Do Financial Incentives Affect Care Provisions in Medicaid? Evidence from Florida Medicaid's Payment Reform

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Abstract

While a large body of literature examines how physicians respond to financial incentives in the context of Medicare and private payers, evidence on this issue for Medicaid is scant. Since Medicaid patients typically constitute a small fraction of a physician's patients, financial incentives in Medicaid may have less impact than the incentives in those larger payers. To shed light on this issue, in this study, I examined how care provision responds to Florida Medicaid's 2017 payment reform, which transitioned from a fee-for-service to a prospective payment system for outpatient services. This transition created procedure-specific payment shocks. Using procedure-level policy exposure variables, I found evidence that physicians reduce the use of procedures that are expected ex ante to be more likely to receive no payment under the new system. Additionally, the effects are concentrated on patients without co-morbidities and are observed only in facilities with above-median propensities to treat Medicaid FFS patients. These findings imply that physicians could respond to the financial incentives for Medicaid services, particularly when their revenues depend more on Medicaid. Thus, similar reforms hold the promise of improving cost efficiency in health care for Medicaid patients.

Keywords: *healthcare financing*, *financial incentives*, *prospective payment system*, *Medicaid payment reform*, *Enhanced Ambulatory Patient Group (EAPG)*

JEL Classification: *H51*, *H75*, *I11*, *I13*, *I18*

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1 Introduction

Slowing health care cost growth has long been a primary objective of U.S. public policy. To this end, there has been a growing interest in transitioning from traditional fee-for-service to alternative payment models (e.g., prospective, capitated, episode-based bundled, pay-for-performance payments). A fee-for-service (FFS) payment system (e.g., actual cost-based reimbursement, fee schedule) reimburses physicians for each additional service provided, rewarding them for performing more unnecessary procedures. Critics blame fee-for-service payments for overprovision, inefficiency, and poor coordination of care, escalating health expenditures without improving health outcomes (e.g., Hackbarth, Reischauer and Mutti 2008; Arrow et al. 2009; Ginsburg 2011; Ikegami 2015). Unlike fee-for-service, a prospective payment system typically bundles services and pays physicians predetermined amounts, regardless of actual costs for those services performed. As a result, the more care physicians provide under a prospective payment, the lower the profit margins they receive, thereby sharing financial risk between payers and health care providers (e.g., hospitals, physicians). This may encourage physicians to reduce unnecessary services and lower costs while maintaining or improving the quality of care (Altman 2012). However, prospective payments can result in valuable treatments not being provided, which could reduce health outcomes (Ellis and McGuire 1986). Therefore, how physicians respond to such a transition in the payment system is an important empirical question for determining whether it could be a promising path to promote cost efficiency.

In this study, I exploit a Florida Medicaid's payment reform to investigate this issue in the context of Medicaid. Effective July 1, 2017, Florida Medicaid replaced its reimbursement methods for outpatient services provided in hospitals and ambulatory surgical centers (ASCs). This study focused on ASCs.[1] Preceding the reform, Florida Medicaid reimbursed each payable ASC service for a medical claim based on a fee schedule. With the reform, Florida Medicaid adopted an outpatient prospective payment system (OPPS) based on the Enhanced Ambulatory Patient Groups (EAPGs).[2] The new payment system discourages providers from providing additional low-intensity procedures for the same

[1] Prior to the reform, Florida Medicaid reimbursed hospitals a provider-specific, cost-based reimbursement rate for each payable outpatient service. Payments were then retrospectively adjusted and settled based on cost reports years after the services were provided. This paper focuses on ASCs as the pre-reformed rates, a key variable in my empirical model, are unavailable for hospitals but available for ASCs.

[2] As of 2017, states (including DC) that have adopted an EAPG-based OPPS for their Medicaid patients include Colorado, Florida, Illinois, Massachusetts, New York, Ohio, Virginia, Washington, and Wisconsin, as well as Washington DC.

medical episode to curb unnecessary low-intensity procedures. As low-intensity procedures are more adversely affected than high-intensity procedures, the reform induces procedure-specific payment shocks that are plausibly exogenous to other determinants of care provisions.

This study contributes to two strands of the health economics literature: the literature on how financial incentives affect procedure choice as well as the literature on how health care providers respond to a different type of payment system. While there is a large body of research on Medicare and private payers, little is known about these issues for Medicaid. As Medicaid patients typically constitute a minor fraction of a physician's patients, evidence for Medicare or private payers, whose patients usually comprise the majority of physicians' patients, may not apply to Medicaid. While previous studies on Medicaid (e.g., Gruber, Kim and Mayzlin 1999; Grant 2009; Alexander 2017) focused on delivery procedures, this study analyzes across-the-board outpatient procedures for Medicaid patients. Moreover, to the best of my knowledge, this study is the first to estimate the effects of payment reform for Medicaid outpatient services.

Exploiting the variation in the procedure-specific payment shocks, I estimated the effects of the reform on care provision. I found evidence that physicians are responsive to financial incentives in this Medicaid setting. Particularly, they reduce the use of procedures that are expected ex ante to be more likely to receive no payment under the new payment system. The results also showed that physician responsiveness was concentrated in the patients without co-morbidities. Since patients with co-morbidities are sicker than those without co-morbidities, this result is consistent with the notion that physicians respond more to financial incentives when treating healthier patients. In addition, the effects were observed only in ASCs with above-median propensities to treat Medicaid FFS patients, implying that health care providers are responsive to financial incentives when their revenues are more dependent on Medicaid.

As increasingly more states are adopting the Affordable Care Act's Medicaid expansion, it is vital to finance and deliver the expanded health care services cost-efficiently. My findings suggest that physicians' financial incentives may play an important role in determining care provision in Medicaid. In particular, bundling services can potentially reduce the provision of clinically wasteful procedures. As such, payment policies may hold the promise of promoting cost efficiency and maintaining Medicaid expenditures at a sustainable level.

The remainder of this paper is organized as follows. Section 2 reviews the rele-

vant literature. Section 3 introduces Florida Medicaid's payment reform and derives the procedure-level policy exposure variables. Sections 4 and 5 describe the data and the identification strategy, respectively. The results are presented in Section 6. Section 7 discusses the limitations of the study. Finally, Section 8 concludes the paper with policy implications.

2 Literature Review

This study relates to two strands of literature. First, it relates to the literature on how financial incentives affect the health care supply.[3] Theoretically, this relationship is undetermined a priori. A neoclassical model of physicians as profit-maximizing firms under market demand constraints predicts that the level of service will decrease following a price cut. However, this view fails to consider that physicians may not be constrained by market demand and may induce patients' demand for their asymmetric information advantages over patients regarding their medical conditions and treatments. Thus, physicians may increase the volume of services to recoup the income loss due to a price cut or even sustain a "target income."[4] To incorporate the two polar cases of profit maximization and target income, McGuire and Pauly (1991) proposed a model in which physicians maximize their generalized utility. The utility depends positively on net income and leisure and negatively on demand inducement due to, for example, ethics, threats of malpractice suits, and patient expectations. With this utility function, a lower price would exert downward pressure on physicians' income (the "income effects") and, simultaneously, induces physicians to switch to more expensive alternatives (the "substitution effects"). How healthcare supply responds to a lower price depends on the relative sizes of income and substitution effects. When substitution effects dominate, demand inducement is less profitable. The physician may substitute away from services directly affected, thereby decreasing the level of these services performed, resembling a profit-maximizing firm.[5] Conversely, when income effects dominate, demand inducement becomes more desirable. Physicians may induce demand by increasing the level of services performed. In an extreme case, when the income effects are all that matter, physicians seek a "target in-

[3] See McGuire (2000) and Chandra, Cutler and Song (2011) for reviews on this literature.

[4] See Johnson and Rehavi (2016) for evidence on physician-induced demand due to the information gap between physicians and patients.

[5] A profit maximizer only considers the marginal profit, disregarding other factors such as income. Accordingly, their income effect is always zero (Folland, Goodman and Stano 2016).

come," entirely undoing the price cut.[6] Empirically, evidence on how physicians respond to financial incentives is mixed. Some studies find positive effects on care provision, i.e., physicians prescribe more procedures when the payment increases or when the payment of an alternative procedure decreases (Gruber, Kim and Mayzlin 1999; Hadley et al. 2009; Grant 2009; Clemens and Gottlieb 2014; Alexander 2017; Foo, Lee and Fong 2017). However, consistent with demand inducement, other studies find negative financial incentive effects (Rice 1983; Gruber and Owings 1996; Yip 1998; He and Mellor 2012; Jacobson et al. 2013). Most of these studies focused on the provision of specific procedures, such as C-sections, coronary artery bypass grafting, diagnostic tests, and chemotherapy. Regardless of the mixed evidence, the notion that physicians would increase the volume of care due to price cuts is commonly assumed in policymaking. For example, the Health Care Financing Administration (HCFA) assumes that half of any Medicare payment reduction will be offset by a volume increase (Physician Payment Review Commission 1991).

Second, this study relates to the literature on how providers respond to a different payment scheme such as prospective (Cutler 1993; Ellis and McGuire 1996; Dafny 2005), capitated (Dickstein 2011; Ho and Pakes 2014), episode-based bundled (Carroll et al. 2018), and pay-for-performance payments (Darden, McCarthy and Barrette 2019; Alexander 2020). These studies provide evidence that providers may respond to payment reforms by changing the intensity of services, becoming more likely to admit profitable patients, reallocating patients across facilities, shifting cost burdens to patients untargeted by the payment scheme, and altering coding practices to their favor.

However, although there is a large body of research on Medicare and private payers in these two strands of literature, research on Medicaid is limited. Gruber, Kim and Mayzlin (1999), Grant (2009), and Alexander (2017) provide Medicaid studies focusing on C-sections. Moreover, while the effects of payment reforms have been widely examined in inpatient and other settings, little is known about their effectiveness for outpatient services, except for He and Mellor (2012), who examined Medicare's transition to an outpatient prospective payment system in 2000.[7]

[6] Another mechanism for the level of services to increase with a price cut is via a backward-banding supply curve. That is, at a sufficiently high income, the supply of labor bends backwardly to be downward sloping. Along the segment of the backward-banding supply curve, the physician becomes so rich that they spend more time in leisure to enjoy the high income (Folland, Goodman and Stano 2016). See Hadley et al. (2009) for suggestive support for the existence of a backward-banding supply curve for Medicare services.

