 + 10). Consistent with the NCQA’s raw data, the rating and measure scores are converted to the 0 – 100 scale (the proportion is multiplied by 100). However, in its annual summary reports of health plans, NCQA uses a 0-5 scale for the overall rating, the composite and subcomposite measures

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<sup>2</sup> The source for data contained in this publication is Quality Compass® [2007-2012] and is used with the permission of the National Committee for Quality Assurance (NCQA). Any data display, analysis, interpretation, or conclusion based on these data is solely that of the authors, and NCQA specifically disclaims responsibility for any such display, analysis, interpretation, or conclusion. Quality Compass is a registered trademark of NCQA. HEDIS® is a registered trademark of NCQA. CAHPS® is a registered trademark of the Agency for Healthcare Research and Quality (AHRQ).

(0-100 scale for the overall ranking before 2015) (<http://www.ncqa.org/report-cards/health-plans>).

This research adopts the 0-100 scale for all the quality measures for the regression purpose.

The following seven quality measures are used as dependent variables (“Health plan customer service” was not used since it did not have enough data):

- Getting needed care (Usually + Always)
- Getting care quickly (Usually + Always)
- How well doctors communicate (Usually + Always)
- Rating of health plan (8 + 9 + 10)
- Rating of all health care (8 + 9 + 10)
- Rating of personal doctor (8 + 9 + 10)
- Rating of specialist (8 + 9 + 10)

Additionally, the dependent variables also include three aggregate ratings of the measures (still on the 0-100 scale). The first aggregate rating is the average of all the seven measures. It corresponds to the NCQA’s “overall rating” of health plans, which, however, NCQA provides on a 0-5 scale, rounded to the nearest half point. The second aggregate rating is the average of six measures without “Rating of specialist”. The reason to exclude “Rating of specialist” is that the specialist might not be seen often and the rating of specialists might not appropriately reflect the overall quality of the health plan itself. The third aggregate rating is the average of four measures without the rating of doctors and specialists, that is, the three measures of “How well doctors communicate”, “Rating of personal doctor”, and “Rating of specialist” are excluded. The rationale for these exclusions is that the rating of doctors and specialists might be confounded by non-plan-related factors such as the

doctor/specialist's personality and social skills. The measures included in the third aggregate rating are consistent with the CMS' current rating measures of "member experience with health plan" for Medicare Advantage (except that the CMS measurers also include "care coordination" and "customer service").

Regarding the control variables of insurer characteristics, the organizational type variable 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 multiple states. The size of the insurer is measured by the logarithm of the insurer's enrollment: total member months. From the NAIC data, 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, aggregate cost arrangements, and other payments. For any payment method, the measure is its percentage of total payments received. The NAIC classifies health insurance into comprehensive (hospital and medical) – individual, comprehensive (hospital and medical) – group, Medicare supplement, Federal employees health benefit plan, Medicare, and Medicaid. Product types include Health Maintenance Organizations (HMOs), Provider Service Organizations (PSOs), Preferred Provider Organizations (PPOs), Point of Service (POS), Indemnity Only, and others. These are all measured by their percentage of the total enrollment. Most insurers do not use all the payment methods or operate in all lines, and they do not offer all the different types of plans. There is also some multicollinearity among these variables. Therefore, only some of them are included in the regression models.

This research uses the Data Envelopment Analysis (DEA) to generate the efficiency measure. DEA is a mathematical programming frontier approach to estimating the relative efficiency of a homogeneous set of peer entities called Decision Making Units (DMUs). The relative efficiency of a DMU is measured by comparing this DMU to “best practice” efficient frontiers formed by the most efficient DMUs. The efficiency score is obtained as the optimal ratio of the weighted sum of outputs over the weighted sum of inputs, where the optimization is over the weights to be given to the multiple inputs and multiple outputs. The efficient frontiers serve as benchmarks for the inefficient DMUs to follow and improve performance. The interested reader is referred to Cooper, Seiford and Tone (2007) for details and references. This technique has been widely used in insurance research to investigate relative efficiency of decision-making units in insurance related organizations.

