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Administrative Pricing, Incentive Alignment, and Medical Market Competition

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A large share of US health care dollars flows through government insurance programs. Medicare, in particular, is a key payer for many firms—making its administratively set prices influential within the sector. We study a large overhaul to its fee schedule for ambulatory surgery centers (ASCs), which directly compete with hospitals and commonly include ownership stakes by physicians. ASCs ultimately experienced negative price shocks due to the Medicare policy change, which we use to investigate changes in service productivity and ambulatory procedure market competition. We find output reductions when ASCs and physicians have close incentive alignment; however, our most compelling findings pertain to ASC entry deterrence. Subsequent analyses suggest that shielding hospitals from greater competition likely prevented losses of 10-20% of their outpatient cases and weakened hospitals' incentives to shift toward more efficient care delivery.

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I. Introduction

The US health care system has long been noteworthy for its claim on a large share of the nation's economic resources as well as its mixed economy structure. Nearly half of the country's more than three trillion dollars in annual health care spending flows through public channels—much of it via the Medicare and Medicaid programs.[1] As these public insurers continue to grow in size, their potential influence on the health care sector increases accordingly.

Medicare, in particular, is a significant source of revenue for much of the sector's firms and can therefore shape health care markets in ways that affect Medicare and non-Medicare consumers alike. Importantly, traditional (i.e., fee-for-service) Medicare has and continues to rely primarily on a government set fee schedule for services rendered by private providers. Ostensibly, this gives the public payer some level of control over health care spending outlays and therefore benefits taxpayers; however, administrative pricing can also be vulnerable to politically driven changes (e.g., Cooper *et al.* 2017), regulatory capture (e.g., Chan and Dickstein 2018), and arbitrary rulemaking. Suboptimal decision-making, in turn, can have a variety of downstream consequences for Medicare beneficiaries, non-Medicare patients, and ultimately the country's fiscal trajectory. For these reasons, it is of economic and policy importance to understand how evolutions in Medicare's reimbursement structure impact health care delivery.

We study such a setting within ambulatory surgical markets, which experienced a Congressionally legislated overhaul of its Medicare fee schedule. A distinguishing feature of ambulatory surgery markets is their reliance on two types of rival firms. Specifically, outpatient medical procedures, where patients are typically discharged the same day as

[1] A brief overview of recent US health care spending breakdowns from the Center for Medicare and Medicaid Services (CMS) is available here: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/downloads/highlights.pdf.

treatment, may be performed in either a hospital outpatient department (HOPD) or a freestanding ambulatory surgery center (ASC). HOPDs represent one business line belonging to the much broader and multiproduct hospitals, whereas ASCs are far more specialized in terms of their scope of services and care delivery capacity. Another unique feature of ASCs is that they often include direct ownership stakes by individual physicians and groups—something much less common among full service hospitals.[2] There is some existing evidence that the choice of procedure setting is linked to physician financial interests and case profitability (David and Neuman 2011; Plotzke and Courtemanche 2011), and ASCs have been championed as the more efficient care setting and thus beneficial to health care consumers (Munnich and Parente 2018; Munnich and Parente 2014; Weber, 2014; Hair, Hussey, and Wynn 2012; Paquette et al. 2008; Grisel et al. 2009)—albeit for a narrower set of procedures than what hospitals supply to the market. Relatedly, other work demonstrates that increased exposure to ASCs is associated with lower outpatient volume and profit margins for hospitals (Carey, Burgess, and Young 2011; Courtemanche and Plotzke 2010; Bian and Morrisey 2007).

Hospitals unsurprisingly lament the rise of ASCs, which now number more than 5,000 across the US, and tend to encourage regulatory efforts that disadvantage what they see as an unfair competitor for some of their most financially valuable cases.[3] A recent example of such a policy intervention occurred at the federal level in the late 2000s, which represented one of the largest changes to ASC Medicare incentives in its previous 30-year history. In 2008, Medicare began phasing in a new facility fee schedule exclusively for

[2] It is estimated that over 90 percent of ASCs are subject to some form of physician ownership (Dyrda 2017).

[3] Hospitals, for example, will often argue that ASCs restrict their services to those that are highly profitable, while hospitals must offer profitable and unprofitable (but socially beneficial) care—with the former cross-subsidizing the latter as a necessary means for financial solvency (Casalino, Devers, Brewster 2003; Vogt and Romley 2009). The absolute number of ASCs is from the CMS Provider of Services files, which captures all Medicare-certified ASC facilities in the US for a given year.

ASCs, which largely tilted payments in favor of HOPDs. Going forward, all outpatient procedures performed within ASCs would be arbitrarily capped at below 60% of prevailing HOPD rates for the same service. As a direct consequence of this mandated ceiling, Medicare reduced facility payments for some key ASC services, while leaving HOPD reimbursement trends undisturbed.

Absent any supply-side behavioral responses, the policy could operate as a blunt tool to lower Medicare spending and hence taxpayer financial obligations. However, as discussed in Section 2B, there are a variety of margins on which providers and markets could adjust, with mixed welfare implications. In fact, how these ASC reimbursement changes affected outpatient procedure productivity, Medicare spending, and prevailing competition is largely unknown and requires empirical investigation.

We subsequently exploit this plausibly exogenous policy change to examine the impact of a negative Medicare price shock on the supply of associated services and the competitive landscape for ambulatory procedural care. We do so by leveraging extensive and detailed administrative data sets from Florida, which include the universe of outpatient surgery market activity from 2005-2013. Our empirical strategies rely on specific features of the Medicare policy change coupled with pre-existing market structure characteristics. We then carry out a variety of difference-in-differences analyses that utilize pre-policy exposure to and reliance on ASC-based care as our key source of variation for county-level, firm-level, and individual provider-level estimation. These empirical exercises ultimately allow us to better understand the role of financial incentives in a medical market where two distinct care settings compete for the same services, with physicians working in both settings but having financial interests in only one.

Overall, we find that counties more reliant on ASC settings experience limited changes in service flows as a consequence of the policy; however, this leads to substantive

falls in aggregate Medicare spending for ambulatory procedures in these same areas. At the individual provider level, spinal injection productivity is 22% lower for those exposed to the negative price shock, which is also a service where facility-to-provider incentive alignment appears close to complete. Our most important results relate to market entry effects. We show declines in ASC entry with the introduction of the less favorable Medicare fee schedule that never fully recovers. We subsequently quantify, at least in part, the benefit of policy-induced ASC entry deterrence has for incumbent hospitals. Specifically, descriptive and causal estimation both imply that preventing a hospital from facing a new ASC competitor spares them a loss of 10-20% of vulnerable cases, on average, over the short- to medium-run. Our evidence further suggests that ASC competition helps drive hospitals toward more efficient care delivery within their own settings. This constellation of findings underscores the influence the Medicare program has within US health care markets, and consequently, why policymakers should proceed with caution when altering the incentives facing suppliers. Administrative pricing can have broad ramifications that extend beyond the single public insurer.

II. Background

A. Outpatient Surgery Markets and Medicare Payment Policy

The number of outpatient surgeries in US community hospitals has grown considerably since the early 1980s, accompanied by a decline in inpatient cases. By 2016, approximately 80 percent of all surgeries were performed on an outpatient basis, and nearly half of all outpatient procedures were performed in ASCs, specifically.[4]

Previous research on the US outpatient surgery market has attributed much of its

[4] Author calculations based on Ambulatory Surgery Center Quality Reporting program data and American Hospital Association (2018).

growth to two factors: technological advances in medicine and changes in Medicare reimbursement policy (Ambulatory Surgery Center Association 2011; Koenig *et al.* 2009). Indeed, most of the change in hospital-based outpatient surgeries occurred in the early 1980s, when Medicare both began covering procedures performed in ASCs and also introduced the Inpatient Prospective Payment System (IPPS), which implicitly incentivized reductions in inpatient-based care.

Medicare payments for outpatient surgeries consist of a facility fee, a physician fee, and fees for other services (e.g., physical therapy and durable medical equipment). While physicians receive a site neutral payment that is the same regardless of whether a procedure was performed in an ASC or a hospital, facility payments differ across settings. In general, reimbursements for outpatient procedures in hospitals are set higher than ASCs because hospitals must meet additional regulatory requirements and treat patients who are more medically complex (MedPAC 2003). For example, in 2007, the national rate for a colonoscopy performed in ASC was $446, whereas HOPDs received 22% more ($543) for the same service.

Differences in the way ASC and HOPD payments are set, and the relative payment rates between the two types of facilities, have also varied over time. When Medicare first started covering outpatient procedures in 1982, HOPD procedures were reimbursed using a cost-based system whereas ASC procedures were grouped into one of four payment categories based on cost and clinical similarity, with every procedure in a particular category reimbursed the same amount. Across both settings, facility payments did not vary with case mix (i.e., underlying health of the patient population) and were updated annually for inflation. They were not otherwise adjusted until Medicare expanded to eight ASC payment groups in 1990, and nine in 1991 (MedPAC 2010).

In 2000, Medicare's traditional cost-based reimbursement system for outpatient care in HOPDs was replaced with the Outpatient Prospective Payment System (OPPS). OPPS established 200 Ambulatory Payment Classifications (APCs) for hospital outpatient procedures. Because little was known historically about costs for outpatient procedures, CMS adjusted payment rates annually depending on the perceived imbalance in ASC supply relative to HOPD supply (Scully 2/26/03, p. 46).[5] In response to rapid growth in the number of ASCs, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 froze ASC payment updates and directed the Government Accountability Office (GAO) to examine the relative costs of procedures performed in ASCs and HOPDs and inform implementation of a new fee schedule by January 1, 2008 (U.S. GAO 2006). Between 2008 and 2011, Medicare rolled out a new system for ASC payments based on the 200 APCs in the OPPS as well as expanded the number of covered ASC procedures (MedPAC 2010). Under the new policy, the ASC facility fee for any procedure would be no greater than 59% of the facility fee paid to a HOPD and would be phased in fully (25 percent per year) by 2012. In the lone study of this specific policy, Munnich and Parente (2018) showed that patient care shifted from ASCs to HOPDs as the relative benefit of ASC treatment declined.

B. 2008 Policy Implications for Service Delivery, Spending, and Market Competition

Existing research tends to consider public payer price changes to physicians or hospitals in isolation when studying care delivery outcomes. However, in a wide variety of settings, health services are jointly produced by these otherwise independent entities, which ultimately receive separate payments. This leads to varying degrees of incentive alignment

[5] Federal Trade Commission (FTC), Health Care and Competition Law hearing transcript, 2/26/2003. Available here: https://www.ftc.gov/sites/default/files/documents/public_events/health-care-competition-law-policy-hearings/030226trans.pdf

between these necessary inputs through existing contractual arrangements or ownership relationships. Altering the price schedule facing one point of production (e.g., a health care facility) can have ambiguous effects on overall productivity, spending levels, and market structure—depending on how closely aligned the incentives are and the presence of substitution possibilities within the production process.