[7] Other Medicare settings studied in the literature include inpatient acute care (Cutler 1993), inpatient psychiatric care (Norton et al. 2002), inpatient rehabilitation care (Sood, Buntin and Escarce 2008), skilled nursing facility care (White 2003; Grabowski, Afendulis and McGuire 2011), and home care (McCall et al. 2003). See Salkever (2000) and Chalkley and Malcomson (2000) for reviews of relevant literature.

3 Background

3.1 Florida Medicaid's Payment Reform[8]

Florida Medicaid's 2017 reform changed its payment method for outpatient services provided to patients with Medicaid FFS. Under the previous payment system, each outpatient procedure provided by ASCs was categorized into one of 14 groups according to the procedure's Current Procedural Terminology (CPT) code. Each procedure is reimbursed by a scheduled fee for its group. However, the new payment method – an outpatient prospective payment system (OPPS) based on the Enhanced Ambulatory Patient Groupings (EAPGs) – categorizes outpatient procedures that are clinically similar and require similar resource costs into an EAPG group. Compared with the previous grouping, the EAPG grouping is much more granular. There are 564 different EAPGs under version 3.12 of the 3M Enhanced APG System Definitions Manual (3M 2015), the same version used by Florida Medicaid through my study period. Defined by the EAPG Definitions Manual through a list of CPT codes, "significant procedures" are usually the primary reason for a medical episode and require the majority of resources incurred during the episode. With an assigned EAPG group, each significant procedure performed received a payment amount according to the following formula:

$$\text{Payment} = \underbrace{\text{base rate} \times \text{EAPG weight}}_{\text{full payment}} \times (\text{consolidate/discount factor}). \tag{1}$$

In the formula, the "base rate" is a common factor for all procedures.[9] "EAPG weight" measures the cost required to perform the procedure relative to the average procedure cost and is constant across procedures in the same EAPG group but varies across EAPG

[8] Information in this section is drawn from Florida's Agency for Health Care Administration (AHCA) website. For more details, see https://ahca.myflorida.com/medicaid/finance/finance/institutional/hoppps.shtml.

[9] During the design phase of the new payment system, base rates are calibrated using historical outpatient claim data so that the reform is conducted in a budget-neutral manner separately for hospitals and ASCs, holding physicians' behavior fixed. The base rate was $276.66 in the state fiscal year (SFY) of 2017, which spans between 2017 Q3 and 2018 Q2. It increased to $279.40 in the SFY of 2018.

groups.[10] Florida Medicaid did not update EAPG weights through 2018, the end of the study period. By factoring in the EAPG weight, the EAPG-based OPPS links payments to procedure intensity.

The product of the first two terms, base rate × EAPG weight, is referred to as the "full payment." However, not all services are reimbursed for the full payment. Instead, the EAPG-based OPPS provide sophisticated ways to bundle services to curb unnecessary ones and promote cost efficiency. Specifically, the significant procedure with the highest weight during an episode is designated as the "primary procedure." During the same episode, an additional significant procedure performed is consolidated and receives zero payment if it is the same as or clinically related to the primary procedure; in this case, the "consolidate factor" in the formula is 0. Conversely, if the additional significant procedure is clinically unrelated to the primary procedure, it receives a discounted payment of 50% of its full payment; in this case, the "discount factor" in the formula is 50%. The rationale behind consolidation and discount is that the resource cost required to perform a procedure alongside a related procedure is less than the cost required to perform the procedure itself. Whether any two procedures are deemed clinically related is established by the EAPG developer 3M based on clinical judgment. Nonetheless, both the rule and discount factors can be altered by the Medicaid agency to adjust the financial incentives.[11]

The EAPG payment for the entire episode is the sum of all payment amounts for all service items[12]. Adapted from the EAPG Definitions Manual, Table 1 shows an example of applying the EAPG-based OPPS to fictitious episode services.

3.2 Expected Payment Shock

This study examines how care provision responds to the financial incentives created by the reform. By switching from a fee-for-service to a prospective payment system, the reform created procedure-specific payment shocks. Moreover, the reimbursement for a procedure depends on whether the same procedure or a related procedure with a higher

[10] An EAPG weight is based on statewide providers' average cost of performing any procedure in the EAPG. This ensures that a service receives the same payment regardless of the provider and incentivizes providers to improve efficiency. EAPG weights are calibrated such that the volume-weighted average of all the weights is 1. For example, the EAPG group, "level 1 skin repair," has a weight of 0.5772, which indicates that the resource cost of any procedure in the group is 0.5772 times that of a weighted average procedure.

[11] Florida Medicaid sets the discount factor and adopts 3M's default rule of determining consolidated and discounted procedures.

[12] In contrast, an inpatient diagnosis-related group (DRG) payment method assigns a DRG to an entire claim and reimburses a flat rate based on the DRG code for all services performed during a medical episode.

intensity is performed for the same episode. That is, the procedure-specific payment shock is context-based rather than fixed. For example, the pre-reform payment for a procedure with a CPT code of 31525 was $717. In the post-reform period, its payment becomes $0 when it is consolidated due to being performed alongside a related procedure with a higher intensity (e.g., the procedure with a CPT code of 31545 in Table 1). However, its post-reform payment becomes $196 when it is the primary procedure during the episode and receives full payment.

To gauge the reform-induced financial incentives, I construct expected payment shocks as follows. The purpose of constructing expected payment shocks is to measure the financial incentives using only pre-reform and pre-determined data in a later section. In doing so, the measures of financial incentives are plausibly exogenous. For procedure i, let P_i^0 and P_i^1 denote the pre-reform payment and post-reform full payment, respectively. Additionally, p_i^c denotes the likelihood of consolidation (i.e., propensity for consolidation); p_i^d, the likelihood of discount (i.e., propensity for discount); accordingly, the likelihood of receiving full payment is $1 - p_i^c - p_i^d$. Given that the discount and consolidation factors are $1/2$ and 0, respectively, the post-reform payment is thus $(1/2) \times P_i^1$ when i is discounted and 0 when i is consolidated. The expected post-reform payment, $\tilde{P}_i^1$, can thus be expressed as a weighted sum of the payments with probabilities as weights:

$$\tilde{P}_i^1 = (1 - p_i^c - p_i^d) \times P_i^1 + p_i^d \times (\frac{1}{2} \cdot P_i^1) + p_i^c \times 0. \tag{2}$$

I quantify the reform-induced financial incentives using the "expected payment shock" (in percentage), $\Delta\tilde{P}_i$, which can be approximated as the log difference between the expected post-reform payment and pre-reform payment,

$$\Delta\tilde{P}_i \approx \ln \tilde{P}_i^1 - \ln P_i^0 \approx [\ln P_i^1 - \ln P_i^0] + p_i^c + \frac{1}{2} \cdot p_i^d. \tag{3}$$

In Equation (3), the expected payment shock is approximately decomposed into a summation of three term relating to three procedure-level policy exposure variables: (1) the log difference between the post-reform full payment and pre-reform payment, referred to as the "full-payment shock," $\Delta \ln P_i = \ln P_i^1 - \ln P_i^0$, (2) the propensity for consolidation, p_i^c, and (3) the propensity for discount, p_i^d. Later, I calculate and use these policy variables for model estimation. Note that they each correspond to the three features of the EAPG-based OPPS: full payment, consolidation, and discount.

4 Data

The analysis dataset was constructed from Florida Ambulatory Discharge Data from 2015 to 2018, obtained from the Florida Agency for Health Care Administration (AHCA). The discharge data contained information about the universe of Florida outpatient discharges. Each observation pertains to a patient's discharge and consists of information such as CPT codes for up to 30 procedures performed, the year-quarter of the discharge, the principal payer (e.g., Medicaid, Medicare, private payers), the attending physician's identification number, and the facility's identification number and type (e.g., hospital, ASC). Pre-reform ASC fee schedules and EAPG weights are from the Florida AHCA website.[13]

This study focused on the significant procedures performed for Medicaid FFS patients treated with ASCs. As the pricing logic for non-significant procedures differs from that for significant procedures, I provide an analysis of ancillary procedures in Appendix A.

Recall that the full payment, base rate × EAPG weight, is the payment that the procedure receives when it is not consolidated or discounted; for procedure i, the full-payment shock ($\Delta \ln P_i$) is the log difference between the full payment in the first year of the post-reform period and the pre-reform payment. The distribution of full-payment shocks is shown in Figure 1. Roughly speaking, the full-payment shock is bell-shaped, centered around zero, and fairly symmetric. For most procedures, the full payment was similar to the pre-reform payment. Procedures with a full-payment shock that falls in the left (or right) tail of the distribution are adversely (or favorably) affected when they become primary procedures.

Moreover, for procedure i, I measured its propensity for consolidation (p_i^c) as the total number of consolidated procedures performed divided by the total number of procedures performed in the pre-reform period (2015 Q1–2017 Q2).[14] For example, the procedure with a CPT code of 43239, "Esophagogastroduodenoscopy, flexible, transoral; with biopsy, single or multiple," was performed 7,537 times in the pre-reform period. Of the 7,537, 572 would be consolidated to another related significant procedure under the new system; thus, its propensity for consolidation was calculated as 572/7,537 = 0.076. The propensity for discount (p_i^d) was computed in a similar manner. Figure 2 shows the distributions of the propensities for consolidation and discount. Both propensities varied

[13] Historical ASC fee schedules can be accessed through https://ahca.myflorida.com/medicaid/review/Historical_Reim.shtml; EAPG weights, https://ahca.myflorida.com/medicaid/finance/finance/institutional/hoppps.shtml.

[14] YYYY QX stands for quarter X of year YYYY.

between zero and one. Most procedures have zero or a low propensity for consolidation, indicating that they would never or are not likely to be consolidated under the EAPGs, holding physicians' behavior fixed. Thus, most procedures are not expected ax ante to be significantly influenced by the consolidation provision. In contrast, the consolidation provision could greatly affect procedures with a high propensity for consolidation. For the propensity for discount, the spike at zero indicates that a vast majority of procedures are not expected ax ante to be discounted under the new system.

The unit of observation of the analysis dataset is at the procedure and year-quarter level. Table 2 reports the summary statistics for the analysis dataset. A procedure is selected if it is present in the pre-reform discharge data, and its pre-reform payment rate is available for calculating procedure-level policy exposure variables. Using this criterion, 965 unique procedures categorized into 101 EAPGs were selected. With 16 year-quarters, the total number of observations was 15,440. On average, 1.45 procedures per 1,000 discharges were performed per procedure and year-quarter combination. The average propensities of consolidation and discount computed using pre-reform data were 0.19 and 0.11. An average procedure was paid $880.90 in the pre-reform period and $962.80 if it received the full payment in the post-reform period. The average number of discharges per quarter is 4,009.19. EAPG weights ranged between 0.43 and 47.02, with a mean of 3.47.