Different parties to an efficiency analysis can have different perspectives of what constitutes the best performance (e.g., what seems better for stockholders may be different from what is better for individual clients, or from a perspective of society at large). The Medicaid efficiency of this research is the “medical services efficiency” from the societal perspective (Brockett et al. 2004; Yang 2014; Yang and Wen 2017; Brockett, Golden, and Yang 2018). The medical services efficiency evaluates the insurer’s performance in providing policyholders’ medical services (which are received from health providers) with reasonable costs. Accordingly, the outputs are the measures of health coverage and medical services; and the inputs are the costs incurred by the insurer and health providers. Specifically, the outputs include enrollment (persons covered) and the utilization of medical services (ambulatory encounters and hospital patient days), and the inputs are hospital and medical expenses (paid to health providers), and claim adjustment, and general administrative expenses (paid to administrative and claim adjustment staff) (Yang and Wen 2017). Other perspectives for evaluating the efficiency of Medicaid programs types are not considered here in the interest of space, and because

Medicaid is a societally oriented set of governmental programs designed to focus on “providing health care services with reasonable medical costs” to society members.

The input-oriented DEA model is adopted in this research to obtain DEA efficiency scores, that is, the efficiency score is generated by minimizing the inputs (costs) given the output level. This is in contrast to an output-oriented DEA model which would focus on maximizing output for a fixed level of inputs. Since the Medicaid program is designed to provide service to society at minimum cost, input orientation seems most appropriate. The DEA optimization problems are solved by using the DEA software developed by Joe Zhu (Zhu 2009). The higher the efficiency score, the lower the cost (including medical payments) for a given level of utilization and enrollment. Lower medical payments might make providers feel underpaid who thus might restrict access to care (O’Shea and Moffit 2017). Therefore, it is expected customer satisfaction would be lower with higher efficiency. Accordingly, the first hypothesis of this research is:

**Hypothesis 1.** Medicaid efficiency has a significant negative effect on the perceived quality of care.

The MLR is computed as the ratio of total hospital and medical expenses (incurred claims plus the change in contract reserves) to earned premiums (Karaca-Mandic, Abraham, and Simon 2015). The minimum MLR requirement limits the portion of premium dollars health insurers may spend on administration and profits and aims to provide quality care of better value to consumers. The higher the MLR, the more medical payments (given the earned premium). This might lead to more medical services of better quality. This is exactly opposite to the mechanism of the medical services efficiency. Therefore it is expected customer satisfaction would be higher with higher MLR. The second hypothesis of this research is:

**Hypothesis 2.** MLR has a significant positive effect on the quality of care.

## **5 Descriptive and univariate analyses**

This section presents some summary statistics and correlation analyses of the quality ratings, medical services efficiency, and medical loss ratio of Medicaid managed care plans, as well as the comparison of the quality of the three types of plans: Medicaid managed care plans, Medicare Advantage plans, and private plans.

The number of insurers and the summary statistics for the seven quality measures of Medicaid managed care plans are presented in Table 2, for all the insurers which have the NCQA quality data (but which may not all have corresponding NAIC data on financial variables), and for the insurers which have both the quality data and the NAIC financial data. The regression models are conducted for the insurers which have both the NCQA quality data and the NAIC financial data.

Of the three composite quality measures for all the insurers with quality data, “How well doctors communicate” is rated the highest: on average, 87% of respondents rate “Usually” or “Always”. “Getting care quickly” is around 4 percentage points higher than “Getting needed care”. Of the four overall rating measures for all the insurers with quality data, “Rating of all health care” is the lowest: 68.22% of respondents rate 8, 9, or 10 (out of 10). “Rating of health plan” is in the middle with 72.5% of respondents who rate 8, 9, or 10.

Generally, the average ratings are similar for the insurers with NCQA quality data only and the sample of the insurers for the regression analysis (the insurers with both NCQA quality data and NAIC financial data). For example, these two data sets (NCQA and NCQA+ NAIC) have 68.22% and

68.77% for “Rating of all health care (8+9+10)”, and 72.50% and 72.87% for “Rating of health plan (8+9+10)” respectively.