Both features are relevant to our context. As previously mentioned, ASCs are a unique facility type in that physicians are often co-owners and hence the residual claimants on the earnings from their personal care delivery as well as the facility's overall output (via profit-sharing arrangements). Direct and indirect exposure to the financial incentives facing the ASC can lead physicians to internalize, at least in part, the fee reductions to ASCs and adjust their output accordingly. Ambulatory procedures may also have more elastic supply than care for conditions that require immediate medical attention.[6] Yet, outpatient procedure markets are also home to "splitters"—individual physicians that deliver the same service within each setting option (i.e., ASCs and HOPDs). Their allocations may favor one setting over the other due to ownership stakes, individual preferences, and patient preferences. But the case allocations could also change following the introduction of less attractive fees for ASC-based services. In this way, total productivity would be preserved but some portion of ASC cases would be redistributed to HOPDs. This possibility has two immediate implications. First, shifting the marginal case from the lower cost to the higher cost setting will increase Medicare spending, all else equal, which may not be in the patient's or society's best interest. Second, hospitals may not have the capacity to absorb all of a given physician's cases intended for reallocation. Any adjustment frictions or binding capacity constraints would consequently lower the

[6] For example, Clemens and Gottlieb (2014) find greater treatment intensity increases following a positive Medicare price change for elective procedures, such as cataract surgeries and colonoscopies, as opposed to less discretionary care.

total flow of services to the market (i.e., Medicare patients could receive less ambulatory procedures overall). Each implication is an open empirical question.

Finally, reforming Medicare payments to ASCs can ultimately shape their long-run profitability and hence the staying power of incumbent ASCs as well as the entry opportunities for the marginal ASC. Slowing ASC expansion or inducing contraction has intuitive benefits for hospitals but may harm consumers through more expensive or less efficient care delivery following weakened competition. While the policy was not explicitly framed with such an objective, it risks being a downstream consequence, which could advantage hospitals well beyond mandating permanently superior fees to ASCs. Our following set of empirics aims to systematically evaluate each of these potential policy effects.

III. Data

A. Florida Discharge Data

Our extensive set of analyses leverages the universe of ambulatory/outpatient procedure discharge records from the state of Florida, which we obtained from the Florida Agency for Health Care Administration (AHCA). Our administrative data also provide a long time series beginning in the first quarter of 2005 and ending in the fourth quarter of 2013—allowing us to capture ambulatory procedure market activity several years before the Medicare price shock and throughout the policy's rollout.[7] Additionally, the comprehensive nature of the data gives us the opportunity to fully track ambulatory

[7] We intentionally truncate the analytic window at the quarter just prior to 2014. That year includes documented changes in private insurance markets via the Affordable Care Act and a large change to Medicaid managed care enrollment courtesy of state policymakers. We also restrict to ASC and HOPD cases, which removes highly specialized points of care (e.g., lithotripsy centers and cardiac catheterization centers) that account for less than 1% of discharges.

procedure flows and related outcomes for all payers and providers operating within the state. These detailed records include a rich set of variables, such as diagnosis and procedure codes, type of insurance, patient demographic information, and individual treating provider information (i.e., associated state clinical licenses).[8] Florida is also home to a large share of the nation's Medicare population (3-4 million beneficiaries in recent years) and has an accommodating regulatory environment toward ASCs (e.g., ASCs are not bound by any existing certificate of need laws).[9] In what follows, we exploit these data features to construct a variety of provider-procedure panels at the county, firm, and clinician levels.[10]

B. ASC and HOPD Summary Characteristics

For additional context, Figure 1 describes the allocation of ASCs throughout Florida as of 2005—our first year of data and hence the starting point for our subsequent ambulatory procedure market analyses. A small minority of counties have a clear concentration of these firms, while many counties have few or none. Areas with the strongest ASC presence tend to be those with large metropolitan areas (e.g., Miami, Orlando, and Tampa Bay).

Table 1 compares the characteristics of the average ASC to the average HOPD in our baseline (2005) year of data. Hospital outpatient departments typically deliver more services and use a greater number of providers; however, the output per provider is

[8] The discharge record procedure codes, specifically, are those belonging to the Current Procedure Terminology (CPT)— or Health Care Common Procedure Coding System (HCPCS)—nomenclature. All specific procedures belonging to any analysis are identified using all available CPT codes provided on a given discharge record.

[9] The size of Florida's Medicare population is second only to California among all US states (see here: https://www.kff.org/medicare/state-indicator/total-medicare-beneficiaries/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D).

[10] We do note one drawback to these data is the inability to follow individual patients over time, which precludes rigorous quality of care investigations.

substantially higher among ASCs, which is consistent with their prevailing business model (i.e., lower complexity, high volume cases). Consistent with the pattern seen in Figure 1, ASCs are also found in more competitive environments, i.e., those with a lower Herfindahl-Hirschman index (HHI).[11] Both types of firms rely on Medicare fee-for-service and the under-65 commercially insured markets for the bulk of their ambulatory procedure business. It is nearly an even split in procedure shares flowing to these two payer groups among ASCs—making them (and their associated price schedules) likely influential for ASC conduct and profitability. HOPDs, on average, devote a share of procedure volumes to the commercial market that is equal to that of ASCs, but they do relatively less Medicare cases and relatively more for other payers (e.g., Medicaid or self-insured patients). It is also worth noting that Florida's ASCs outnumbered HOPDs roughly 3:2 in 2005.

IV. Empirical Strategies for Procedure Productivity and Spending Effects

Our first analytic aim is to estimate the impact of negative price changes for ASCs on the supply of services to the Medicare market and associated spending levels. We focus on four of the most common ASC procedure types for Medicare patients in the pre-policy period: colonoscopies, spinal injections, cystoscopies, and upper endoscopies that include a tissue biopsy. These four procedure groups alone account for nearly half (46%) of all ASC Medicare cases in our pre-policy data, and importantly, experienced a negative facility fee price shock as a consequence of the 2008 policy.[12]

[11] The HHI calculations are based on the facilities' market share of all ambulatory procedures within the county a given facility is located within.

[12] They are also points of empirical emphasis within the only other published paper on this specific policy change (i.e., Munnich and Parente 2018).

The evolution of the Medicare reimbursement changes can be seen in Figure 2. Medicare payments (in nominal dollars) are flat from 2005 through 2007 and then are gradually reduced from 2008-2012 as the policy is rolled out. We further summarize some key features of these procedures in Table 2. Prior to the fee schedule reforms, the majority of Medicare patients received these services within an ASC setting. All four procedures were also priced below the analogous HOPD facility fee just prior to policy implementation (implied by the fee ratio < 1.0)—though to varying degrees. By 2012, they are uniformly set at 58% of the prevailing HOPD Medicare facility reimbursement level—making the full negative price changes between 9-23% across our procedures of interest.

In the following sub-sections, we diagram our various empirical strategies. They differ in terms of the unit of observation; however, each is a variant on the standard difference-in-differences (DD) design. We specifically leverage pre-policy exposure to ASCs as the key source of identifying variation in the data. Although we do not expect ASC market penetration to be random, prevailing market structures should be exogenous to the Medicare policy shock introduced in 2008.

A. County Level Estimation

We begin by estimating county-level changes in Medicare procedure volumes and spending. For each Florida county and procedure type, we calculate the share performed within an ASC setting (as opposed to a HOPD) in 2005. This continuous variable becomes our measure of policy exposure (or 'bite') since it reflects a given county's baseline (and pre-policy shock) reliance on ASCs for the associated Medicare service. Appendix Figure 1 shows the corresponding county-level variation in the data for each of our four procedures of interest. For colonoscopies, spinal injections, and upper

endoscopies, many counties fall into the relatively high 60-80% ASC reliance range, while some counties (at the opposite end of the distribution) have as little as 20% or less of their 2005 cases performed within an ASC. Cystoscopies, however, have an opposite pattern (bottom panel, Appendix Figure 1) when compared to the other three procedure types.

Our first estimating equation exploits the full range of variation in the data (i.e., uses the continuous ASC reliance measure) within a pre-post framework.

$$Y_{ct} = \alpha + \beta Post_t + \delta(Post * BaselineASCShare)_{ct} + \theta_c + \varepsilon_{ct} \quad (1)$$

Y is the procedure-specific volume or spending level outcome in county (c) and year (t).[13] *Post* is equal to one from 2008 onwards, and we use county fixed effects (θ) throughout. We also focus on counties consistently performing the relevant procedure over our full study period.[14] The delta parameter is our coefficient of interest and linearly approximates how the outcomes evolve during the post-period according to pre-existing (i.e., time invariant) county shares of procedures performed within ASCs.

Next, we complement this approach by using the distribution of the continuous (baseline) ASC share measure to sort Florida counties into corresponding terciles where the top tercile relies on ASCs the most while the bottom tercile relies on ASCs the least. Put differently, the former group of counties can be thought of as the most exposed to the

[13] The outcomes are also measure in total (i.e., across all procedures performed within the county) as well as by delivery setting (i.e., ASC versus HOPD facilities).

[14] Some counties do not have outpatient facilities performing a given ambulatory procedure at baseline or do so inconsistently. Such counties are not included in the panel estimation—meaning that the number of observational units will vary across procedure types.

negative price shock, while the latter group of counties is the least exposed.[15] We then adapt Equation 1 to the more common two-by-two difference-in-differences setup, followed by an event-study specification. The latter uses the year immediately preceding policy implementation (i.e., 2007) as the omitted reference year for when t=0—making all estimated differentials relative to that year.

$$Y_{ct} = \alpha + \beta Post_t + \delta(Post * HighASCReliance)_{ct} + \theta_c + \varepsilon_{ct} \quad (2)$$

$$Y_{ct} = \alpha + \gamma_t \sum_{t=-2}^{6} Year_t + \delta_t \sum_{t=-2}^{6} (Year * HighASCReliance)_{ct} + \theta_c + \varepsilon_{ct} \quad (3)$$

HighASCReliance is equal to one for counties in the top third of the ASC exposure variable distribution and zero otherwise. The analytic samples exclude counties within the second tercile of the ASC exposure variable distribution—leading to an estimation strategy akin to a treatment-control comparison between the two extreme tercile groups. Across all three estimation approaches, we cluster our standard errors at the county level.

B. Individual Provider Level Estimation

As a point of comparison, we move to a clinician-level panel estimation strategy. Doing so allows us to corroborate or contradict the findings from the county-level estimation and hence inform the strength of our subsequent inferences. Additionally, the approach benefits from a closer alignment with a traditional treatment-control setup belonging to the DD design—making it our preferred strategy for estimating service throughput changes.

[15] Recall, all ASC reliance/exposure measures for any observational unit belonging to our empirics are procedure-payer specific to ensure that high/low/no exposure classifications are meaningful for a given outcome measure, which is also procedure-payer specific.