For each procedure performed during the study period between 2015 Q1 and 2018 Q4, I assigned a payment type indicating whether the procedure received full payment, was consolidated, or discounted under the EAPG-based OPPS according to the EAPG Definitions Manual. As pre-reform procedures were not paid via EAPGs, I interpret this assignment as the payment type that would be assigned under the new system. Figure 3 shows the average number of significant procedures per discharge during the study period: total and by payment type. The total is equal to the sum of the numbers by the payment type. Immediately after the reform, the average number of significant procedures per discharge decreases discretely, mainly driven by consolidated procedures. Meanwhile, the reform does not appear to affect the average numbers for full-payment and discounted procedures, as the level of each series is similar before and after the reform.

5 Method

5.1 Baseline Specification

In this section, I empirically examine how care provision responds to reform-induced financial incentives. Here, for procedure i, care provision is measured by the procedure rate, defined as the number of procedures performed per 1,000 discharges. In a previous section, I capture the incentive in three policy exposure variables for procedure i, namely, the full payment shock ($\Delta \ln P_i$), the propensity for consolidation (p_i^c), and the propensity for discount (p_i^d). Here, I relate procedure rate of i at year -quarter t (2015 Q1–2018 Q4) to these policy measures in a baseline fixed effects model, flexibly allowing each variable to affect the procedure rate differently, as follows:

$$\text{Procedure rate}_{it} = \left[\alpha \cdot \ln P_i + \beta \cdot p_i^c + \gamma \cdot p_i^d\right] \times \text{reform}_t + I_i + T_t + \epsilon_{it}. \tag{4}$$

where reform_{it} is an indicator for the timing of the reform, equaling 1 if $t \geq$ 2017 Q3 and 0 otherwise; I_i, procedure fixed effects; T_t, year-quarter fixed effects; ϵ_{it}, the error term.

In Equation (4), α, β, and γ are the coefficients of interest. These fixed-effects estimates compare the pre-and post-reform differentials in the procedure rate between procedures more affected by the reform and other procedures. Specifically, α measures the influence of a full-payment shock on the procedure rate. β measures the pre- and post-reform change in the procedure rate for "always-consolidated" procedures ($p_i^c = 1$) relative to that for "never consolidated" procedures ($p_i^c = 0$). Similarly, γ measures the response of the procedure rate to the reform for an "always-discounted" procedure ($p_i^d = 1$) relative to that for a "never-discounted" procedure ($p_i^d = 0$).

What can be inferred from the signs of α, β, and γ? First, the sign of α is ambiguous in principle, depending on the relative magnitudes of the income and substitution effects. When income effects exceed substitution effects, incentive effects on the procedure rate are negative ($\alpha < 0$). Conversely, when substitution effects exceed income effects, incentive effects on the procedure rate are positive ($\alpha > 0$). $\alpha = 0$ when the full payment shock has neither income nor substitution effects or when income and substitution effects offset each other. Second, because a consolidated procedure incurs costs while receiving no payment, procedures with a higher p_i^c are expected ex ante to be more adversely affected by the reform. Therefore, if the procedure rate of procedures with a higher p_i^c decreases more after the reform (i.e., $\beta < 0$), this would indicate that physicians respond to finan-

cial incentives when prescribing procedures. Finally, because discounting is equivalent to a price decrease, the argument for α applies to γ, and thus the sign of γ is ambiguous. That is, the relative sizes of the income and substitution effects determine whether the procedure rate of a procedure with a higher p_i^d decreases or increases more after the reform.

Year-quarter fixed effects, T_t, capture the effects of state-wide trends (e.g., demographics of Medicaid FFS patients) on the procedure rate. Alternatively, I controlled for EAPG/year-quarter fixed effects, $\text{EAPG}_i \times T_t$, which account for variables at the EAPG-quarter level (e.g., demographics of Medicaid FFS patients with similar conditions).

For a given procedure, as the number of observations increases, the computed propensity for consolidation approximates the actual propensity. Therefore, for procedures that are occasionally performed, the computed propensity for consolidation may be inaccurate in measuring the actual propensity. To address this measurement error issue, I constructed a categorical measure of the propensity for consolidation (p_i^c). Specifically, I grouped the procedures into the following three groups. "No propensity for consolidation" (Group 0) consists of procedures that are expected ex ante unlikely to be consolidated ($p_i^c = 0$). "Low propensity for consolidation" (Group 1) consists of procedures moderately likely to be consolidated. "High propensity for consolidation" (Group 2) consists of procedures most likely to be consolidated. Here, a high (or low) propensity for consolidation is defined as being above (or below) the median of p_i^c, 0.33, conditional on $p_i^c > 0$. If consolidation causes the procedure rate to decrease, the effects should be more pronounced in procedures with a greater propensity for consolidation. To examine whether the estimate on p_i^c increases monotonically in magnitude as the level of p_i^c increases, Equation (4) can be modified as follows:

$$\begin{aligned}\text{Procedure rate}_{it} = &\Big[\alpha \cdot \ln P_i + \sum_{j=1}^{2} \beta_j \cdot \mathbb{1}(i \in \text{Group } j) + \gamma \cdot p_i^d\Big] \times \text{reform}_t \\ &+ I_i + T_t + \epsilon_{it}.\end{aligned} \tag{5}$$

where $\mathbb{1}(i \in \text{Group } j)$ is an indicator of whether procedure i is in Group j, $j = 0, 1, 2$.[15] I omit Group 0 in Equation (5) so that β_j gauges the reform effects on Group j relative to Group 0. If the relationship between consolidation and the procedure rate is causal, then β_1 and β_2 are expected to be negative, with β_2 being greater in magnitude.

[15] $\mathbb{1}(\cdot)$ is the indicator function.

5.2 Event Study

To check for pre-existing trends that drive the baseline estimate and to examine how the baseline coefficient on p_i^c (β in Equation 4) evolves in the post-reform period, I estimate the following leads and lags regression:

$$\begin{aligned}\text{Procedure rate}_{it} =&\Big[\alpha \cdot \ln P_i + \sum_{k=2015\text{ Q1}}^{2018\text{ Q4}} \beta_k \cdot p_i^c \cdot \mathbb{1}(t=k) + \gamma \cdot p_i^d\Big] \times \text{reform}_t \\ &+ I_i + T_t + \epsilon_{it}.\end{aligned} \tag{6}$$

In Equation (6), I omit t = 2017 Q2, the quarter immediately preceding reform. Consequently, β_k was estimated relative to that quarter. For the baseline estimate (β in Equation 4) to be valid, estimates of β_k's in the pre-reform period should not exhibit a trend that appears to be correlated with the timing of the reform. Given that the baseline estimate is valid, estimates of β_k's in the post-reform period show how the effect of the reform evolves over time.

6 Results

6.1 Baseline Estimates

Table 3 shows coefficients from estimating various specifications. Standard errors are clustered at the EAPG level and reported in parentheses.[16] All specifications control for procedure fixed effects and year-quarter fixed effects except column (5), which controls for EAPG/year-quarter fixed effects instead of year-quarter- fixed effects.

Columns (1)–(3) separately include each policy variable, that is, full-payment shock ($\Delta \ln P_i$), propensity for consolidation (p_i^c), and propensity for discount (p_i^d), as interacted with an indicator for the reform. Column (4) estimates Equation (4) of Section 5, including all three policy variables. Comparing columns (1) through (4), column (4) preserves the pattern found in columns (1) to (3), suggesting that these policy variables affect the outcome fairly independently. While the estimates on the full payment shock and propensity for discount are not statistically significant, the estimate on the propensity for consolidation is negative and significantly significant. The negative significant effect

[16] For each coefficient, the status of whether it is statistically significant at the 5% level preserves when standard errors are clustered at the pre-reform group level.

on the propensity for consolidation indicates that the procedure rate for procedures expected ex ante to be more likely to be consolidated is reduced more due to the reform. Based on the estimates in column (4), the reform reduces "always-consolidated" procedures ($p_i^c = 1$) by 0.722 relative to "never-consolidated" procedures ($p_i^c = 0$), a 49.38% decrease compared to the pre-reform mean of the procedure rate, 1.462. As consolidated procedures incur costs but receive no payment, this finding is consistent with the notion that physicians consider financial incentives when prescribing procedures and points to an important role of payment schemes in physicians' treatment decisions. Contrarily, the null effects on the full-payment shock and propensity for discount suggest that they do not lead to demand inducement or procedure substitution.

Column (5) controls for EAPG/year-quarter fixed effects, instead of year-quarter fixed effects. The estimates in column (5) are qualitatively similar to those in column (4), except for the coefficient on the full-payment shock, which flips the sign from negative to positive but is still statistically insignificant. This suggests that the reform effects are not driven by variables at the EAPG/year-quarter level (e.g., demographics of Medicaid FFS patients with similar conditions).

Column (6) estimates the alternative specification (Equation 5 in Section 5). Instead of including p_i^c, column (6) includes two dummy variables each for a procedure group (as interacted with the indicator for the reform), "low p_i^c" (Group 1) and "high p_i^c" (Group 2), using procedures with $p_i^c = 0$ (Group 0) as the base group. Table 4 shows the number of unique procedures and value or range of p_i^c in each group. While the coefficient on "low $p_i^c \times$ reform" is -0.0197 and is significantly insignificant, the coefficient on "high $p_i^c \times$ reform" is -0.433 and is significantly significant. Thus, procedures with a higher level of p_i^c were more responsive to the reform and decreased after the reform. This supports the causal negative significant effect on p_i^c in column (4); that is, the consolidation provision under the new system reduces the procedure rate after the reform. I hereafter refer to column (4) estimates as the "baseline estimates."

An alternative explanation for these findings is that they are due to the underreporting of consolidated procedures. As consolidated procedures receive no payment under the new system, providers may have less incentive to report these procedures for reimbursement purposes, reducing the consolidated procedures observed in the discharge data after the reform. However, an analysis in Appendix A for ancillary procedures shows that ancillary procedures receiving zero separate payments (i.e., packaging) do not respond to the reform compared to other procedures. (If anything, the procedure rate of packaged

ancillary procedures increases after the reform compared to non-packaged ancillary procedures.) This result ensures that the baseline estimates are not due to underreporting because if providers underreported separately unpaid procedures, the observed procedure rate of packaged ancillary procedures would also decrease. Meanwhile, a packaged ancillary procedure, although not separately paid, is paid through an increase in the payment for its associated significant procedure or medical visit by its expected payment. However, there is no such provision for a consolidated significant procedure, which is unpaid. As such, providing a packaged ancillary procedure is not expected to affect providers adversely, but providing a consolidated significant procedure is. Together, these findings are more in line with the role of financial incentives in care provision than with underreporting.