To compare the quality of Medicaid managed care plans with private plans and Medicare Advantage plans, the national average rating scores of these three types of plans are presented in Table 3, for the four common quality measures of member experience and satisfaction: “Getting care quickly (usually + always)”, “Getting needed care (usually + always)”, “Rating of all health care (8+9+10)”, and “Rating of health plan (8+9+10)”. The quality data of private plans and Medicare Advantage plans are obtained from NCQA and CMS respectively. The quality measures are not always the same for the three types of plans and/or different years. Comparable quality ratings are available for Medicaid managed care plans and private plans for the years of 2007-2012, but only the year 2007 for Medicaid managed care plans and Medicare Advantage plans. Since 2008, the four quality measures for Medicare Advantage have changed to “Getting care quickly (always)”, “Getting needed care (always)”, “Rating of all health care (10)”, and “Rating of health plan (10)”.<sup>3</sup> Detailed information of the quality measures of private plans and Medicare Advantage plans is available at [www.ncqa.org](http://www.ncqa.org) and [www.cms.gov](http://www.cms.gov) respectively.

Based on the ratings of health care measures, the quality of Medicaid managed care plans is the lowest, lower than both Medicare Advantage and private plans. Specifically, the average quality rating scores of Medicaid managed care are 6.61, 10.12, and 7.19 percentage points lower than those of private plans (7.64%, 11.85%, and 9.58% by percent) for the three quality measures of “Getting

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<sup>3</sup> It says the quality measures of Medicare Advantage have changed since 2009 ([www.cms.gov](http://www.cms.gov)). However, the quality data of 2008 are more consistent with the following years, not 2007. For example, the national average rating scores of the measure “Getting care quickly” are 88.83, 73.55, 74.10, 73.88, 75.50, and 75.78 for the years of 2007-2012 respectively. Therefore, the 2008 data are not included in the comparison.

care quickly”, “Getting needed care”, and “Rating of all health care”, respectively. The quality of Medicaid managed care is much lower compared to Medicare Advantage: the rating scores of the above three measures are 10.15, 16.86, and 15.98 percentage points lower (11.43%, 18.52%, and 19.59% by percent) respectively.

The quality of Medicare Advantage is the highest. The quality rating scores of Medicare Advantage are 2.70, 6.93, and 7.96 percentage points higher than those of private plans (3.14%, 8.24%, and 10.82% by percent) for the three quality measures of “Getting care quickly”, “Getting needed care”, and “Rating of all health care”, respectively.

However, the rating of health plan of Medicaid managed care is much higher than that of private plans. The average rating score of Medicaid managed care is 10.02 percentage points higher than that of private plans. As the rating of health care, the rating of health plan of Medicare Advantage is also the highest: 8.11 and 15.15 percentage points (11.58% and 24.04% by percent) higher than Medicaid managed care and private plans respectively. It is most probably the lower (or no) premium payments or cost-sharing of Medicaid and Medicare that puts private plans at the bottom on “Rating of health plan”.

It is worth noting that, as to the rating of health care, it might not be reasonable to compare Medicaid managed care with private plans or Medicare Advantage. Instead, it might make more sense to compare Medicaid managed care with “uninsured”. In other words, being of lower quality than private plans and Medicare Advantage does not necessarily imply that Medicaid managed care is providing health care of inferior quality. People with Medicaid coverage fare much better than their uninsured counterparts on diverse measures of access to care, utilization, and unmet need (Paradise and Garfield,

2013). Actually, as noted at the beginning of this section, the average rating scores of Medicaid managed care are 80.34%, 76.24%, and 68.22% for “Getting care quickly (usually + always)”, “Getting needed care (usually + always)”, and “Rating of all health care (8+9+10)” respectively. The average of these three measures is 74.93%. Evaluated on its scores alone without comparing it to other plans, Medicaid managed care is providing decent health care of acceptable quality. However, if possible, it would be ideal to improve its quality of care to that of Medicare Advantage or private plans, or a higher level. This research examines the factors impacting the quality of care of Medicaid managed care, hopefully providing some important insights on its quality improvement potentials.