These analyses first categorize all individual providers performing the relevant procedure for Medicare FFS patients over our study period according to their procedure setting allocations during the pre-policy period. More specifically, we leverage the fact that some individuals are "splitters" and thereby perform the same procedure for some Medicare patients within ASCs and other Medicare patients within HOPDs. Meanwhile, other individuals exclusively perform the relevant cases in HOPDs (i.e., have zero ASC utilization). We classify providers with at least one relevant ASC case over each year of the pre-policy period (2005-2007) as our treatment group (*Treated*) since they are plausibly exposed to the Medicare facility fee reimbursement changes introduced for ASCs. The control group is then composed of clinicians with no ASC exposure at baseline. The resulting estimating equation is the simple two-by-two DD specification with individual provider fixed effects (λ):

$$Volume_{it} = \alpha + \phi Post_t + \delta(Post * Treated)_{it} + \lambda_i + \varepsilon_{it} \quad (4)$$

The *Volume* outcome measure in Equation 4 captures the total procedure productivity (specific to the type of case—4 in total) for provider (i) in year (t), which is importantly independent of delivery setting. In this way, we are allowing for a reallocation of procedures to different settings after the policy shock and therefore investigating changes in providers' aggregate flows of a given service to the Medicare market.[16]

A negative difference-in-differences estimate (δ) would imply a productivity drop for those exposed to the ASC fee reductions relative to those with no ASC reliance at baseline. In supporting analyses, we refine the *Treated* group definition by the degree of

[16] Of note, Appendix Table 1 implies some level of procedure shifting into HOPD settings for the "Treated" (i.e., pre-policy ASC exposed providers) when using an estimating equation that parallels the county-level one used for the results in Table 3.

pre-policy ASC exposure to explore possible heterogeneity in the procedure productivity effects as well as adapt our event study estimation (Equation 3) to this specific empirical setup. We also cluster our standard errors at the county level based on where the provider performed her largest share of the relevant procedure during the 2005-2006 period.

V. Results for Procedure Productivity and Spending

A. County Level Panels

Table 3 presents the results from estimating Equation 1 where we exploit all of the variation in the data related to procedure-specific ASC reliance as a continuous treatment measure to investigate changes in procedure productivity after the ASC facility fee reductions. Columns 1-4 focus on care delivery within HOPDs while columns 5-8 focus on ASCs operating within a given county. There are no clear changes in HOPD procedure volumes in the post-policy period, with the exception of spinal injections. We see a statistically significant increase of approximately 2.5 HOPD-based spinal injections for every one percentage point increase in the county-level ASC exposure measure. This is a 45% increase over the 2005 level of HOPD spinal injection output when scaled at the mean. Conversely, the data suggest greater procedure volume changes among ASCs (columns 5-8 in Table 3). Both colonoscopies and spinal injections reveal declines in productivity for counties more reliant on ASCs for service provision at baseline. Cystoscopy procedures demonstrate no statistically significant change, and upper endoscopies that include a biopsy are actually increasing over the post-period for counties with greater ASC exposure.

Table 4 and Figure 3 further investigate the observed changes in ASC output by using our high-versus-low ASC reliance setup from Section 4 (Equation 2 and Equation 3,

respectively). Recall, these models estimate differential changes for counties that relied extensively on ASCs for Medicare service delivery in our baseline year when compared against counties that had relatively low (or no) use of ASCs. The simple DD estimates in Table 4 parallel the results from Table 3. 'High ASC Reliance' counties witness relative declines in procedure productivity of 11% and 23% for colonoscopies and spinal injections, respectively, when compared with their initial level output for these procedures. We again do not see evidence that cystoscopy output is altered, and upper endoscopies are possibly trending upward—though the estimate is less precise than in Table 3. Productivity is also increasing in the post-period across all four procedure types within counties with limited ASC exposure (see the un-interacted *Post* coefficients in Table 4).

The event study patterns in Figure 3 largely reinforce the findings from Tables 3 and 4.[17] Among 'High ASC Reliance' counties, colonoscopy volumes begin to sharply fall in 2009 and stabilize at lower output levels from 2010-2013. The corresponding spinal injection differentials do not strongly materialize until later in the study period (2012-2013); however, there are also some indications that these two county groups may have been differentially trending away from each other in the pre-period, which cautions against any strong interpretations. The cystoscopy and upper endoscopy panels belonging to Figure 3 do not reveal clear policy effects. The cystoscopy estimates are uniformly too noisy throughout the post-period, and the upper endoscopy output in 'High ASC Reliance' counties seems to continue on an upward trend, at least until 2011 when it levels out for the remaining two years.

Taken together, the preceding findings offer only suggestive evidence that two of the four procedure types witnessed lower ASC activity within the most exposed counties for Medicare patients following the negative facility fee changes. An immediate potential

[17] Appendix Table 2 provides the full regression results underlying Figure 3.

consequence of a muted behavioral response is lower overall spending (across both service settings) for Medicare patients within these areas. We document this in Figure 4, which displays the corresponding event study estimates for total spending per procedure.[18] Medicare spending falls sharply for colonoscopies once the lower reimbursements are introduced, with a similar pattern emerging for cystoscopy procedures. Spinal injection spending does not clearly decline until late in the study period—likely reflecting, in part, some reallocation of these procedures to the (more expensive) HOPD setting. Departing from the other three procedure types in Figure 4, upper endoscopy Medicare spending levels do not demonstrate clear changes for counties using more ASCs at baseline.

B. Individual Provider Level Panels

Table 5 begins our individual provider-level empirical strategy results. Again, these findings are from a complementary but distinct identification strategy (see Section 4B). For colonoscopies, clinicians relying on ASC facilities (to some degree) deliver almost 17 fewer procedures to Medicare patients per year relative to those only using HOPD facilities (column 1, Table 5) after the ASC price shock. Columns 2 and 3 of Table 5 reveal that the negative productivity effects localize to where economic intuition predict (i.e., clinicians with the highest utilization of ASCs before the Medicare fee schedule change). The most exposed individual providers have 11% lower total output to the Medicare market (relative to their pre-policy procedure volumes) following the facility price decline, on average (column 3, Table 5). Conversely, there is no detectable effect among providers with some (but much more limited) ASC exposure (column 2, Table 5).

[18] Note, for simplicity, we have not made geographic adjustments to the corresponding price levels. We have instead used the national average price level from the Medicare facility fee schedule attached to a given procedure. This simplification should affect absolute scaling of the estimate but not the identified differential itself. The full regression output underlying Figure 4 is displayed in Appendix Table 3. For completeness, Appendix Table 4 provides the results from using the simple two-by-two specification as well as from using the continuous treatment exposure measure.

Providers performing spinal injections within ASCs also appear 22% less productive once the policy change is in place (Table 6).[19]

The corresponding event study findings are found within Figure 5. The pre-treatment trends and post-policy changes at the individual provider level are most compelling for spinal injections, as the pre-trends are flat and the declines are steeper as the fee reductions are phased in. The pattern and inferences are more speculative for colonoscopies, however. Appendix Table 5 shows the associated regression output for Figure 5, and Appendix Table 6 contains the analogous output for providers' cystoscopy and upper endoscopy productivity. There is no evidence of a policy effect for either service (Appendix Table 6), which is consistent with the findings from the county-level analyses.[20]

VI. Empirical Strategies for Market Dynamic Effects

Shifting our focus away from medical care productivity and associated spending, we now explore the potential implications of Medicare's ASC fee reforms on ambulatory procedure markets' structure and conduct. Our various empirical strategies closely follow those belonging to Section 4. However, we first leverage the completeness of our data to describe entry, exit, and net growth of these firms over time in order to motivate our subsequent regression analyses.

A. ASC Market Presence 2005-2013

[19] Of note, the ASC exposure measure for spinal injections is strongly bimodal where providers almost exclusively perform cases in one of the two ambulatory settings, which consequently precludes heterogeneity analyses among the treatment group, such as those found in Table 5.

[20] We also note that we have explored analogous outcomes for the commercially insured market. We either see no substitution effect or changes in output that parallel our Medicare market results, which suggests, if anything, price following behavior by the private insurance market (e.g., see Clemens and Gottlieb 2017).

Annual growth among ASCs and HOPDs is displayed in Figure 6. The supply of ASCs is increasing at a robust 4-5% per year in the lead up to the Medicare policy change but substantively slows and even temporarily reverses during the post-period. The weakest years of ASC growth are also found after the revised fee schedule is fully implemented (i.e., 2012 and 2013). Hospitals expectedly show more limited changes in net supply over time—typically less than 1% year-on-year. We further decompose the observed ASC trend within Figure 7, which separately displays annualized entry and exit behavior for these firms. The number of ASCs leaving the market in a given year appears unchanged after the new fee schedule takes hold; yet, firm entry behavior sharply declines over the policy's rollout and hits its lowest point when the price adjustments are complete. These reductions in ASC entry, in turn, are primarily responsible for the net ASC growth patterns observed in Figure 6 and simultaneously offer *prima facie* evidence that ASC entry behavior may have been altered (i.e., restrained) by the overhauled public payer fee schedule.[21]

B. Descriptive Models for ASC Entry and Hospital Volumes

If the reformulated and less generous Medicare payments do discourage the marginal ASC from entering the market, then this could represent an unintended consequence of the policy and a boon for hospitals. To better understand this potential benefit for hospitals,

[21] We do note that the initiation of this policy change does coincide with the Great Recession, which could lead to tighter liquidity constraints for marginal firms wishing to enter the ambulatory procedure market. However, the trends in ASC net growth and entry behavior do not align with the business cycle—they have gradual declines during the recession period and fall more steeply during the years of economic recovery. In this way, the patterns are more consistent with the fee schedule evolution. Additionally, Appendix Figure 2 stratifies the entry trends by recession bite among Florida counties. These trends, again, are not easily explained by a business cycle interpretation. Appendix Figure 3 looks at the payer mix for new entrants before and after the Medicare fee schedule change. Those entering the market in the post-period have a smaller share of Medicare cases and devote more services to other payers. This is opposite of what would be expected if entry decisions were completely shaped by concurrent macroeconomic conditions and fluctuations (e.g., He *et al.* 2015).

we first implement descriptive panel models for the association between ASC entry and incumbent firms' caseloads. Specifically, we construct firm (facility) level panels and use a corresponding regression model to describe changes in procedure volumes over time:

$$Y_{jt} = \alpha + \zeta ASCEntry_{j(t-1)} + \theta_{jt} + \kappa_t + \eta_j + \varepsilon_{jt} \quad (5)$$

Our outcomes of interest (Y) are the total cases, total Medicare FFS cases, and total commercial cases (all logged) for a given facility (j) in year (t). We make no restriction on the types of procedure performed, so we are capturing the summed flow of all procedures to the market, irrespective of service mix. Our focal parameter (ζ) reveals the association between experiencing one or more new ASCs entering the facility's county of operation in the preceding year (i.e., 'ASCEntry' is a binary indicator for this market level change) and the contemporaneous year's aggregate throughput. We restrict to incumbent firms already operating in the market as of 2005 and truncate the panel at 2008, which intentionally constrains our ASC entry activity to occurrences between 2006-2008 in order to minimize the risk of post-policy confounding (i.e., to aim for a relatively clean estimate of the relationship from the pre-policy years). The specification includes year (κ) and facility (η) fixed effects, along with county ('market') level time-varying covariates (θ) for ASC exit behavior and the local level of unemployment. Equation 5 is also estimated separately for incumbent HOPDs and incumbent ASCs, and the standard errors are clustered at the county level based on a facility's geographic location.