To visually inspect the relationship between the pre- and post-reform changes in the procedure rate and the propensity for consolidation (p_i^c), I first obtained residuals from regressing the procedure rate on all the independent variables in Equation (4) in Section 5, except $p_i^c \times$reform. Here, I refer to these residuals as the "adjusted procedure rate." Then, I calculate the pre- and post-reform changes in the adjusted procedure rate for each procedure. Figure 4 shows the median of the change at each value of p_i^c. Procedures with a low propensity for consolidation (i.e., p_i^c close to zero) do not appear responsive to the reform as their changes primarily cluster around zero. However, the reform seems to reduce procedures with a high propensity (i.e., p_i^c close to one), as their changes are mostly below zero. For procedures with propensities in between, the changes generally center around zero. As the fitted regression line with a slope of -337.06 ($p = 0.002$) illustrates, the relationship was negative overall.

6.2 Event Study Estimates

In this section, I conduct an event study to examine whether there is a pre-trend that drives the baseline estimate. Figure 5 shows the leads and lags estimates from estimating Equation (6) in Section 5 for each year-quarter during the study period, with standard errors clustered at the EAPG level. None of the pre-reform period coefficients are statistically different from zero compared to the coefficient in the last quarter before the reform (2017 Q2), which is anchored at zero. There appears to be no pre-existing trend that is correlated with the timing of the reform, suggesting that the propensity for consolidation (p_i^c) is exogenous, given other covariates. An F-test with the null hypothesis that all pre-reform betas are jointly zero is not statistically significant ($p = 0.1298$). The procedure

rate responds to the reform immediately after the reform, as the coefficient in the effective quarter (2017 Q3) drops below zero and is statistically significant. The effects during the post-reform period were maintained at a similar level around the baseline estimate of −0.722. The event study results ensure that the baseline estimate is driven by the reform and not by unobserved factors.

6.3 Heterogeneous Effects

In this section, I examine the reform's heterogeneous effects across (1) patient groups with different health statuses, (2) ASC groups with different levels of propensities to treat Medicaid FFS patients, and (3) procedure groups with different payment types.

First, in the terminology of principal-agent literature, physicians act as the "agent" on behalf of their patients (Ellis and McGuire 1986). Physicians' care supply decisions respond less strongly to financial incentives when they weigh more value on patients' health benefits (Clemens and Gottlieb 2014). As sick patients are likely to benefit more from care than healthy patients, physicians may respond less to financial incentives for sick patients than for healthier patients. To examine whether this holds in the case of Florida Medicaid's payment reform, I classified patients into two groups based on their health status using the Charlson index, which gauges the level of mortality for a patient with co-morbidities (Charlson et al. 1987).[17] Patients with co-morbidities are sicker than those without co-morbidities. While a zero value of the Charlson index indicates no co-morbidities, a higher positive value indicates a higher chance that co-morbidities will result in death.[18] Figure 6 shows the coefficients of the full-payment shock, propensity for consolidation, and propensity for discount (as interacted with an indicator for the reform) separately for all patients, those with a zero Charlson index and those with a positive Charlson index. We observed that the reform effects are concentrated exclusively on patients with no co-morbidities, whereas the reform does not appear to impact patients with co-morbidities. Thus, consistent with previous literature (e.g., Clemens and Gottlieb 2014), physicians are more responsive to financial incentives when treating healthier patients in this case.

Second, since the reform applies to services for Medicaid FFS patients, we expect that ASCs with higher propensities for treating Medicaid FFS patients will be more affected by

[17] The Charlson index calculation uses diagnosis codes in the discharge data and is implemented using the Stata module "CHARLSON."

[18] The vast majority (97%) of the patients in the discharge data during the study period have a zero Charlson index.

the reform because these ASCs are more financially dependent on Medicaid. To examine this, for each ASC, I computed the propensity for treating Medicaid FFS patients as the share of discharges paid by Medicaid FFS. Next, I define the high (or low) propensities for treating Medicaid FFS patients as being above (or below) the median of the propensities among all 317 ASCs in the analysis dataset. Table 5 lists the number of ASCs with high (or low) propensities besides the range of propensities in each ASC group. Figure 7 shows the coefficients obtained by estimating the baseline specification (Equation 4 in Section 5) for each ASC group, along with the coefficients for all ASCs. For comparison, all estimates were divided by the corresponding group's mean pre-reform procedure rate. Consistent with our expectations, the baseline estimates were exclusively driven by ASCs with higher propensities, whereas the reform had little effect on ASCs with low propensities.

Finally, I examine how the reform impacted procedures in each payment type (i.e., full-payment, consolidated, or discounted procedures). The total volume is split into the sum of volumes by payment type. Subsequently, I estimate the baseline specification (Equation 4 in Section 5) for each payment type (i.e., full-payment, consolidated, and discount procedures). Figure 8 shows the coefficients according to payment type. For each policy variable on the x-axis, the sum of the three point estimates equals the baseline estimate on the policy variable. None of the coefficients on the full-payment shock and the propensity for discount is statistically significant. For the propensity for consolidation (p_i^c), the coefficients of full-payment procedures and consolidated procedures are -0.186 ($p = 0.099$) and -0.524 ($p = 0.032$), respectively. These two coefficients make up almost the entire baseline estimate on the propensity for consolidation (-0.722). Accordingly, consolidated procedures account for the majority (72.58%), and full-payment procedures account for part (25.76%) of the baseline estimate. On the one hand, since "never-consolidated" ($p_i^c = 0$) procedures are rarely consolidated, the coefficient for consolidated procedures indicates that the reform reduced the use of consolidated procedures, with the reduction more pronounced in procedures expected ex ante to be more likely to be consolidated.[19] On the other hand, the coefficient for full-payment procedures indicates that there is limited evidence that the reform shifted full-payment procedures from low-intensive to high-intensive services (i.e., procedures with high propensities for consolidation to those with low propensities for consolidation).

[19] For "never-consolidated" procedures, the average number of consolidated procedures per discharge is 0 in the pre-reform period by definition and 0.006 in the post-reform period. As a comparison, the average is 0.269 for all procedures in the analysis dataset.

6.4 Spillover Effects

Since ASCs typically receive patients with various payers, a reform targeted at one particular payer may spill over to affect patients with other payers. This "spillover effect" may stem from various avenues. For example, if the reform reduces the net revenue for providers, providers may seek to recoup profits from other reform-untargeted payers, for example, by increasing the volume of care if these other payers pay for additional services. Second, the reform may have induced physicians to change their practice patterns for one set of patients. In turn, they may carry that changed practice pattern over to patients with other payers.

To examine whether the Florida Medicaid payment reform has any spillover effect on another reform-untargeted payer, I estimated the baseline specification (Equation 4 in Section 5) using the procedure rate for that untargeted payer as the dependent variable and the same independent variables. Essentially, I relate the care provision of a reform-untargeted payer to the reform-induced financial incentives for Medicaid. Figure 9 depicts the baseline estimates on policy variables (as interacted with an indicator for the reform) separately for Medicaid FFS, private payers, and Medicare FFS. For comparison, procedures common to all three payers (927 in total) were used in the estimations. In addition, all the coefficients are normalized by the corresponding mean of the procedure rate in the pre-reform period. Among all the coefficients for private and Medicare FFS payers, none is statistically significant except for the private payer's coefficient on the propensity for consolidation. This significant coefficient indicates that, for private payers, the level of "always-consolidated" procedures ($p_i^c = 1$) decreases by 6.29% relative to "never-consolidated" procedures ($p_i^c = 0$), which is much smaller in magnitude than its Medicaid FFS counterpart (49.38%).

Thus, there is suggestive evidence that the reform may have affected patients with private payers. One explanation for this finding is that physicians carry their altered practice patterns from Medicaid patients to private payer patients. However, a caveat of this analysis is that, due to data limitations, certain potential determinants of care provision (e.g., procedure-level reimbursement rates) for these other payers are omitted when estimating the specifications. Consequently, the estimates for the reform-untargeted payers could be driven by omitted variables and thereby spurious.

7 Limitations

Ideally, my specifications should include the prices of substitutes or complement for the procedure as they may influence the provision of that procedure. Nonetheless, substitutes or complements are difficult to define for a given procedure and may depend on the patient's condition. Consequently, a caveat of this analysis is that the estimates could be biased if the prices of substitutes or complements are correlated with policy variables. However, the finding that among all payment types, only consolidated procedures are responsive and reduced more for procedures with higher propensities for consolidation provides us with confidence that the only significant baseline estimate, the estimate on the propensity for consolidation, is unlikely to be driven by substitute or complement prices. Otherwise, other payment types (i.e., full-payment and discounted procedures) could also be influenced similarly.

Moreover, while this study finds that care provision responds to reform, it does not identify the source of that response. Figure 10 plots the number of Florida Medicaid FFS and managed care enrollees during the study period.[20] Since the number of FFS enrollees changes smoothly during the transition of the payment system, the effects found immediately after the transition (see Figure 5) were unlikely to be driven by factors on the demand side (i.e., changes in patients' demographics or preferences) but rather by the supply side. One scenario is that ACSs admit more low-cost patients (e.g., patients whose health conditions do not require additional, possibly consolidated procedures) while denying admissions to high-cost patients. Another scenario is that for a given patient's case mix, physicians change their practice styles by undersupplying certain services in response to prospective payments. Still, the reform effects could stem from a combination of the two scenarios. Since different scenarios have drastically different policy implications, it is important to determine which scenario or whether both are at work.[21]

Finally, policymakers should also be cautious about overshooting payment policies, leading to the underprovision of care. However, as the discharge data do not contain and cannot be linked to quality-of-care measures, this study did not examine the re-

[20] Florida Medicaid enrollment data are obtained from https://ahca.myflorida.com/medicaid/finance/data_analytics/enrollment_report/index.shtml.

[21] The baseline estimates are essentially unchanged when, in addition to the baseline specification, I control the number of distinct attending physicians who had treated Medicaid FFS patients with a procedure i at quarter t. Thus, the baseline estimates are not driven by the variation in the number of physicians practicing in ASCs.

form effects on access to care, patients' health outcomes, and the quality of care. More comprehensive data are required to examine these topics, and this remains an important direction for future research.