**Table 2** Summary statistics of the rating scores (0-100) of the seven quality measures: 2007 - 2012

Quality measure	Insurers with NCQA quality data			Insurers with both NCQA quality data and NAIC data		
	# of insurers	Mean	Std Dev	# of insurers	Mean	Std Dev
Getting care quickly (Usually + Always)	555	80.34	4.95	332	81.34	3.52
Getting needed care (Usually + Always)	546	76.24	6.60	327	77.38	5.51
How well doctors communicate (Usually + Always)	556	87.34	3.24	332	87.91	2.74
Rating of all health care (8+9+10)	558	68.22	5.23	334	68.77	5.06
Rating of health plan (8+9+10)	558	72.50	6.23	334	72.87	6.47
Rating of personal doctor (8+9+10)	557	76.45	4.33	333	76.75	3.99
Rating of specialist (8+9+10)	498	76.49	4.35	304	76.61	4.23

**Table 3** National average rating scores of Medicaid managed care plans, Medicare Advantage plans, and private plans

Quality measure	Year	Medicaid (1)	Private plans (2)	Medicare (3)	(1)-(2)	(1)-(3)	(2)-(3)
Getting care quickly (Usually + Always)	2007	78.68	86.13	88.83	-7.45	-10.15	-2.70
	2008	80.24	86.33		-6.09		
	2009	80.13	86.68		-6.55		
	2010	79.53	86.76		-7.23		
	2011	80.60	86.77		-6.17		
	2012	80.37	86.56		-6.19		
Getting needed care (Usually + Always)	2007	74.22	84.15	91.08	-9.93	-16.86	-6.93
	2008	75.31	84.63		-9.32		
	2009	75.67	85.77		-10.1		
	2010	75.05	85.80		-10.75		
	2011	76.01	86.37		-10.36		
	2012	75.57	85.85		-10.28		
Rating of all health care (8+9+10)	2007	65.59	73.61	81.57	-8.02	-15.98	-7.96
	2008	67.08	73.73		-6.65		
	2009	68.21	75.13		-6.92		
	2010	67.35	74.62		-7.27		
	2011	68.94	76.18		-7.24		
	2012	69.91	76.94		-7.03		
Rating of health plan (8+9+10)	2007	70.07	63.03	78.18	7.04	-8.11	-15.15
	2008	70.59	59.84		10.75		
	2009	72.75	62.36		10.39		
	2010	70.71	60.38		10.33		
	2011	72.46	61.81		10.65		
	2012	73.49	62.51		10.98		

The number of insurers with NAIC financial data and the summary statistics of the Medicaid medical services efficiency and medical loss ratio are presented in Table 4. Because each of the quality measures serves as a dependent variable of our regression models, the efficiency is presented for all the groups of insurers with both NAIC data and data of each of the quality measurers respectively. It shows that each of the sub-groups should be representative of the whole population with regard to efficiency. The average efficiency of each sub-group is similar to that of all the insurers (0.27 vs. 0.31). Compared to all the insurers with NAIC financial data, the average MLR of each sub-group is

similar to that of all the insurers (89.2% vs. 87.2%). However, the standard deviation of the sub-groups is much smaller (8% vs. 16%).

The correlation analysis is conducted for the quality measures, the medical services efficiency, and the MLR. The results are presented in Table 5. There is a negative (but very low) correlation between the quality measures and the medical services efficiency. This indicates a negative (but insignificant) effect of the medical services efficiency on the quality of care. On the contrary, there is a positive correlation between the quality measures and the MLR, thus a positive effect of the MLR on the quality of care. Specifically, the correlation between “Rating of all health care” and MLR (medical services efficiency) is 0.312 (-0.132).