C. Causal Estimation for ASC Entry Effects on HOPDs

Following our descriptive exercise, we exploit another nuanced feature of the 2008 Medicare fee schedule reform to generate causal estimates of ASC entry effects on

incumbent firms' caseloads. To do so, we leverage the fact that Medicare would not pay ASC facilities for laparoscopic cholecystectomies (a relatively common surgical procedure) prior to 2008. This pre-existing policy virtually ruled out Medicare laparoscopic cholecystectomies for ASCs and therefore forced their full allocation to hospital-based settings (i.e., inpatient or outpatient delivery). ASCs would be paid for these particular cases going forward as part of the new ASC reimbursements implemented in 2008. Put differently, ASCs abruptly moved from a zero price to a positive price for this specific surgery within the Medicare market, and importantly, no such rule existed within the private (commercial) market. Commercial payers could contract with ASCs for this specific service as they pleased.

The dichotomy across payer types is displayed in Figure 8. As expected, almost no Medicare cases exist prior to 2008, which is followed by an aggressive ramp up in the post-policy years.[22] Commercial cases, on the other hand, both exist within ASCs prior to 2008 and are increasing in number over much of the study period.[23] We subsequently use this exogenous shock to ambulatory surgical markets within two separate difference-in-differences frameworks to recover causal estimates of ASC entry behavior on local hospital volumes. Each empirical strategy takes advantage of the pre-policy *commercial* market environment for laparoscopic cholecystectomies facing HOPDs as a marker of exogenous

[22] It is likely that the few Medicare cases reported prior to 2008 represent discharge record reporting errors—e.g., an incorrect CPT code or, and perhaps more likely, misclassifying a Medicare Advantage patient as a Medicare FFS patient.

[23] That said, laparoscopic cholecystectomies are heavily skewed toward HOPDs for commercial payers. HOPD case volumes are roughly 10-fold higher than those of ASCs. Given ASCs advantage for so many other ambulatory procedures (e.g., see Table 2), this suggests a spillover effect from Medicare's exclusion of ASCs for laparoscopic cholecystectomies prior to 2008 (i.e., there may be important economies of scale in being able to offer the same service to both markets and/or surgeons may have strong preferences for being able to deliver care to either patient type within a given setting).

policy exposure or 'bite'—which parallels much of our previous analyses for procedure productivity in Sections 4 and 5.[24]

Our first approach focuses on the presence of ASCs doing commercial laparoscopic cholecystectomy cases as of 2007 (i.e., just before the Medicare rule change) within a given HOPD's county of operation. Contested markets (i.e., where HOPDs and ASCs are already competing for the same cases from commercial insurers) would plausibly be the most responsive to the introduction of Medicare payment for this particular surgery. ASCs previously delivering the exact service to merely a different payer could take advantage of existing infrastructure and surgeon relationships to capture the new revenue stream. For these reasons, we consider HOPDs in contested markets prior to the policy change as our treatment group and compare them to HOPDs that have no pre-existing ASC competition for laparoscopic cholecystectomies within their county of operation (i.e., the 'control' group). The resulting estimating equations (Equations 6 and 7) are similar in spirit to those found in Section 4:

$$Y_{ht} = \alpha + \psi Post_t + \delta Post * PreExistingCompetition_{ht} + \nu_h + \varepsilon_{ht} \tag{6}$$

$$Y_{ht} = \alpha + \varphi_t \sum_{t=-2}^{6} Year_t + \delta_t \sum_{t=-2}^{6} (Year * PreExistingCompetition)_{ht} + \nu_h + \varepsilon_{ht} \tag{7}$$

Our outcomes (Y) are surgical volume levels for hospital (h) in year (t), and we investigate four outcomes in total: total laparoscopic cholecystectomy cases, ambulatory laparoscopic cholecystectomy cases, inpatient laparoscopic cholecystectomy cases, and

[24] For both of our causal estimation strategies pertaining to cholecystectomies, we focus on HOPDs present in 2005 and delivering this service of our study period.

inpatient "open" (non-laparoscopic) cholecystectomy cases.[25] We have a binary indicator ('Pre-Existing Competition') equal to one when a given hospital is located in a contested commercial market for these cases in 2007 and zero otherwise. There are hospital fixed effects (ν) throughout to recover within-hospital changes in surgical volumes.[26] Equation 7 simply adapts the specification to an event study setup using 2007 as the omitted reference year (t=0), just as before, and the standard errors are clustered on HOPDs' county of location.

Our final approach also relies on Equations 6 and 7 but introduces an alternative treatment-control comparison. Instead of classifying hospitals' entry shock exposure by the presence of local ASCs doing these (commercial) surgical cases, we go a step further and stratify them by the presence or absence of commercial case "splitters" immediately prior the Medicare reimbursement policy change. The intuition is straightforward in that HOPDs exposed to pre-existing commercial case splitter surgeons should be at the greatest risk of Medicare case losses once the public insurer will pay ASCs for laparoscopic cholecystectomy services since these surgeons are already allocating some portion of their commercial cases to competing ASCs and have therefore revealed themselves to be 'disloyal' from the perspective of the HOPD. Conversely, HOPDs without such surgeon splitters at baseline should have much weaker exposure to the Medicare rule change, at

[25] Note, the inpatient data are also a universe of discharge records provided by Florida AHCA. The data structure and reporting are quite similar to our main data asset (i.e., the ambulatory discharge records), with the exception that cases are identified using the International Classification of Disease (ICD) 9 taxonomy for inpatient discharge records.

[26] In our main results presented below, we further refine the treatment group to only include HOPDs in counties with at least three competing ASCs in 2007 in an effort to match the approaches from Section 4 that focus on the extreme markets (i.e., those with zero competition at the time of the rule change and those with the most exposure to existing competitors for laparoscopic cholecystectomies). However, we have also run the analyses with the simple distinction (i.e., any pre-existing competitors or not), which generates comparable results and inferences.

least in the short- to medium-run.[27] We can then compare our DD estimates across these two strategies as means to draw stronger conclusions from our entry effect results.

VII. Results for Market Dynamics

A. Association Between ASC Entry and Incumbent Firm Caseloads

Table 7 shows the results from our descriptive exercise laid out in Section 6B. Hospitals located within areas experiencing the recent arrival of one or more ASCs are associated with approximately 10-15% reductions in aggregate service volumes, on average and depending on the payer. Interestingly, a similar pattern of results does not emerge for incumbent ASCs. There are no statistically significant changes to their overall or Medicare FFS-specific caseloads. Their total commercial cases are associated with a decline, but it is only about half as large as the negative relationship for incumbent HOPDs. Moreover, Appendix Table 7, which uses a modified specification that separates single firm entry from multiple firm entry, demonstrates that only multiple new ASC entrants appear to negatively impact existing ASCs; meanwhile, even the introduction of a single ASC to the market strongly and negatively correlates with HOPD procedure volumes. Courtemanche and Plotzke (2010) likewise show that HOPD volume is negatively correlated with ASC entry, at least for ASCs in close proximity (i.e., 2 to 4 miles). This collection of descriptive findings points toward market stealing by newly

[27] If ASCs newly and quickly adopt laparoscopic cholecystectomy cases into their existing suite of services, then this would perhaps not be the case. Yet, we can see in Appendix Figure 4, that the increase in the share of ASCs performing these cases (across payers) is small. 14% of ASCs perform them in 2007, and following the Medicare rule change, there is only growth of about 2-percentage points between 2007 and 2010. The share of ASCs providing this surgical service remains stable (and low) after that. Consequently, the observed trend in Appendix Figure 4 supports the validity of the two empirical approaches diagrammed in Section 6C.

arriving ASCs, which is overwhelmingly targeted at competing hospitals in the area, as opposed to other ASCs.

B. Causal Estimates of ASC Entry Effects on HOPDs

Our first difference-in-differences setup leveraging pre-existing ASC competition for cholecystectomies reveals substantive reductions in HOPD cases across delivery settings and surgical methods (Table 8). The magnitude of the effect is typically 10-15% of the pre-policy level of output for these firms in contested markets and contrasts with the typically positive volume growth for HOPDs in uncontested markets prior the Medicare rule change (i.e., the standalone *Post* coefficients found in Table 8). Figure 9 displays the corresponding event study results, which reinforce the inferences from the simple two-by-two estimates in Table 8. HOPDs in contested markets lose surgical cases once Medicare will reimburse ASCs for this particular service, and the negative effects tend to accelerate with time. However, the differences in dynamics across hospital procedure setting and surgical approach are also of interest (which can be seen in Figure 9 and the associated regression table: Appendix Table 8). Ambulatory laparoscopic cases initially decline with the policy's introduction but temporarily rebound as inpatient laparoscopic cases and non-laparoscopic cholecystectomies begin to fall. These patterns suggest that ASC entry not only engages in market stealing from local hospitals but also drives hospitals to alter how they perform these procedures for the cases they retain (i.e., shift toward more laparoscopic and outpatient-based care delivery).[28]

Table 9 and Figure 10 offer the complementary results from our second difference-in-differences design based on the Medicare payment change for laparoscopic

[28] Appendix Table 9 separates the estimation and results by payer type for comparison. Although the magnitudes and precision can differ, the qualitative patterns for both payer groups align with what is seen in Table 9 and Figure 9 from the main results.

cholecystectomies within ASCs. The finding and inferences parallel the preceding estimates. HOPDs with pre-existing exposure to surgeon "splitters" for these cases suffer roughly a 10% reduction in ambulatory surgical volumes, on average, following the Medicare reimbursement rule change (Table 9). And once again, the declines strengthen over time for both the Medicare and commercial insurance markets (Figure 10).[29] In fact, relative to the pre-policy caseloads for these hospitals, the drops in the later years of our analytic window correspond to decreases of as much as 20% across payers. Taken together, our two empirical strategies exploiting this specific Medicare policy change (embedded within the larger fee schedule reform) reinforce one another and support causal interpretations that are consistent with the descriptive findings from Section 7A. Furthermore, the magnitude of the estimated caseload reductions is quite similar between the descriptive and causal approaches, despite the latter's focus on a single service while the former captured all services.

ASC market entry negatively impacts local hospitals, who ultimately lose profitable cases to these competing firms. Entry also seems to force hospitals to adjust their care delivery style in order to compete with ASCs for future cases. If these localized findings (i.e., specific to laparoscopic cholecystectomies) are generalizable to the broader set of ambulatory procedures, restraining market entry to some degree—and perhaps inadvertently—due to the reformulated Medicare fee schedule suggests a nontrivial strategic and financial advantage for hospitals, which does not necessarily benefit consumers.

VIII. Discussion

The US health care system is notorious for high levels of absolute spending, and

[29] Appendix Table 10 provides the regression table output underlying the results in Figure 10.

importantly, inefficient resource use (e.g., see Abaluck *et al.* 2016; Doyle, Graves, and Gruber 2017). These salient features have unsurprisingly invited negative media and policymaker attention over many years and led many to advocate for payment reforms and more cost-effective models of care delivery—especially within the Medicare program (Cutler and Ghosh 2012; Fisher, Bynum, and Skinner 2009). However, adjustments to the Medicare program can have targeted as well as diffuse effects on health care markets due to its size and publicly administered design. They can then produce a mix of good and bad outcomes from a societal welfare perspective.