8 Conclusion

As the federal and state governments are expanding health insurance access through the Affordable Care Act (ACA) Medicaid expansion and exchange marketplace, financing and delivering expanded services cost-efficiently is crucial to maintain sustainable cost growth. The traditional fee-for-service financing model is generally believed to lead to the overprovision of unnecessary services without improving health outcomes. Therefore, it is important to empirically examine whether an alternative financing model can remedy the shortcomings of fee-for-service.

This study contributes to the understanding of how financial incentives affect care provision for Medicaid outpatient services by exploiting a 2017 Florida Medicaid's payment reform that shifted from a fee-for-service to an EAPG-based prospective payment system as a natural experiment. In the empirical specification, I relate the procedure rate to three policy exposure measures (full-payment shock and propensities for consolidation and discount), as interacted with an indicator of the timing of the reform.

I find evidence that EAPG consolidation, which provides no payment for consolidated procedures, has effectively reduced the use of procedures that are expected ex ante to be consolidated more frequently. Since consolidated procedures receive no payment but incur costs, this finding implies that physicians weigh financial costs and benefits when prescribing treatments. However, I did not find evidence that the other two aspects of EAPG have affected care provision. This suggests that either the reform induces no income or substitution effects or that income and substitution effects offset each other. Moreover, the reform effects were concentrated on healthier patients (i.e., patients with no co-morbidities). Conversely, physicians did not seem to change practice patterns for sick patients (i.e., patients with co-morbidities). This is consistent with the notion in previous literature that physicians respond less to financial incentives when they value patients' health gains. Furthermore, the reform effects are driven exclusively by ASCs with above-median propensities for treating Medicaid FFS patients (suggesting that facilities respond more to the incentives when they are more financially dependent on Medicaid) and primarily by consolidated procedures. Finally, there is limited evidence of spillover

effects that the reform also affects untargeted patients with private-payer.

The findings imply that health care providers could respond substantially to financial incentives for Medicaid. Therefore, a Medicaid payment policy has the potential to influence physicians' procedure choices and thereby contain Medicaid expenditure. In particular, providing zero payments for clinically wasteful procedures could curb the use of such procedures. Accordingly, similar Medicaid reforms (e.g., prospective, bundled payments), which have generated a growing interest among states in adoption, may prove effective in promoting cost efficiency.

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A Appendix

In this appendix, I analyze how the 2017 Florida Medicaid payment reform affected ancillary services with no separate payments. The EAPG payment system classifies services into three types: (1) significant procedures, (2) medical visits, and (3) ancillary services.[22] Under the EAPGs, ancillary services refer to ancillary tests and procedures, which may or may not be performed along with a significant procedure or a medical visit during an outpatient episode. An ancillary service may be "packaged" to a significant procedure or medical visit, which means that the ancillary service is included in the EAPG payment for the significant procedure or medical visit instead of being separately paid. For example, anesthesia may be packaged into a total knee arthroplasty, chest X-ray, or pneumonia visit. Based on clinical grounds, the EAPG developer defines a suggested list of ancillary services that are always packaged when an associated significant procedure or medical visit occurs (hereafter referred to as the EAPG-packaged ancillaries). However, this list can be modified by the payer. Table A.1 shows an example of applying the EAPG payment system to a fictitious episode's service items, adapted from the EAPG Definitions Manual.

The packaging does not imply that packaged services receive zero payment. Rather, the expected cost of packaged services is included in the payment for its associated significant procedure or medical visits. For example, if a packaged service costs $10 and is performed on 10% of patients with one of its associated medical visits, then $1 (10% of $10) would be included in the payment for that medical visit. While packaging only applies to inexpensive ancillaries that are routinely performed alongside the significant procedure or medical visit, expansive and rarely-performed ancillaries receive separate payments (e.g., the procedure with a CPT code of 84233 in Table A.1). This is because the packaging of expansive, rarely-performed ancillaries would put providers at financial risk and discourage them from performing these, often valuable, services. For example, a provider would receive only $1 from a packaged test that costs $1,000 but occurs once every 1,000 visits.

A priori, how packaging affects the level of packaged EAPG-packaged ancillaries remains ambiguous. On the one hand, EAPG-packaged ancillaries receive zero payments but require resources, whereas non-EAPG-packaged ancillaries receive separate payments. This may incentivize physicians to substitute non-EAPG-packaged ancillaries

[22] A medical visit refers to an outpatient episode during which the patient receives treatment, with no significant procedures performed.

with EAPG-packaged ancillaries, increasing the former relative to the latter. On the other hand, a definite list of EAPG-packaged ancillaries could prevent providers from performing other ancillaries, given that payments for their associated significant procedures or medical visits sufficiently account for packaged ancillaries' costs.

To examine how the provision of EAPG-packaged ancillaries responds to the reform, I estimate a difference-in-differences (DiD) model that relates the service rate (defined as the number of services per 1,000 discharges) for ancillary service i at year-quarter t in the following form:

$$\text{Service rate}_{it} = \alpha \cdot \text{package}_i \times \text{reform}_t + I_i + T_t + \epsilon_{it}. \tag{A1}$$

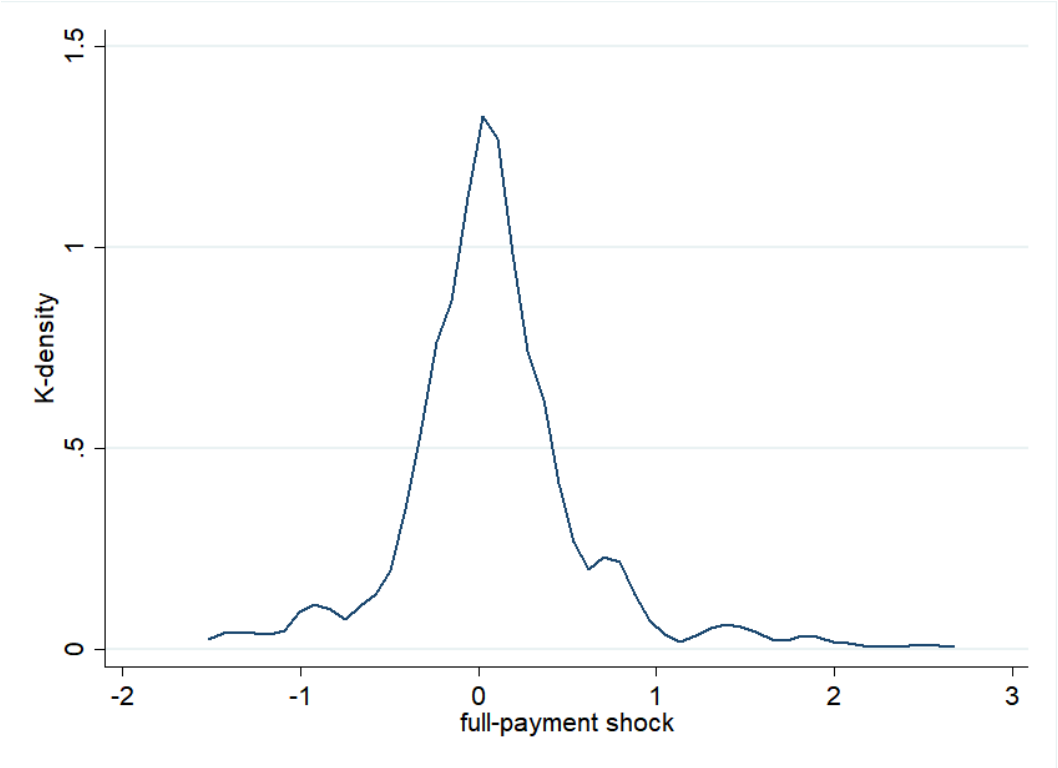
where package_i is an indicator of the EAPG-packaged ancillaries, that is, 1 if i is always packaged under the EAPGs and 0 otherwise. α is the coefficient of interest and measures the effect of packaging on the service rate. The other notations and variables remain the same as those in the main text.

For this analysis, I constructed an analysis dataset with the unit of observation at the service and year-quarter level. Table A.2 presents the summary statistics for this dataset. An ancillary service was selected if it was performed for Medicaid FFS patients during the study period (2015 Q1–2018 Q4). Using this criterion, 74 unique ancillary services categorized into 26 EAPGs were selected. Among these, 39 were EAPG-packaged and the rest were non-EAPG-packaged. With 16 year-quarters, the total number of observations was 1,186. On average, 0.41 services per 1,000 discharges were performed per procedure and year-quarter combination.

Table A.3 reports the estimate of Equation (A1), which is not statistically significant with standard errors clustered at the EAPG level. If anything, the packaging increases the service rate by 0.0249 (or 4.2%, relative to the pre-reform mean of the service rate, 0.5922), which is also economically insignificant. In conclusion, I found no evidence that the reform significantly impacts the provision of the EAPG-packaged ancillaries.