**Table 4** Summary statistics of the Medicaid medical services efficiency and medical loss ratio: 2007 – 2012

Insurers	# of insurers	Medical Services efficiency		Medical loss ratio	
		Mean	StDev	Mean	StDev
All insurers with NAIC data	887	0.31	0.20	89.2%	17.5%
Insurers with NAIC data and data of "Getting care quickly"	332	0.27	0.16	87.2%	8.1%
Insurers with NAIC data and data of "Getting needed care"	327	0.27	0.16	87.4%	8.1%
Insurers with NAIC data and data of "How well doctors communicate"	332	0.27	0.16	87.2%	8.1%
Insurers with NAIC data and data of "Rating of all health care"	334	0.27	0.16	87.2%	8.2%
Insurers with NAIC data and data of "Rating of health plan"	334	0.27	0.16	87.2%	8.2%
Insurers with NAIC data and data of "Rating of personal doctor"	333	0.27	0.16	87.2%	8.2%
Insurers with NAIC data and data of "Rating of specialist"	304	0.27	0.16	87.4%	8.0%

**Table 5** Correlation between quality measures, medical services efficiency, and medical loss ratio (MLR)

Quality measures	# of insurers	Medical services efficiency	Medical loss ratio
Getting care quickly (Usually + Always)	332	-0.063	0.071
Getting needed care (Usually + Always)	327	-0.053	0.145
How well doctors communicate (Usually + Always)	332	-0.099	0.249
Rating of all health care (8+9+10)	334	-0.132	0.312
Rating of health plan (8+9+10)	334	-0.085	0.275
Rating of personal doctor (8+9+10)	333	-0.123	0.245
Rating of specialist (8+9+10)	304	-0.002	0.056

### **6 Impact of medical services efficiency and MLR on quality of care: multivariate results**

This section presents the regression estimates of the impact of MLR and medical services efficiency on the quality of care of Medicaid managed care plans. As stated, there are 10 regressions with the seven quality measures and the three aggregate ratings as the dependent variables respectively. The regression results are presented in Table 6 (composite measures), Table 7 (overall ratings), and Table 8 (aggregate ratings).

For the three composite measures and the four overall ratings, the effect of the medical services efficiency is mixed. It has an insignificant negative effect on “Rating of all health care”, “Getting needed care”, and “How well doctors communicate”, a significant negative effect on “Rating of health plan” and “Rating of personal doctor”, but an insignificant positive effect on “Getting care quickly” and “Rating of specialist”. However, to evaluate the quality of health care, it should be reasonable to focus on the responses on “Rating of all health care” especially when there exist inconsistent results. Furthermore, the medical services efficiency has a negative effect on all the three aggregate ratings, although insignificant. Therefore, the result does not support the first alternative hypothesis that

medical services efficiency has a (significant) negative effect on quality of care. Nonetheless, it still has an insignificant negative effect.

Due to the insignificant but negative effect, quality deterioration and patient dissatisfaction due to efficiency improvement should not be a big concern. In other words, the results indicate that there should be room to improve medical services efficiency without significantly reducing the quality of care. On average, the medical services efficiency of the sample is 0.27 (Table 4). If the average medical services efficiency is increased by 0.16 (one standard deviation), the aggregate rating of the six quality measures (without “Rating of specialist”), for example, would be reduced by only 0.254 percentage point (the coefficient of the medical services efficiency is -1.586 in the regression results), other things being equal. The magnitude of the effect is very small and the effect is thus negligible. With coefficient estimates of -0.365 and -1.537 respectively, the other two aggregate ratings would be reduced even less.

Medical service efficiency might be enhanced through some innovative health care payment and delivery models such as accountable care organizations (ACOs). According to the Center for Health Care Strategies, Inc. ([www.chcs.org](http://www.chcs.org)), state-based Medicaid accountable care organizations (ACOs) are becoming increasingly prevalent, with more states pursuing this model as a way to align provider and payer incentives to focus on value instead of volume. ACOs offer promising potential for improving patient outcomes and controlling costs by shifting accountability for risk and quality to providers. Brockett, Golden, and Yang (2018) indicate that efficiency improvement through Medicare ACOs has the potential to generate around 5% - 8% cost savings.