Our first set of findings reveals Medicare spending declines for ambulatory procedure care but also some reduced flows of specific services following the price decreases. Individual providers exposed to the negative ASC fee change lower their spinal injection output by more than a fifth of their pre-policy productivity. Our other three common procedures do not show clear policy responses within our preferred (individual provider-level) estimation.

A driving force underlying the localized changes for spinal injection may be the relatively tighter incentive alignment between ASCs and clinicians performing these services. There is nearly an "all or none" dichotomy for these procedures in terms of relying on ASC settings. It, in turn, seems plausible that these same clinicians either have stronger preferences for working within ASCs and/or more direct ownership stakes in the facilities. Another departure for spinal injections, specifically, is their therapeutic nature. These injections serve as treatments while the other investigated procedures (colonoscopies, cystoscopies, and upper endoscopies) are typically used in diagnostic roles.[30] The potential complementarities with other downstream cases (i.e., diagnostics

[30] Admittedly, these data do not allow us to meaningfully say anything about the marginal benefit of the spinal injections for patients. So, while we see productivity decline, we do not know if the new equilibrium is closer or farther from a social optimum.

leading to more procedures) may have bolstered ASCs' willingness to absorb the Medicare price cuts for these services.

Upper endoscopies (with a tissue biopsy) also represent a somewhat unusual circumstance. Another common ambulatory procedure taking place within ASCs (that did not receive a negative price change) is an upper endoscopy that *excludes* tissue biopsy. These two forms of upper endoscopy (with and without biopsy) have been reimbursed equally for HOPDs, but interestingly, ASC cases including a tissue biopsy were paid 34% more than the non-biopsy version prior to 2008. The Medicare fee reductions fully erased this ASC payment disparity by 2011. Given that it is hard to imagine infrastructure needs and facility operation costs that are meaningfully different between these two types of upper endoscopy cases, this procedure was likely (and perhaps accidentally) overpaid prior to the Medicare reforms, which thereby blunts the impact of its eventual fee decrease.

Our arguably most important findings relate to the entry behavior of ASCs after the Medicare fee changes. With fewer new ASCs opening after the policy was implemented, the rate of net growth in Florida is slowed by more than half. While this behavior could be state-specific, the national trends in Figure 11 suggest otherwise. There is a clear kink in the long-run trend after 2008 that keeps the aggregate number of ASCs fairly flat from 2010-2015. This contrasts with the prior 25 years showing a strong and stable upward trend in ASC supply across the US. Our complementary estimates imply that deterring ASC entry can protect 10-20% of a hospital's caseload—making this market-level effect of the policy financially beneficial for incumbent hospitals. However, new entrants do more than simply steal market share. Leveraging the laparoscopic cholecystectomy rule change, which previously forced a misalignment between ASCs and providers since ASCs were prohibited from Medicare payment, we find that hospitals also shift toward outpatient and laparoscopic delivery for their remaining patients when

exposed to greater ASC presence (i.e., they behave more like ASCs). These features suggest that ASCs have influence on ambulatory care typically associated with "sustaining innovations" for a given product or service (Christensen, Raynor, and McDonald 2015). Driving more efficient care delivery is an improvement for all consumers, just as restraining supplier entry can be broadly harmful.

Finally, if capping ASC fees is a means to financially benefit hospitals in order to compensate hospitals for their greater variety of services—some of which are socially valuable but loss-making—it is unclear that this is the best way to go about it. Direct transfers to subsidize care and services that the market underprovides has the potential to be more efficient. At a minimum, the amount of subsidization can be transparently verified, quantified, and tracked. Using a variety of more complex policy levers to deliver public subsidies risks misallocated spending, perverse provider responses, and market distortions. Hospitals arguments that they require public financing to support their 'full access and full service' operations may have merit. However, a collection of indirect actions, such as anti-competitive measures, side payments (e.g., the 340B program and DSH payments), and tax exemptions may be a poor strategy for achieving the stated aim and can lack sufficient accountability and justification to taxpayers.

In the lead up to the overhaul of Medicare's ASC fee schedule, the director of CMS remarked:

> "*If the ASC rate is off, all of a sudden you start seeing ASCs pop up all over the place to do colonoscopies or to do outpatient surgery…But we need to start thinking about the impact we have on the market because we're such a big player.*"—Tom Scully, FTC health care market hearing 2/26/2003.

The sentiment reflects a belief that ASC payments from Medicare may have been overly generous at times but also an acknowledgment that the long-run implications are not always fully considered by the public payer. Our findings speak directly to this note of

caution, and somewhat ironically, reveal another instance where the market-level effects were likely overlooked. Competition within the outpatient surgery market can benefit consumers as well as overall health care spending, so there can be important ramifications from suppressing it (intentionally or inadvertently) through government intervention.

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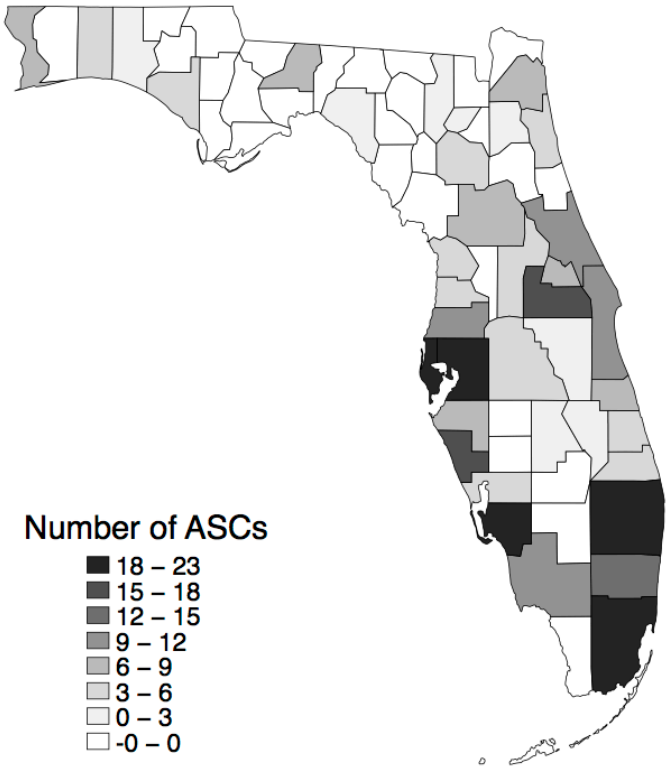
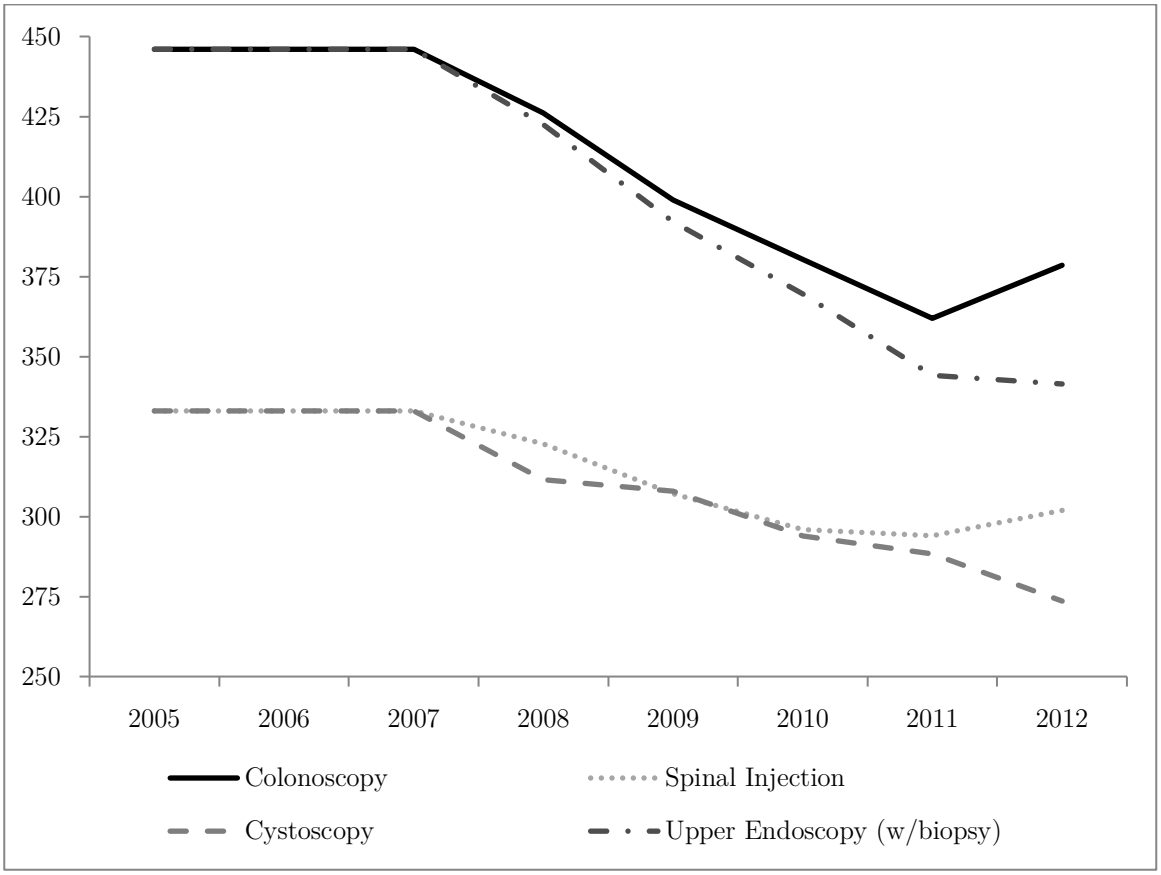
MAIN RESULTS