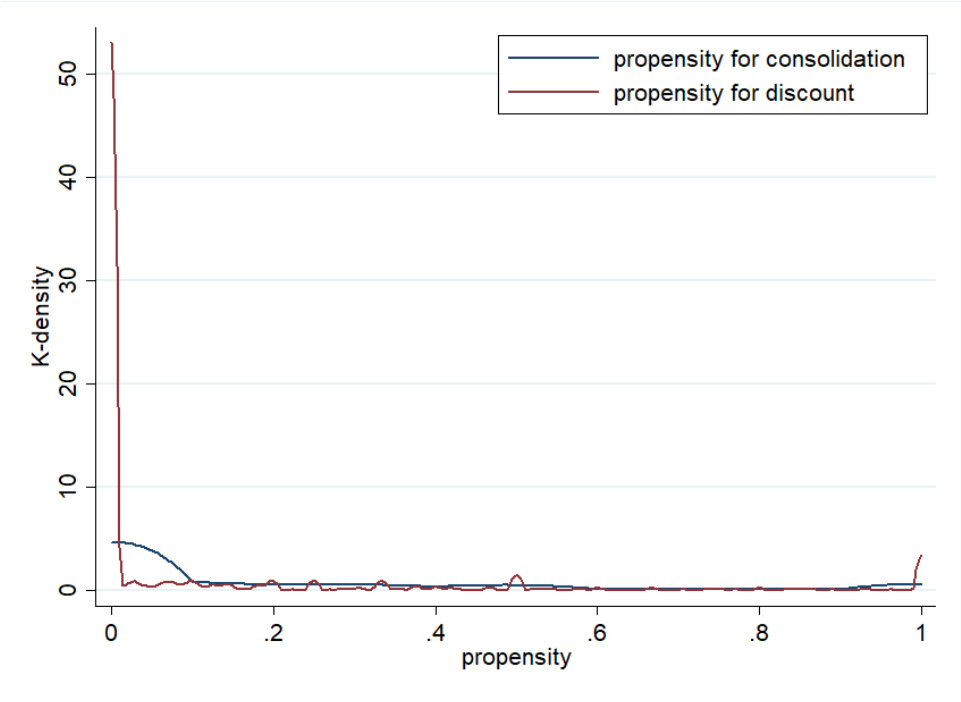
Figures and Tables

Figure 1: Distribution of the full-payment shock



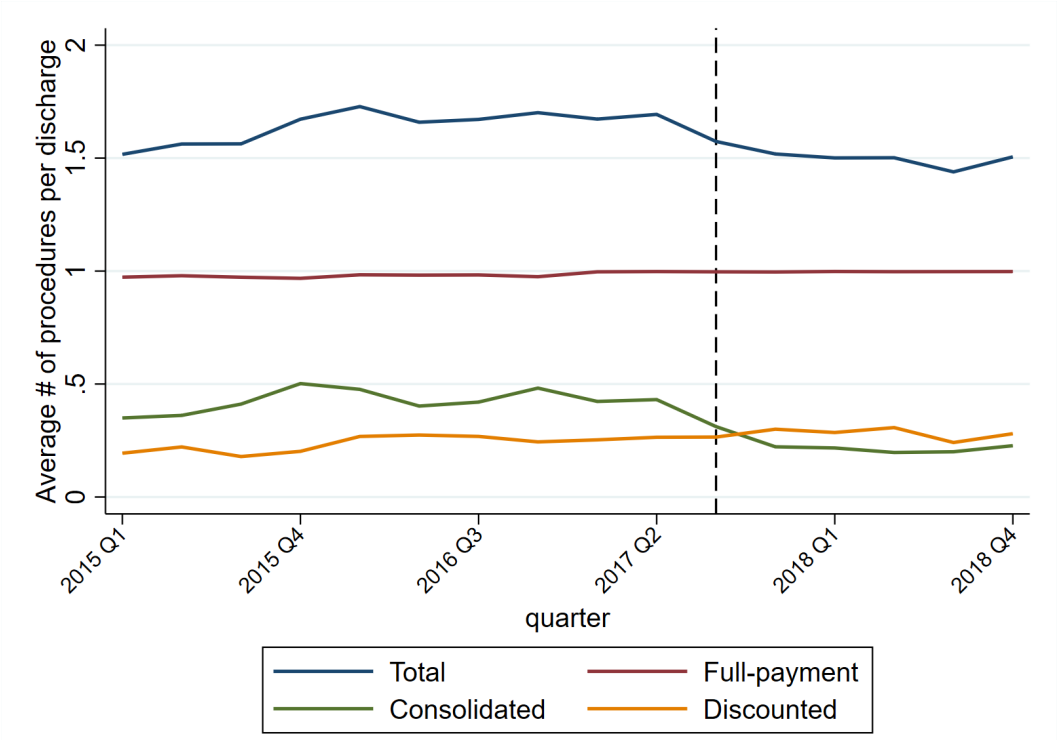
Notes: This figure shows the distribution, estimated by the kernel density (K-density), of the full-payment shock ($\Delta \ln P_i$), which is calculated as the log difference between the full payment in the first year of the post-reform period and the pre-reform payment.

Figure 2: Distributions of propensities of consolidation and discount



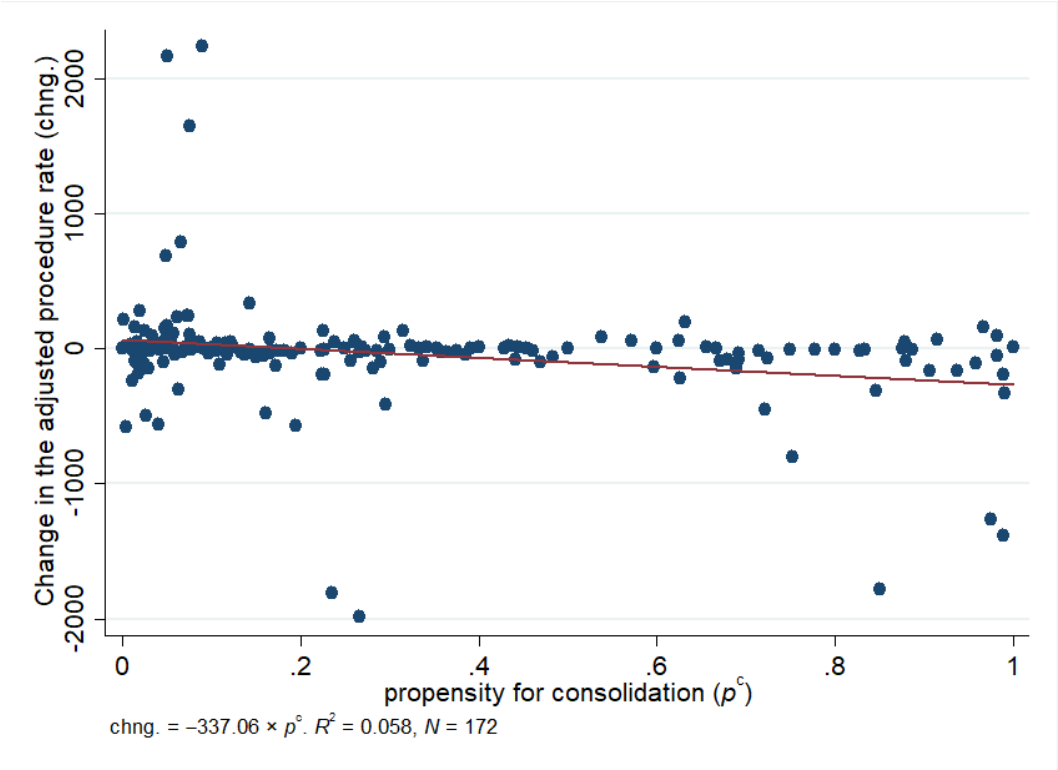
Notes: This figure shows the distributions, estimated by the kernel density (K-density), of the propensities of consolidation and discount. With pre-reform data, the propensity for consolidation of a procedure was computed as the total number of procedures performed that would be consolidated under the new system divided by the total number of procedures performed. The propensity for discount was computed analogously.

Figure 3: Average number of significant procedures per discharge



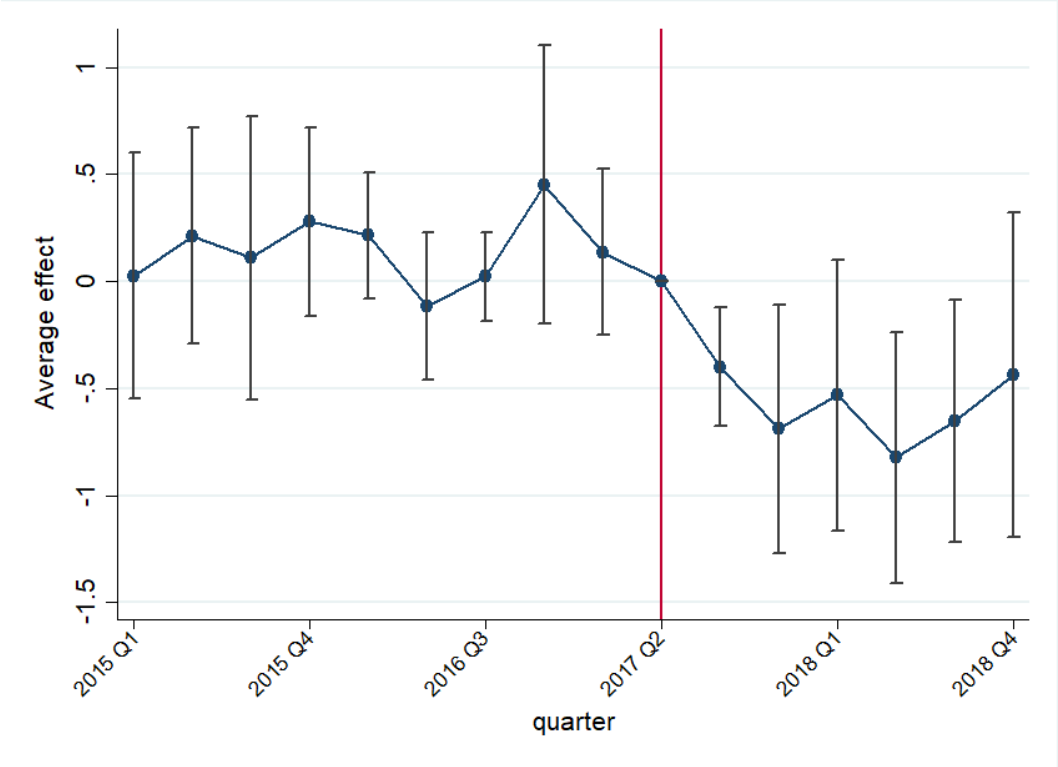
Notes: The vertical dashed line indicates the effective quarter of 2017 Florida Medicaid's payment reform in 2017 Q3. Under the new system based on EAPGs, a full-payment procedure receives the full payment (base rate × EAPG weight), a consolidated procedure receives no payment, and a discounted procedure receives 50% of the full payment.