The CMS’ final rule of 2016 on managed care in Medicaid and the Children’s Health Insurance Program (CHIP) contains several provisions designed to strengthen states’ delivery and payment initiatives and improve efficiency and quality of care. These initiatives include, for example, value-based purchasing, incentive arrangements, and withhold arrangements, all of which encourage Medicaid managed care to provide high-value care while controlling costs (CMS 2016b). Antos and Capretta (2017) indicate that a better approach would be to combine new provider payment policies with stronger economic incentives for beneficiaries and consumers to seek out lower-cost and higher-value care.

**Table 6** Regression estimates of the impact of medical services efficiency and medical loss ratio (MLR) on quality of care: composite quality measures as dependent variables

Independent variables	Getting care quickly	Getting needed care	How well doctors communicate
	Coefficient	Coefficient	Coefficient
Medical services efficiency	0.317	-1.257	-0.969
Medical loss ratio (MLR)	1.759	7.101**	0.958
Stock insurer	-0.218	-2.879***	-0.205
Group affiliation	-0.341	-0.441	-0.161
Single state insurer	0.220	0.575	0.044
Log of member months	1.516**	3.403***	0.712
Capitation payments (%)	-2.115	-1.204	-1.020
Contractual fee payments (%)	-0.747	-0.269	-0.983
Bonus/withhold - contractual fee payments (%)	3.567	-0.269	4.188*
HMO (%)	-1.051	-0.476	-0.324
POS (%)	1.437	-3.755	1.686
Comprehensive – individual (%)	-2.143	0.534	2.644
Medicare (%)	0.427	0.461	0.698
R <sup>2</sup>	0.443	0.553	0.489
Adjusted R <sup>2</sup>	0.348	< 0.0001	0.402
Observations	332	327	332

Other variables included in regressions are year fixed effects and state fixed effects.

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

**Table 7** Regression estimates of the impact of medical services efficiency and medical loss ratio (MLR) on quality of care: overall quality ratings as dependent variables

	Rating of all health care	Rating of health plan	Rating of personal doctor	Rating of specialist
	Coefficient	Coefficient	Coefficient	Coefficient
Medical services efficiency	-1.944	-3.089*	-2.575*	2.514
Medical loss ratio (MLR)	5.922*	3.755	0.885	-1.908
Stock insurer	-1.683**	-4.364***	0.618	-1.400**
Group affiliation	-0.077	-0.894	-0.944	-0.137
Single state insurer	-0.814	-0.149	-0.077	0.281
Log of member months	2.255**	5.220***	0.862	-0.499
Capitation payments (%)	-2.285	-2.005	0.102	0.387
Contractual fee payments (%)	-1.536	-2.735*	0.398	4.231***
Bonus/withhold - contractual fee payments (%)	-1.302	-6.001	1.880	9.927**
HMO (%)	0.973	5.786***	1.555	0.398
POS (%)	4.812	0.479	3.896	0.050
Comprehensive – individual (%)	5.743	10.183**	6.782**	-0.730
Medicare (%)	1.339	-4.314	0.281	5.966
R <sup>2</sup>	0.525	0.663	0.426	0.351
Adjusted R <sup>2</sup>	0.445	0.606	0.330	0.231
Observations	334	334	333	304

Other variables included: year fixed effects and state fixed effects.

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

**Table 8** Regression estimates of the impact of medical services efficiency and medical loss ratio (MLR) on quality of care: aggregate quality ratings as dependent variables

	Aggregate rating 1	Aggregate rating 2	Aggregate rating 3
	Value	Value	Value
Medical services efficiency	-0.365	-1.586	-1.537
Medical loss ratio (MLR)	3.582*	3.772*	5.290**
Stock insurer	-1.168***	-1.463***	-2.277***
Group affiliation	-0.447	-0.482	-0.444
Single state insurer	1.285	0.040	0.015
Log of member months	1.403**	2.377***	3.152***
Capitation payments (%)	-2.215*	-1.555	-2.026
Contractual fee payments (%)	-0.830	-1.017	-1.390
Bonus/withhold - contractual fee payments (%)	1.279	0.350	-1.060
HMO (%)	0.483	1.105	1.328
POS (%)	0.140	1.152	0.240
Comprehensive – individual (%)	2.992	3.998	3.614
Medicare (%)	5.774**	0.146	-0.316

R <sup>2</sup>	0.575	0.578	0.612
Adjusted R <sup>2</sup>	0.497	0.507	0.547
Observations	304	327	327

Other variables included: year fixed effects and state fixed effects.