FIGURE 1—2005 FLORIDA COUNTY LEVEL AMBULATORY SURGERY CENTER (ASC) ALLOCATION



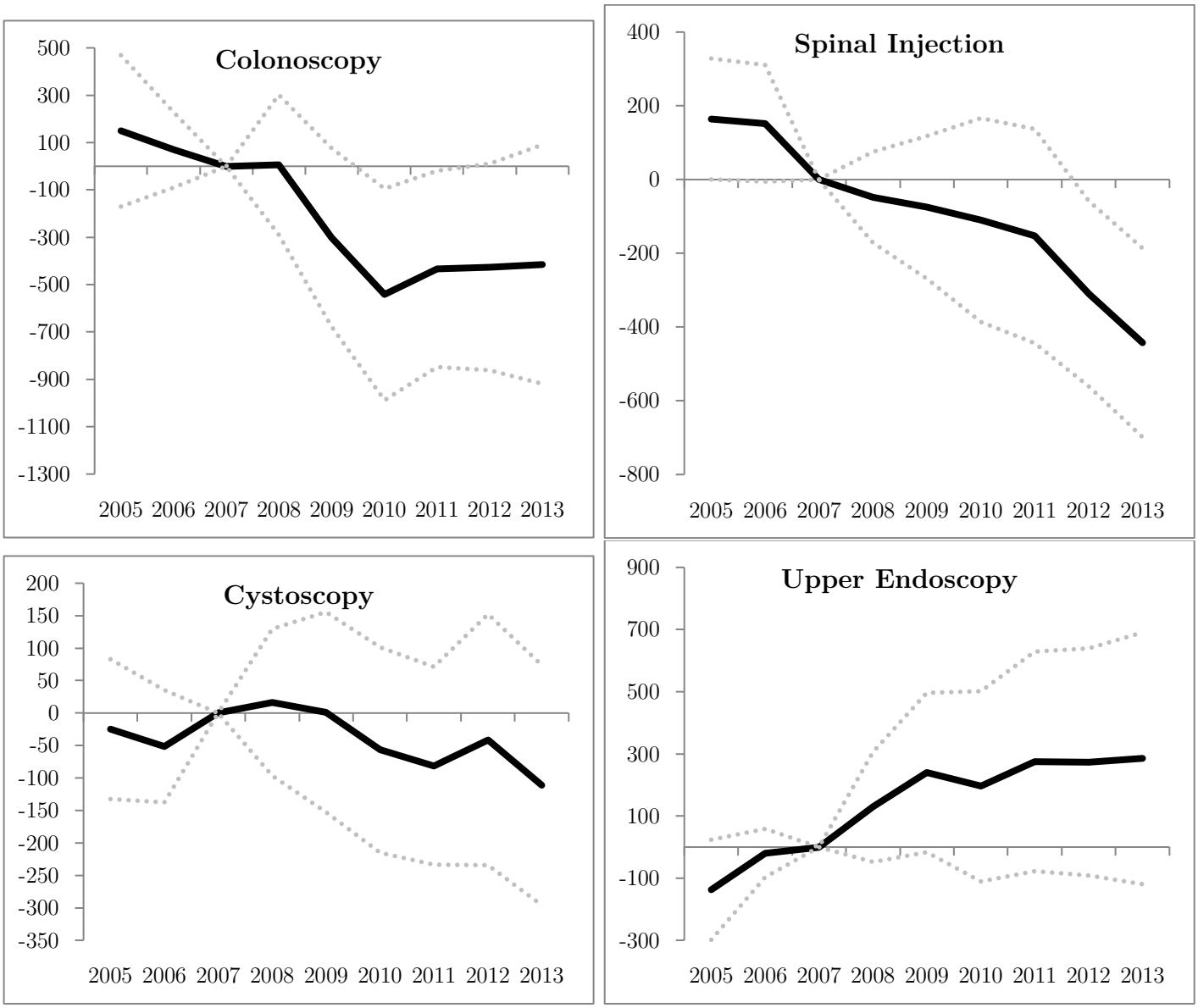
Notes: Florida AHCA ambulatory procedure discharge data and facility lists

FIGURE 2—MEDICARE FFS ASC FACILITY FEE TRENDS BY SERVICE TYPE



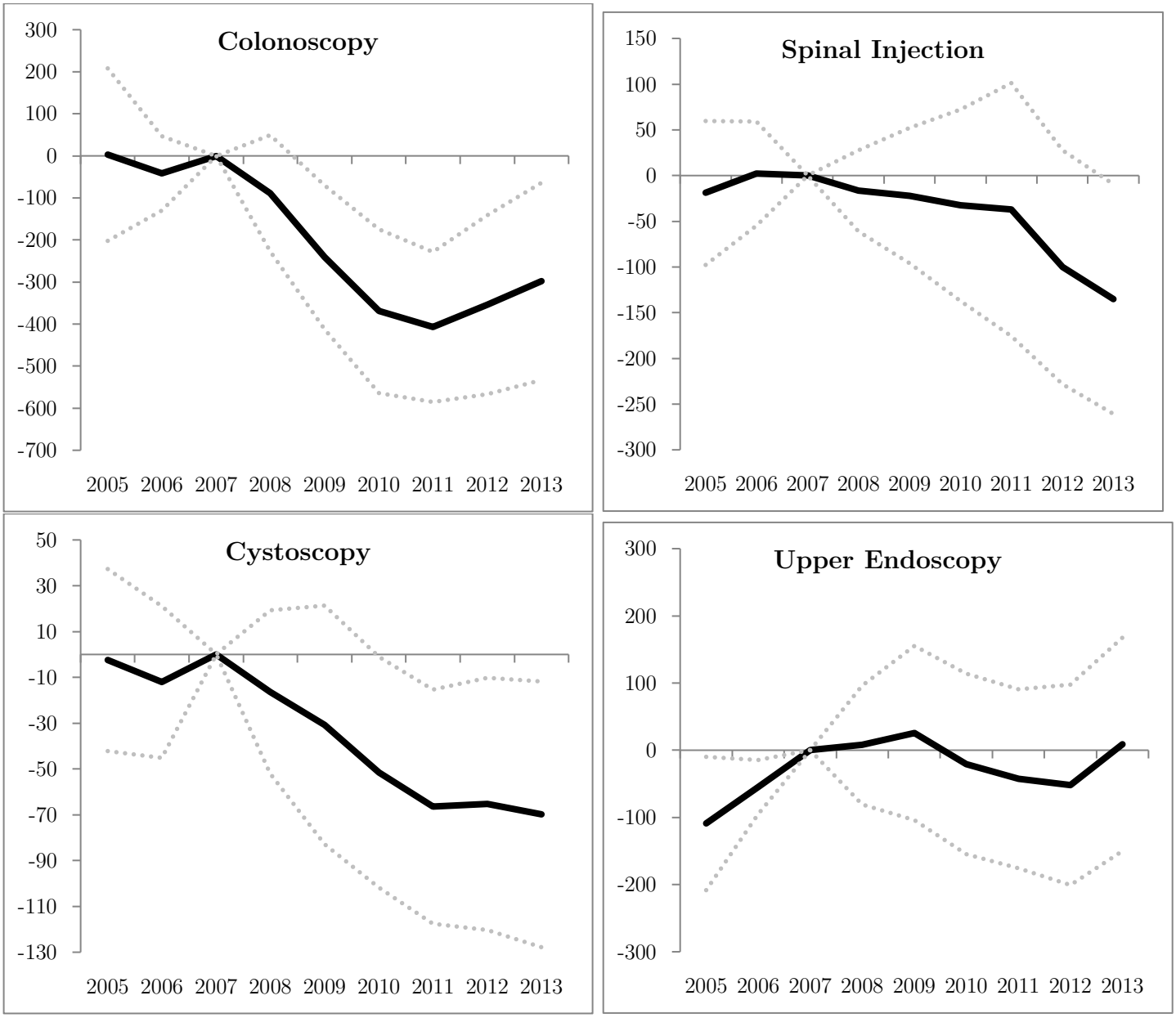
Notes: These four procedure types account for 46% of all Florida Medicare FFS ASC cases in the pre-policy period (2005-2007). Fee levels are in nominal dollars and can found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ASCPayment/index.html.

FIGURE 3—EVENT STUDIES FOR DIFFERENTIAL CHANGES IN ASC MEDICARE FFS PROCEDURE VOLUME ACCORDING TO LOW VERSUS HIGH BASELINE ASC RELIANCE



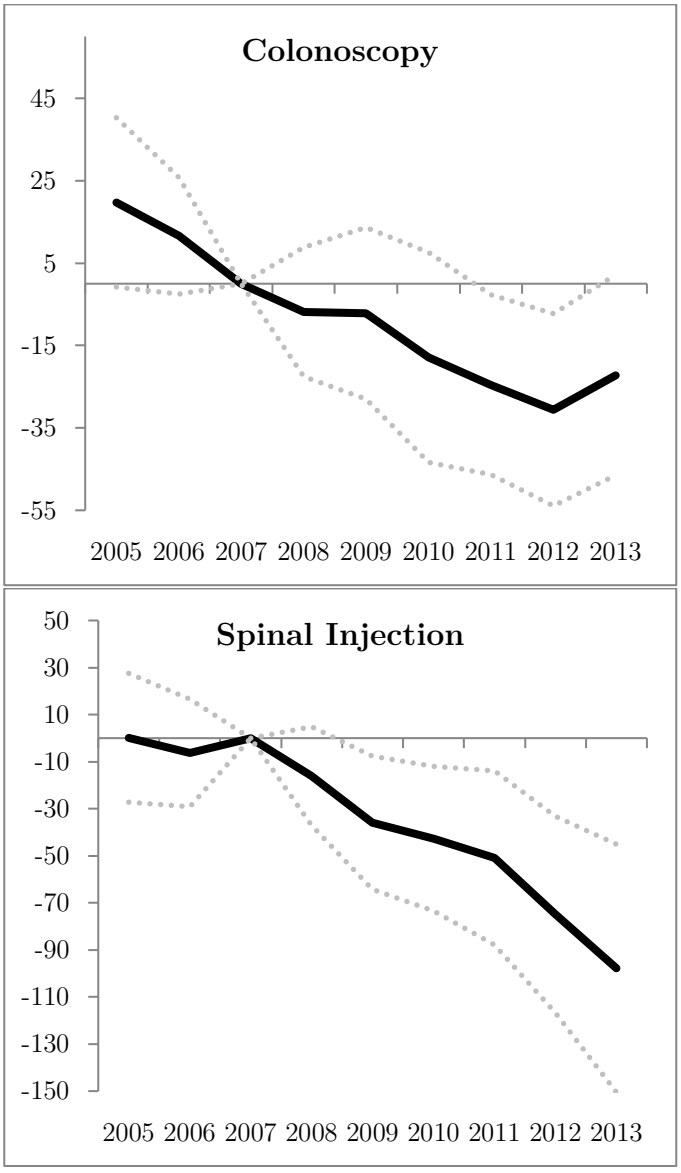
Notes: Analytic samples are the same as those in Table 4. The coefficients and 95% confidence intervals are from the event study estimation using 2007 as the omitted year. The outcome is total Medicare FFS ASC volume for the relevant procedure.