Figure 4: Relationship between the pre- and post-reform change in the adjusted procedure rate and the propensity of consolidation



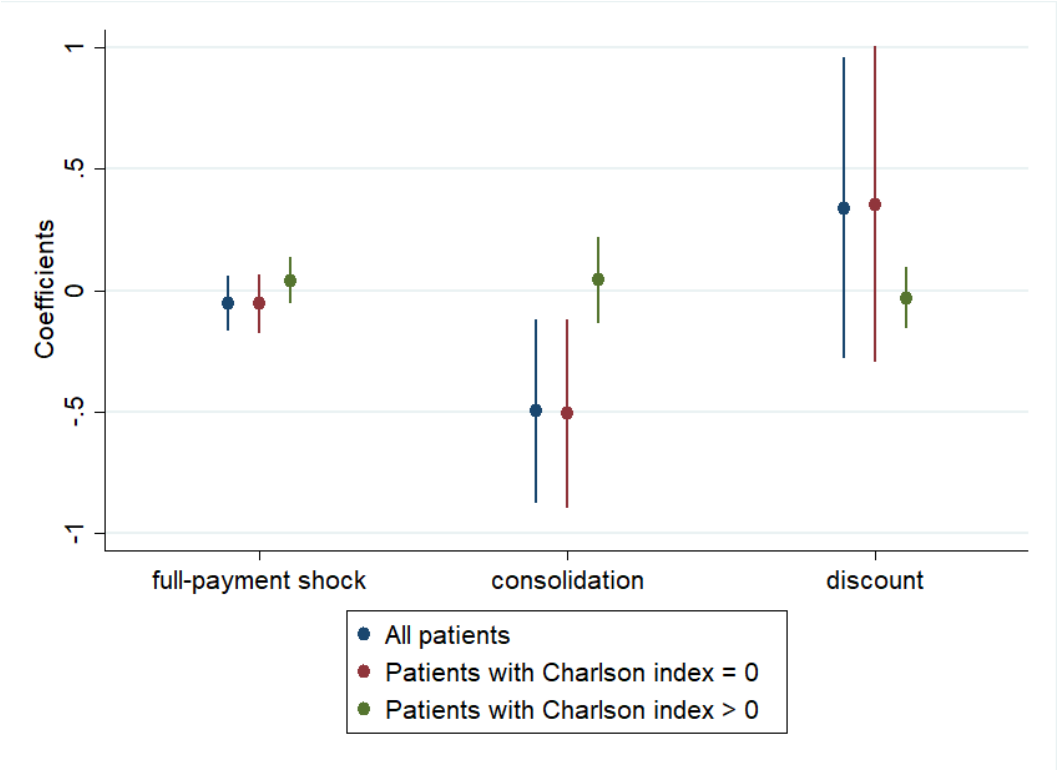
Notes:The above figure plots the median of the pre- and post-reform changes in the adjusted procedure rate at each value of the propensity of consolidation. Here, the adjusted procedure rate refers to the residuals from regressing the procedure rate on the full-payment shock and the propensity of discount, as interacted with an indicator for Florida Medicaid's payment reform, as well as procedure and year-quarter fixed effects.

Figure 5: Event study estimates



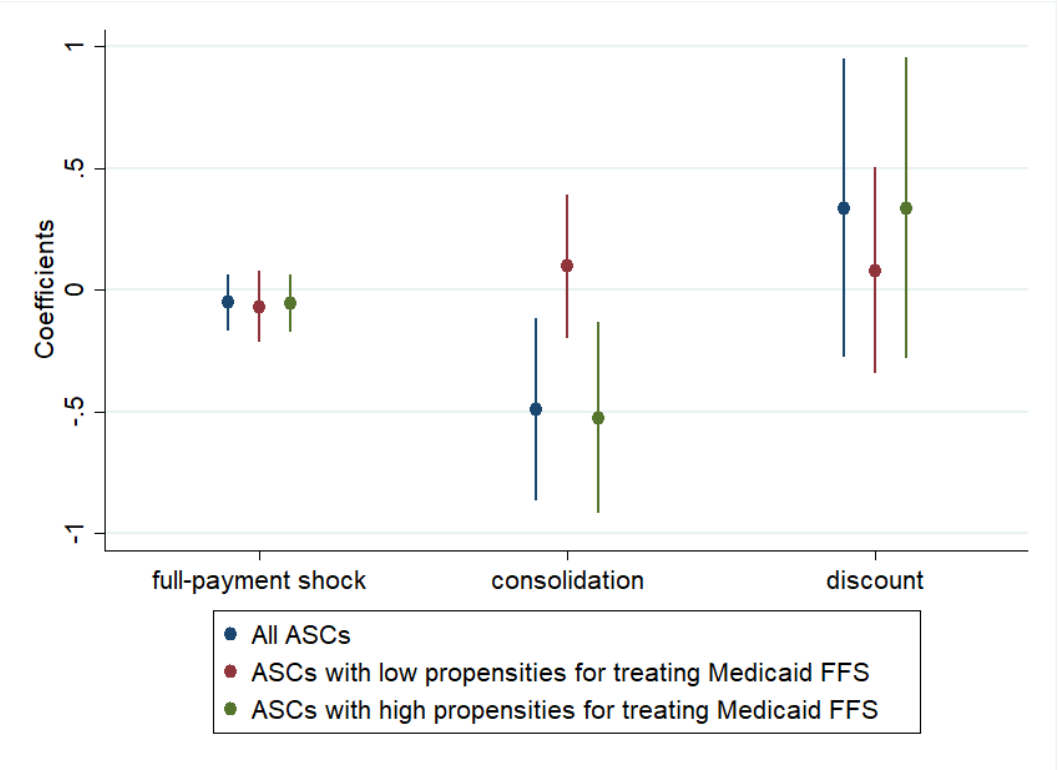
Notes: This figure shows estimates from a lead and lag regression, which regresses the procedure rate on the propensity for consolidation, as interacted with the indicators for each quarter. Dots show point estimates; vertical bars, 95% confidence intervals using standard errors clustered on the EAPG level. The controls include the full-payment shock and the propensity for discount, as interacted with an indicator for Florida Medicaid's payment reform, as well as procedure and year-quarter fixed effects. The solid vertical line indicates the effective quarter of reform.

Figure 6: Effect of the reform on care provision by health statuses



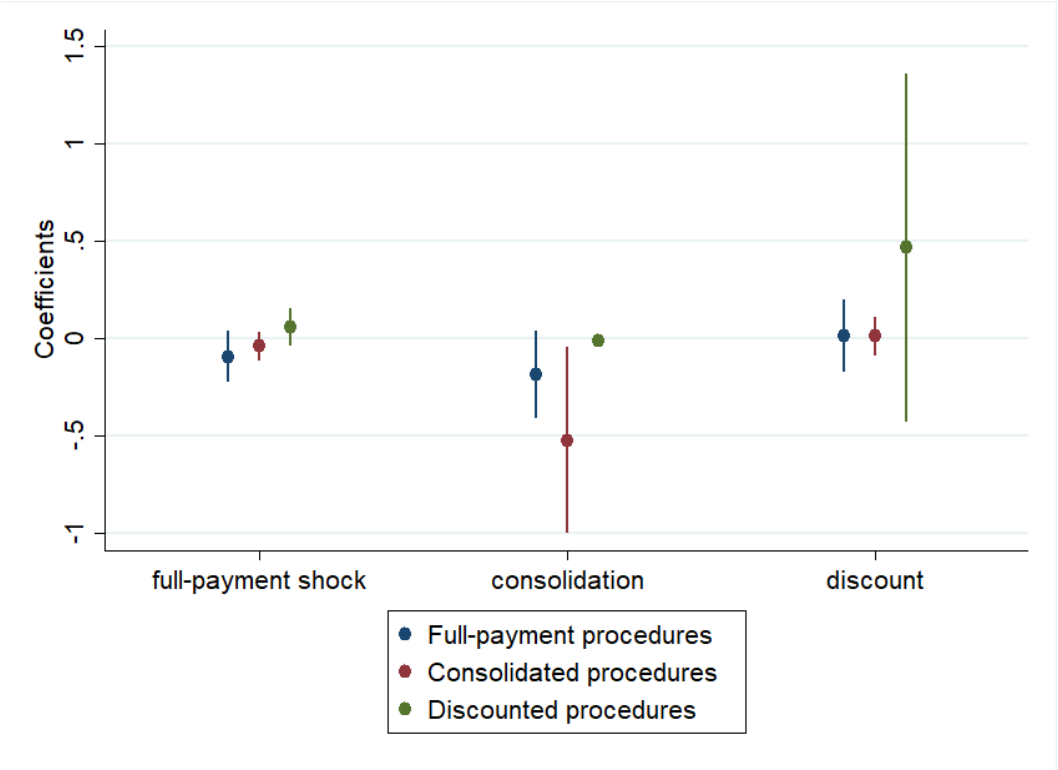
Notes: For each patient group indicated in the legend, this figure shows estimates from regressing the procedure rate for the patient group on the three policy variables. As indicated on the x-axis, the three policy variables consist of full payment and the propensities of consolidation and discount, as interacted with an indicator for Florida Medicaid's payment reform. All the models include procedure and year-quarter fixed effects. Dots show point estimates; vertical bars, 95% confidence intervals with standard errors clustered on the EAPG level.

Figure 7: Effect of the reform on care provision by ASC groups



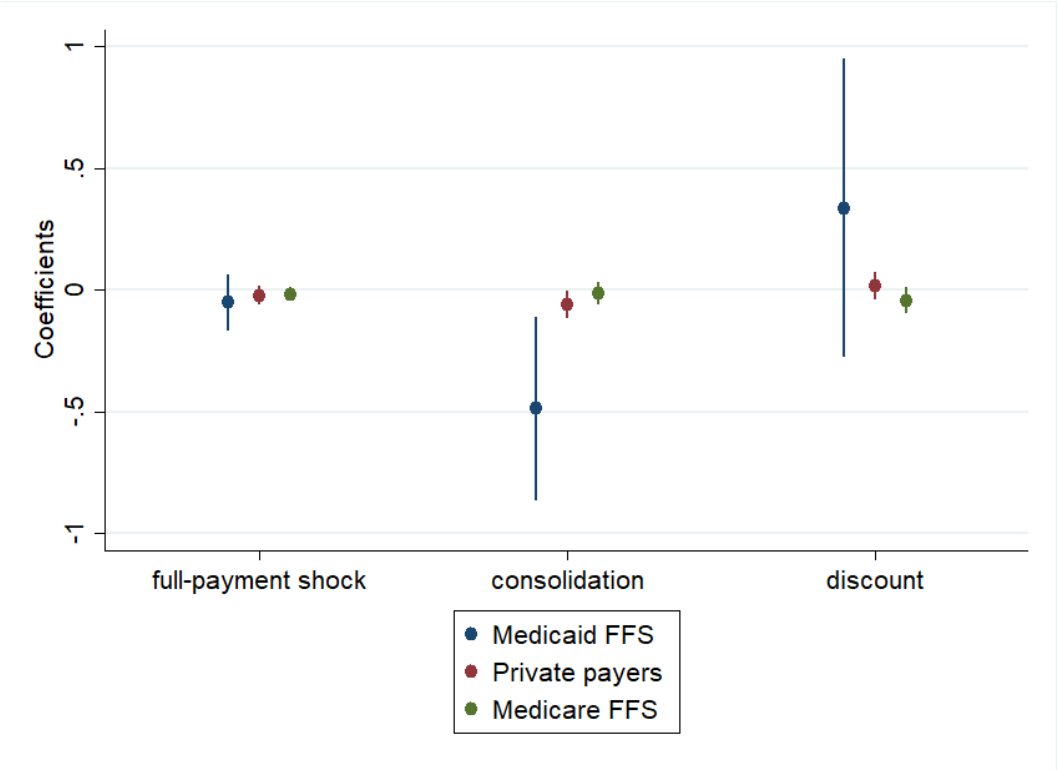
Notes: In the legend, "ASCs with low propensities for treating Medicaid FFS" refers to ASCs with below-median baseline propensity for treating Medicaid FFS patients, and "ASCs with low propensities for treating Medicaid FFS" refers to other ASCs. For each ACS group indicated in the legend, this figure shows estimates from regressing the procedure rate for the ASC group on the three policy variables. As indicated on the x-axis, the three policy variables consist of the full-payment shock and the propensities of consolidation and discount, as interacted with an indicator for Florida Medicaid's payment reform. All the models include procedure and year-quarter fixed effects. Dots show point estimates; vertical bars, 95% confidence intervals with standard errors clustered on the EAPG level.