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Aggregate rating 1: the average of the seven quality measures.

Aggregate rating 2: the average of six quality measures (without “Rating of specialist”).

Aggregate rating 3: the average of four quality measures – “Getting care quickly”, “Getting needed care”, “Rating of all health care”, and “Rating of health plan”.

From the tables, MLR, it has a positive effect on all the quality measures except for “Rating of specialist”. The MLR has a significant positive effect on “Getting needed care” and “Rating of all health care”, and an insignificant (but positive) effect on “Getting care quickly”, “How well doctors communicate”, “Rating of health plan”, and “Rating of personal doctor”. MLR has a significant positive effect on all three aggregate ratings. Therefore, especially based on the aggregate ratings, the results support the second alternative hypothesis that MLR has a positive effect on quality of care.

Similar to the minimum MLR requirement, it might be advisable to impose a minimum medical quality ratio (MQR) requirement for Medicaid insurers (and other insurers). On average, the MLR of the sample is around 87% (Table 4). The average score of the aggregate quality rating (of all the seven quality measures) is 77.4% (Table 2). If the minimum MQR is set at 75%, the minimum MLR could be reduced to 80% or lower (from the current required minimum 85%). Specifically, by the regression results, the coefficient of MLR is 3.582. Therefore, a 10 percentage points MLR decrease would only reduce the quality score by 0.3582 percentage point, other things being equal. Even though MLR has a significant positive effect on the aggregate quality ratings, the magnitude of the practical effect is actually very small. This implies that a minimum MLR requirement of 80% or 85% does not really make a huge difference on resulted quality ratings. Thus, 80% should be acceptable especially when a higher MLR is restricting the moves to improve medical services efficiency.

The above analyses regarding the impact of the MLR and the medical services efficiency are based on the assumption that they are not highly correlated. To provide some support for this assumption, the correlation of the MLR and the medical services efficiency is presented in Table 9. It shows that the MLR and the medical services efficiency are negatively correlated but the correlation is extremely low. Therefore, increasing medical services efficiency would not result in a significant decrease in MLR, vice versa.

**Table 9** Correlation between medical loss ratio (MLR) and medical service efficiency (MSE)

Insurers	# of insurers	correlation of MLR and MSE
All insurers with NAIC data	887	-0.019
Insurers with NAIC data and data of "Getting care quickly"	332	-0.050
Insurers with NAIC data and data of "Getting needed care"	327	-0.044
Insurers with NAIC data and data of "How well doctors communicate"	332	-0.050
Insurers with NAIC data and data of "Rating of all health care"	334	-0.066
Insurers with NAIC data and data of "Rating of health plan"	334	-0.066
Insurers with NAIC data and data of "Rating of personal doctor"	333	-0.062
Insurers with NAIC data and data of "Rating of specialist"	304	-0.030

Regarding the impact of other variables, the results show that stock insurers have a significant lower aggregate quality rating than other types of insurers. They are 1.17, 1.46, and 2.28 percentage points lower for the three aggregate ratings respectively. Among all the insurers with Medicaid managed care plans, 73.5% are stock insurers (Table 10). To increase the quality of care, it might possibly be advisable to move more Medicaid plans to non-stock insurers. On the other hand, the size of the insurer (by enrollment - member months) also has a significant positive effect on the aggregate quality rating. This provides some supporting evidence for mergers and acquisitions to form bigger health insurers as far as the quality of care is concerned, at least for Medicaid managed care beneficiaries.