FIGURE 4—EVENT STUDIES FOR TOTAL MEDICARE FACILITY FEE SPENDING DIFFERENTIALS ($1000) ACCORDING TO LOW VERSUS HIGH BASELINE ASC RELIANCE



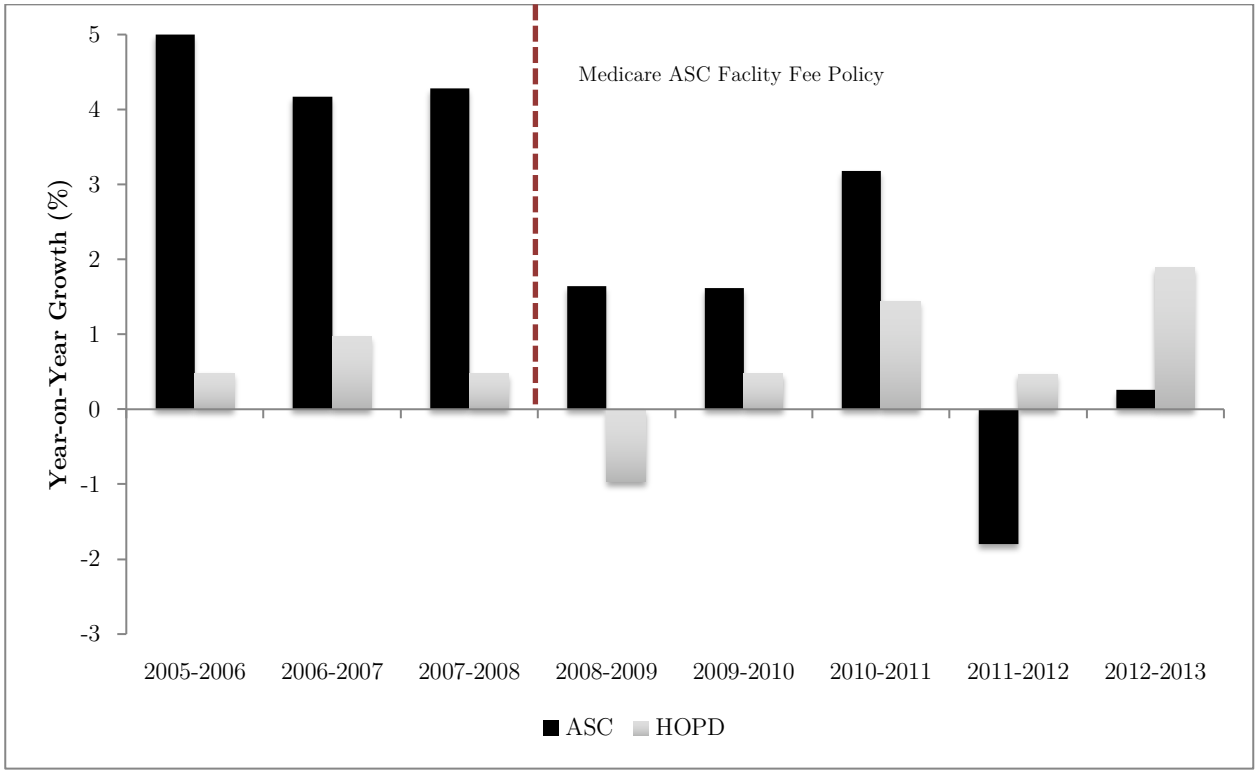
Notes: Analytic samples are the same as those in Table 4. The coefficients and 95% confidence intervals are from the event study estimation using 2007 as the omitted year. The spending outcome is in thousand dollar nominal units.

FIGURE 5—EVENT STUDIES FOR POLICY EFFECTS ON INDIVIDUAL PROVIDERS WITH HIGH ASC RELIANCE IN THE PRE-POLICY PERIOD



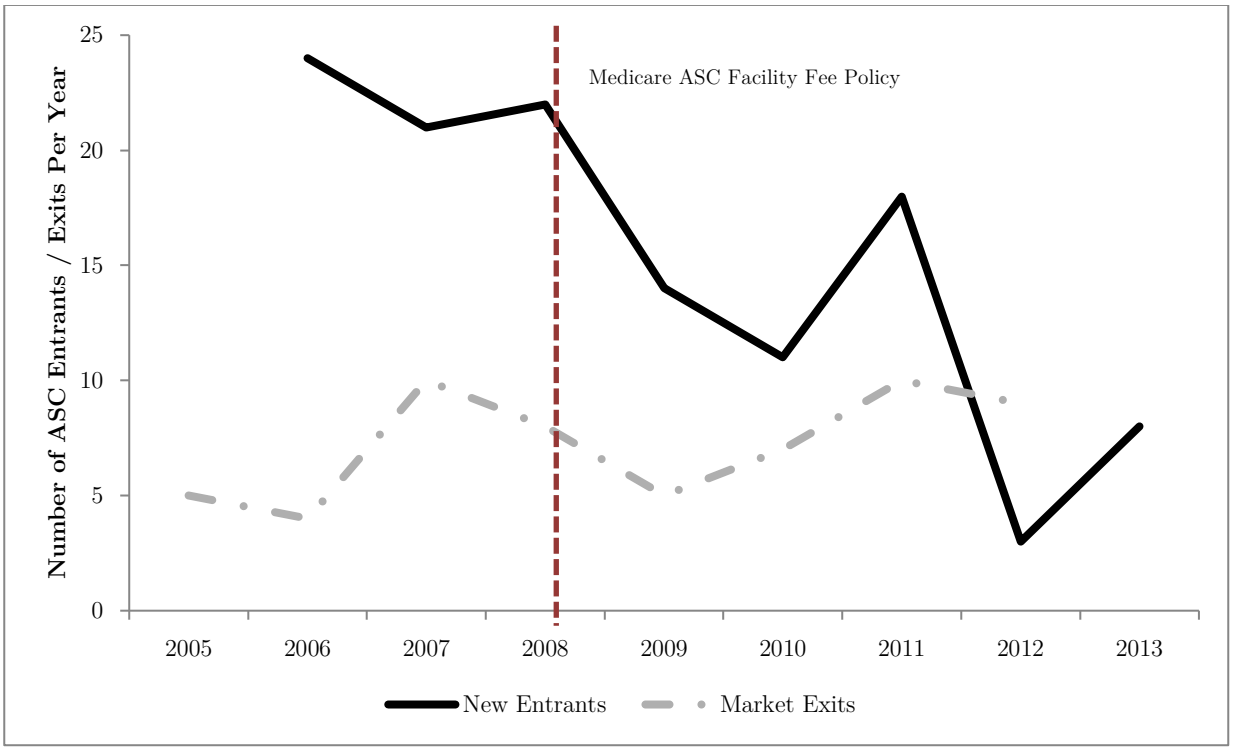
Notes: Estimates are event study specifications that parallel the two-by-two difference-in-differences models belonging to Table 5 (column 3) and Table 6, respectively.

FIGURE 6—OUTPATIENT SURGICAL FACILITY GROWTH BY FACILITY TYPE 2005-2013



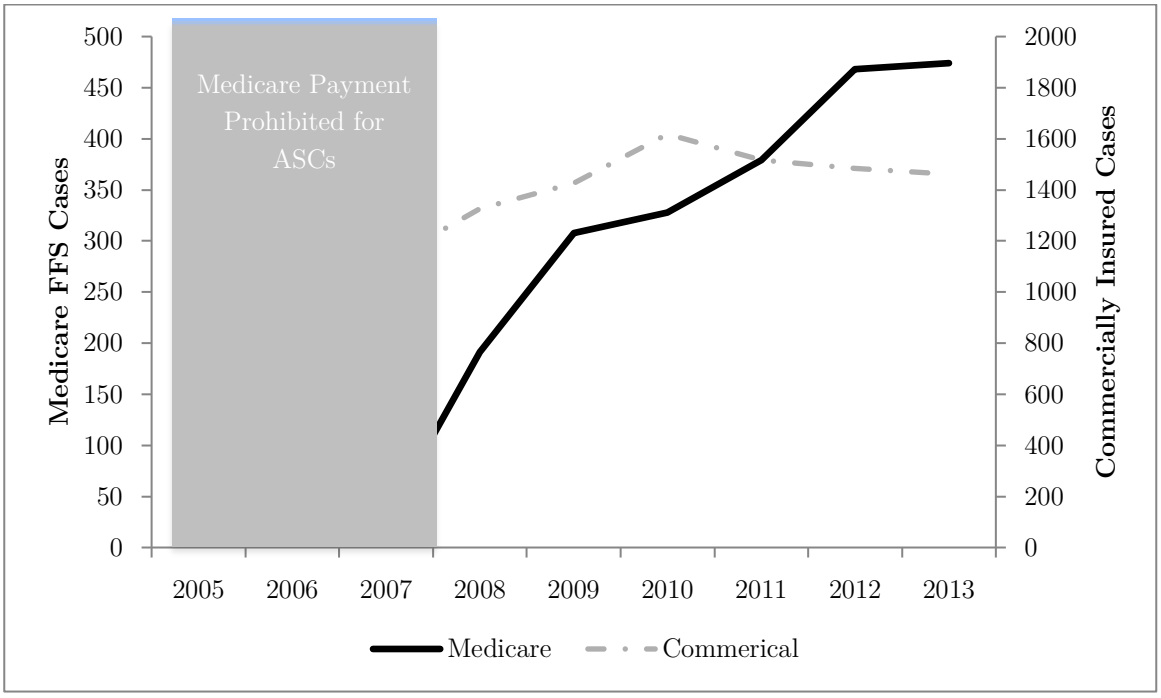
Notes: Florida AHCA discharge data capturing the universe of ambulatory surgical cases and facilities per year.

FIGURE 7—ENTRY AND EXIT BY AMBULATORY SURGICAL CENTERS OVER TIME



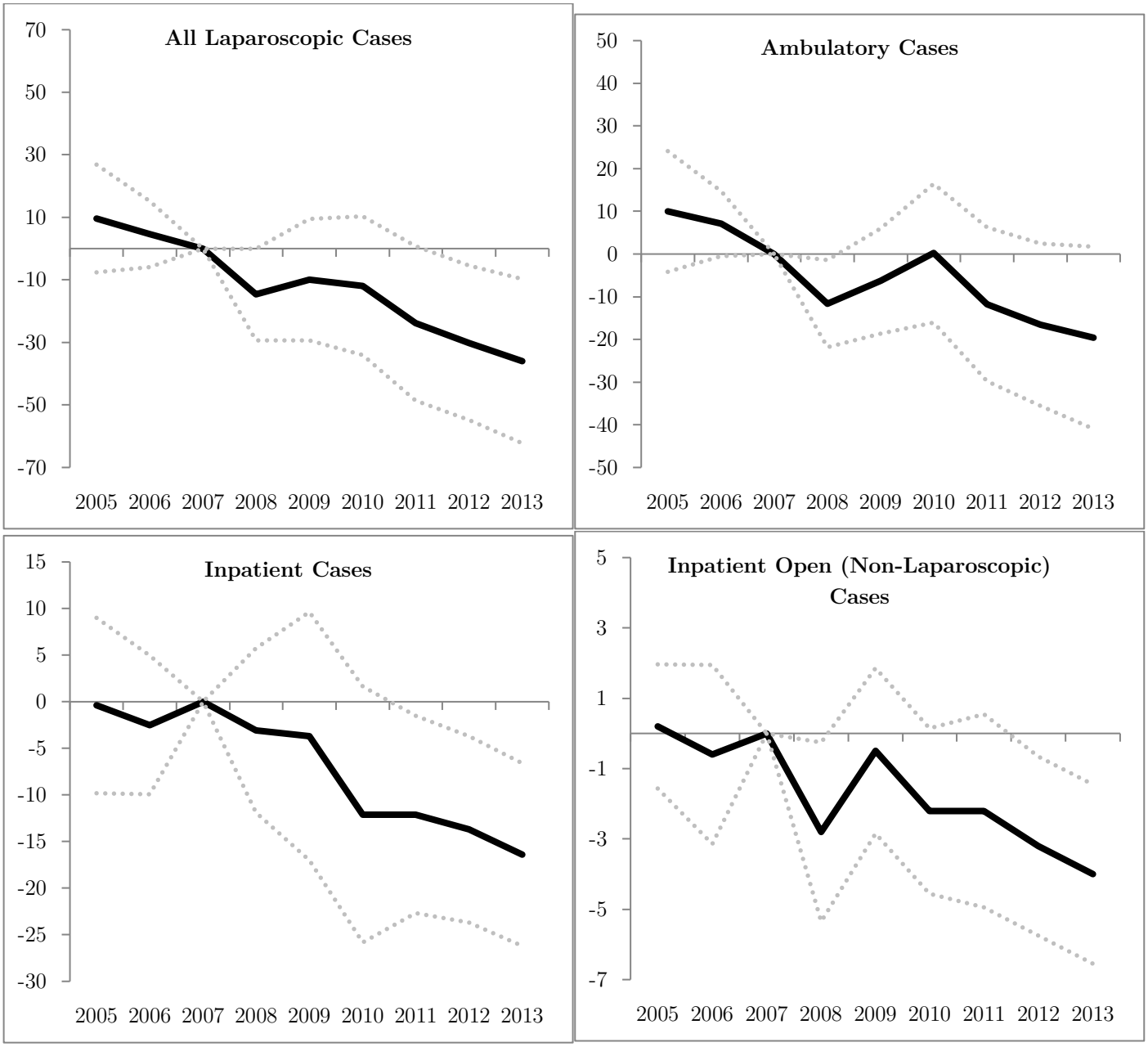
Notes: Florida AHCA discharge data capturing the universe of ambulatory surgical cases and facilities per year.