Figure 8: Effect of the reform on care provision by payment types



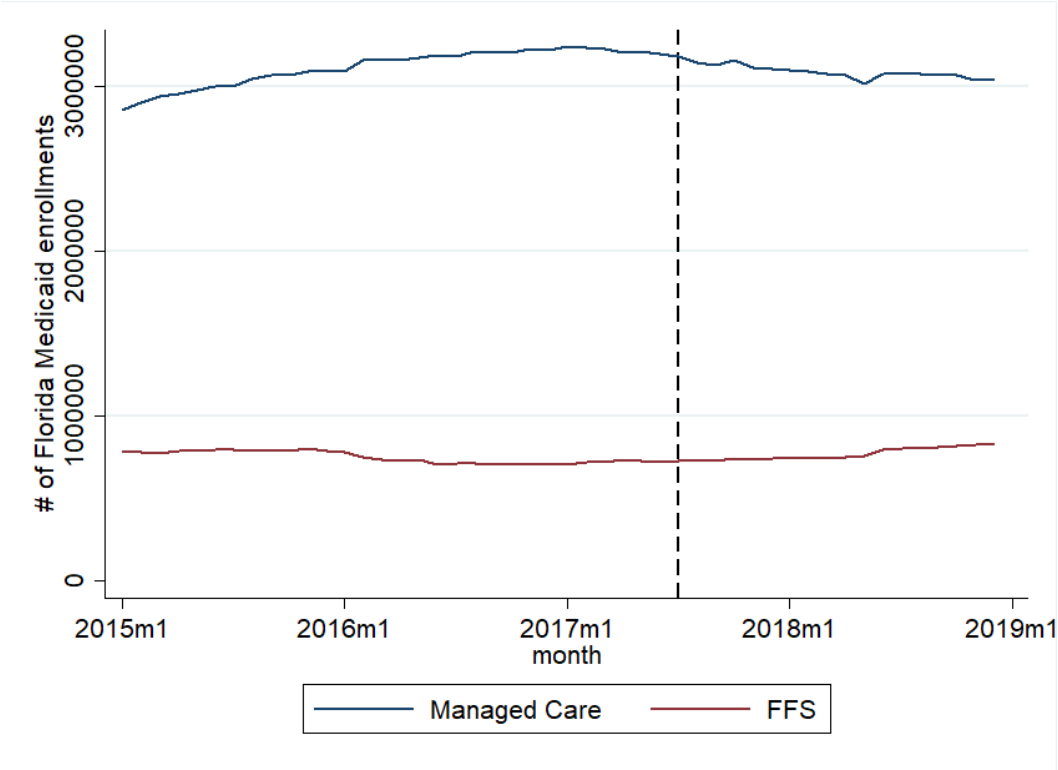
Notes: For each payment type of procedures indicated in the legend, this figure shows estimates from regressing the procedure rate for that payment type on the three policy variables. As indicated on the x-axis, the three policy variables consist of the full-payment shock and the propensities of consolidation and discount, as interacted with an indicator for Florida Medicaid's payment reform. All the models include procedure and year-quarter fixed effects. Dots show point estimates; vertical bars, 95% confidence intervals with standard errors clustered on the EAPG level.

Figure 9: Effect of the reform on care provision by payers



Notes: For each payer indicated in the legend, this figure shows estimates from regressing the procedure rate for that payer on the three policy variables. As indicated on the x-axis, the three policy variables consist of the full-payment shock and the propensities of consolidation and discount, as interacted with an indicator for Florida Medicaid's payment reform. All the models include procedure and year-quarter fixed effects. Dots show point estimates; vertical bars, 95% confidence intervals with standard errors clustered on the EAPG level.

Figure 10: Number of Florida Medicaid enrollees



Notes: YYYYmX stands for month X of year YYYY. The vertical dash line indicates the effective month of Florida Medicaid's payment reform, July 2017.

Table 1: An application of the EAPG payment system to an episode's service items

CPT code	EAPG assigned	Payment element	Payment type	Consolidation/Discount factor
31545	063 Level II Endoscopy of Upper Air Way	Significant Procedure	Full Payment	100%
31525	062 Level I Endoscopy of Upper Air Way	Related Procedure	Consolidated	0%
41821	252 Level I Facial and ENT Procedures	Unrelated Procedure	Discounted	50%

Table 2: Summary statistics

	mean	min	max
# of procedures per 1,000 discharges	1.45	0	218.11
Propensity for consolidation	0.19	0	1
Propensity for discount	0.11	0	1
Pre-reform payment	880.90	100	3,000
Post-reform full payment	962.80	119.77	13,137.02
# of discharges	4,009.19	3,091	5,079
EAPG weight	3.47	0.43	47.02
# of unique procedures	965		
# of EAPGs	101		
# of year-quarters	16		
Observations	15,440		

Notes: This table shows the summary statistics of the analysis sample for the study period (2015 Q1–2018 Q4) in terms of the mean, maximum, and minimum. The unit of observation is at the procedure and year-quarter level. The propensities for consolidation and discount are described in the text.

Table 3: Effect of Florida Medicaid's payment reform on the procedure rate

	Procedure rate (# of procedures per 1,000 discharges)					
	(1)	(2)	(3)	(4)	(5)	(6)
Full-payment shock × reform	-0.115			-0.0781	0.0519	-0.0817
	(0.0732)			(0.0690)	(0.118)	(0.0842)
Propensity for consolidation × reform		-0.791***		-0.722***	-0.823**	
		(0.233)		(0.227)	(0.298)	
Propensity for discount × reform			0.630	0.491	0.602	0.529
			(0.366)	(0.372)	(0.458)	(0.376)
Low propensity for consolidation × reform						-0.0197
						(0.251)
High propensity for consolidation × reform						-0.433**
						(0.171)
Baseline mean	1.462	1.462	1.462	1.462	1.462	1.462
EAPG-quarter fixed effects	No	No	No	No	Yes	No
Observations	15,440	15,440	15,440	15,440	15,440	15,440

Notes: This table reports estimates from various specifications in which the procedure rate, i.e., # of procedures per 1,000 discharges, is the dependent variable. The data are a balanced panel with the unit of observation at the procedure/quarter level from 2015 to 2018. "Reform" is an indicator for the timing of Florida Medicaid's payment reform. The "full-payment shock," "propensity for consolidation," and "propensity for discount" are defined in the text, capturing three aspects of the new payment system. With procedures unlikely to be consolidated as the base group, "low propensity for consolidation" refer to procedures that are more modestly likely to be consolidated. "High propensity for consolidation" are procedures most likely to be consolidated. "Baseline mean" presents the pre-reform average procedure rate. All columns include procedure and year-quarter fixed effects, except for column (5), which includes procedure and EAPG/year-quarter fixed effects. Standard errors are clustered at the EAPG level and reported in parentheses. *$p < 0.1$ ** $p < 0.05$ *** $p < 0.01$.

Table 4: Groups of procedures based on the propensity for consolidation

	# of unique procedures	value/range of propensity for consolidation
No propensity for consolidation	542	0
Low propensity for consolidation	225	(0, 0.33]
High propensity for consolidation	198	(0.33, 1]

Table 5: ASC groups based on the propensity for treating Medicaid FFS patients

	# of ASCs	range of the propensity
ASCs with low propensities	159	(0, 0.0025]
ASCs with high propensities	158	(0.0025, 1]

Table A.1: An application of the EAPG payment system to an episode's service items

CPT Code	EAPG assigned	Payment element	Payment type	Payment discount
31545	063 Level II Endoscopy of Upper Air Way	Significant Procedure	Full Payment	100%
31525	062 Level I Endoscopy of Upper Air Way	Related Procedure	Consolidated	0%
41821	252 Level I Facial and ENT Procedures	Unrelated Procedure	Discounted	50%
88331	390 Level I Pathology	Routine Ancillary	Packaged	0%
82435	402 Basic Chemistry Tests	Routine Ancillary	Packaged	0%
93000	413 Cardiogram	Routine Ancillary	Packaged	0%
322	380 Anesthesia	Routine Ancillary	Packaged	0%
84233	399 Level II Endocrinology Tests	Non Routine Ancillary	Full Payment	100%

Table A.2: Summary statistics

	mean	min	max
# of services per 1,000 discharges	0.41	0	24.71
# of unique ancillaries	74		
# of unique EAPG-packaged ancillaries	39		
# of unique non-EAPG-packaged ancillaries	35		
# of EAPGs	26		
# of year-quarters	16		
Observations	1,186		

Notes: This table shows the summary statistics of the analysis dataset for the study period (2015 Q1–2018 Q4) in terms of the mean, maximum, and minimum. The unit of observation is at the ancillary service and year-quarter level.

Table A.3: Effect of the reform on the ancillary service rate

	Service rate (# of services per 1,000 discharges)
Package × reform	0.0249
	(0.280)
Baseline mean	0.5922

Notes: This table reports estimates from a difference-in-differences regression in which the ancillary service rate (of services per 1,000 discharges) is the dependent variable. Standard errors are clustered at the EAPG level and are shown in parentheses. Data are balanced panel with the unit of observation at the service and year-quarter level from 2015 Q1 to 2018 Q4. "Package" is an indicator of the EAPG-packaged ancillaries. "Reform" is an indicator for the timing of the 2017 Florida Medicaid's payment reform. The model includes service and year-quarter fixed effects. "Baseline mean" presents the pre-reform average service rate.