**Table 10** Number of insurers by organization type

Insurers	# stock insurers	# of other types of insurers	total
All insurers with NAIC data	652	235	887
Insurers with NAIC data and data of "Getting care quickly"	213	119	332
Insurers with NAIC data and data of "Getting needed care"	208	119	327
Insurers with NAIC data and data of "How well doctors communicate"	213	119	332
Insurers with NAIC data and data of "Rating of all health care"	215	119	334
Insurers with NAIC data and data of "Rating of health plan"	215	119	334
Insurers with NAIC data and data of "Rating of personal doctor"	214	119	333
Insurers with NAIC data and data of "Rating of specialist"	189	115	304

## 7 Conclusions

Medicaid is the nation's predominate public health insurance program for low-income children, adults, seniors, and people with disabilities, and is the largest source of health coverage in the United States. Medicaid is constantly evolving as policymakers strive to improve program value and outcomes through delivery system reforms, federal policy changes including those in the ACA or other regulatory changes (Gifford et al. 2017). The recent CMS' final rule on managed care in Medicaid and the Children's Health Insurance Program (CHIP), issued on April 25, 2016, is the first major update to Medicaid and CHIP managed care regulations in more than a decade. It aligns key rules (such as the minimum MLR requirement) with those of other health insurance coverage programs, modernizes how states purchase managed care for beneficiaries, and strengthens the consumer experience, the quality improvement, and key consumer protections (CMS 2016a). Furthermore, Congress has been considering fundamental changes to Medicaid's financing structure to make federal funding for Medicaid more predictable and achieve substantial federal budgetary savings. In response to the new MLR standard, the Medicaid financing proposals, and the CMS final rule on Medicaid quality of care, this research is designed to examine the quality of Medicaid

managed care and its impacting factors including MLR and efficiency. This research should provide some useful insights into Medicaid regulation, performance and quality improvement.

In evaluating the quality of Medicaid managed care plans, this research uses the quality measures of customer experience and satisfaction generated by the health plan surveys of the CAHPS. The CAHPS surveys ask consumers and patients to report on and evaluate their health care experiences such as “Rating of all health care”, “Getting care quickly”, “Getting needed care”, and “Rating of health plan”. The results show that, Medicaid managed care plans are the lowest on rating of health care, lower than both Medicare Advantage and private plans, while Medicare Advantage is the highest. Specifically, the average quality rating score of Medicaid managed care is 7.19 percentage points (9.58%) lower than that of private plans on “Rating of all health care”; 15.98 percentage points (19.59%) lower than that of Medicare Advantage. However, the rating of health plan of Medicaid managed care is much higher than that of private plans (but still lower than Medicare Advantage), most probably due to lower (or no) premium payments or cost-sharing for Medicaid plans. It is worth noting that, evaluated on its scores alone without comparing it to other plans, Medicaid managed care is providing decent health care of acceptable quality. Medicaid managed care’s aggregate rating on all the seven quality measures is around 77% (where 100% is the best possible score).

The goal of improved efficiency in health care should be a central feature of any reform effort. However, economic efficiency might result in lower quality of care and patient dissatisfaction. The results show that, based on the aggregate quality ratings, the medical services efficiency does have a negative effect on the quality of care, but the effect is statistically insignificant. The magnitude of the effect is very small and the negative effect is statistically negligible. This finding implies that there should be room to improve medical services efficiency without significantly reducing the quality of

care. Medical services efficiency might be enhanced through some innovative health care payment and delivery models such as accountable care organizations (ACOs), value-based purchasing, incentive and withhold arrangements, all of which encourage Medicaid managed care to provide high-value care while controlling costs.

The results of this paper indicate that MLR has a significant positive effect on all the three aggregate ratings. However, practically the magnitude of the effect is actually very small. For example, a 10 percentage points MLR decrease would only reduce the quality score by 0.3582 percentage point, other things being equal. This implies that a minimum MLR requirement of 80% or 85% does not really make a huge difference on resulted quality ratings. Accordingly, an MLR requirement of 80% should be acceptable, especially when a higher MLR is restricting the moves of the insurer to improve medical services efficiency. Regarding the impact other variables, the results indicate that stock insurers have a significant lower aggregate quality rating than other types of insurers. On the other hand, the size of the insurer (by enrollment - member months) does have a significant positive effect on the aggregate quality rating. This provides supporting evidence for mergers and acquisitions to form larger health insurers to improve average quality of care perceptual ratings, at least for Medicaid managed care beneficiaries.

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