FIGURE 8—ASC LAPAROSCOPIC CHOLECYSTECTOMY PROCEDURE VOLUMES FOR MEDICARE AND COMMERCIALLY INSURED PAYERS 2005-2013



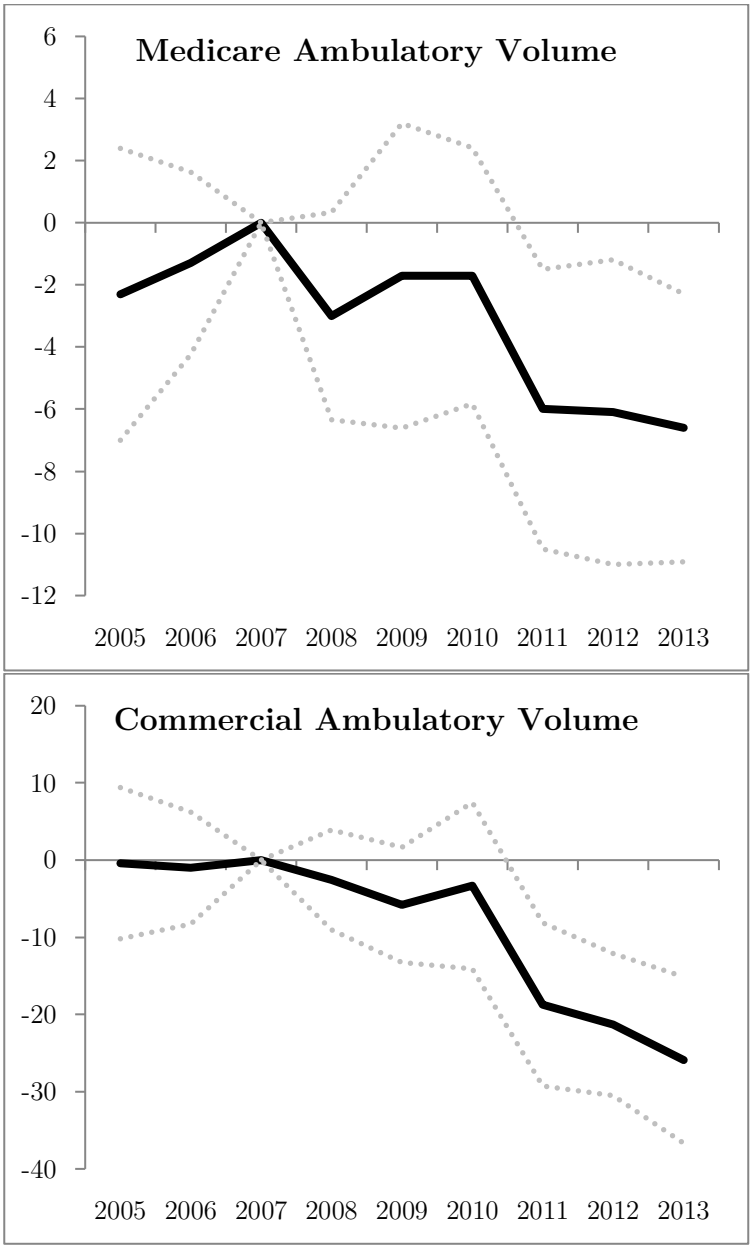
Notes: Florida AHCA discharge data capturing the universe of ambulatory surgical cases. Laparoscopic cholecystectomies are identified via the corresponding HCPCS (CPT) codes.

FIGURE 9—EVENT STUDIES FOR ASC ENTRY EFFECT ON HOSPITALS' CHOLECYSTECTOMY CASE LOADS



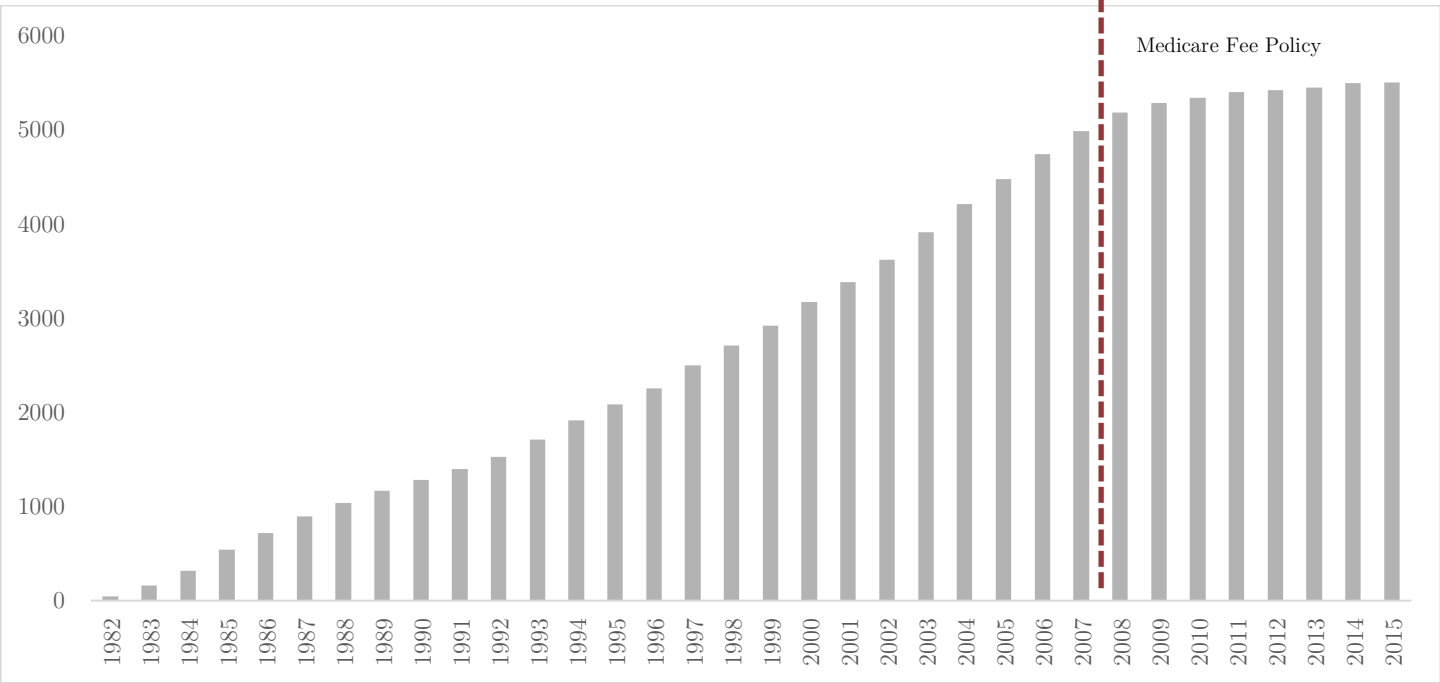
Notes: Standard errors clustered at the county level based on facility location. Treated hospitals are those located in counties with three or more ASCs performing commercial laparoscopic cholecystectomy cases in 2007. The control comparison hospitals are those located in counties with zero ASCs performing these procedures as of 2007. Analytic sample is also restricted to hospitals performing cholecystectomies over the full study period.

FIGURE 10—EVENT STUDIES FOR ASC ENTRY EFFECT ON HOSPITALS' AMBULATORY CHOLECYSTECTOMY CASE LOADS BY PRESENCE OF COMMERCIAL "SPLITTERS" PRIOR TO MEDICARE REIMBURSEMENT CHANGE



Notes: The analytic sample is identical to Table 11. 2007 is the omitted reference year.

FIGURE 11—NUMBER OF MEDICARE CERTIFIED AMBULATORY SURGICAL CENTERS NATIONALLY 1982-2015



Notes: Data are from the Medicare Provider of Services files

TABLE 1—BASELINE SUMMARY STATISTICS FOR AMBULATORY SURGICAL CENTERS AND HOSPITAL OUTPATIENT DEPARTMENTS

	ASC	**HOPD**
	Mean (SD)	Mean (SD)
Number of Providers	24.2 (30.4)	202.4 (168.0)
Number of Cases	4103.3 (2804.2)	7276.1 (6420.9)
HHI	0.11 (0.09)	0.18 (0.26)
Share of Cases	(%)	(%)
Medicare FFS	42.8	34.5
Commercial	42.2	42.6
All Others	15.1	22.9

Restricted to ASC and HOPD facilities in operation as of 2005 and therefore present in the Florida AHCA ambulatory discharge data in that year. In total, there are 320 and 204 ASCs and HOPDs, respectively, present in Florida in 2005. Unique providers are identified by the license information provided within the discharge data. Herfindahl-Hirschman index (HHI) measures are constructed at the county level based on the share of all ambulatory procedures performed within a given facility.

TABLE 2—DELIVERY SETTING AND MEDICARE PRICE CUT FOR SELECT AMBULATORY SURGICAL SERVICES

Outpatient Surgical Procedure	Medicare Share Performed in ASC (%)	ASC to HOPD Fee Ratio 2007	ASC to HOPD Fee Ratio 2012	Facility Fee Change 2007-2012 (%)
Colonoscopy	68.0	0.82	0.58	-15.2
Spinal Injection	77.0	0.72	0.58	-9.3
Cystoscopy	77.1	0.80	0.58	-17.8
Upper Endoscopy (w/biopsy)	68.5	0.87	0.58	-23.4

Cases are identified from the Florida ambulatory discharge data using the corresponding HCPCS (CPT) codes. The second column captures the share of all Medicare FFS cases over 2005-2006. The Medicare facility fee schedule is in nominal dollars and by HCPCS code. The corresponding fees can also be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ASCPayment/index.html.

TABLE 3—COUNTY LEVEL CHANGES IN MEDICARE FFS PROCEDURE VOLUME BY DELIVERY SETTING TYPE

	Hospital Outpatient Departments				**Ambulatory Surgical Centers**			
	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-275.99***	-202.87***	-28.17	-53.83	139.5*	166.60***	3.31	81.77
	(91.10)	(71.73)	(39.94)	(33.58)	(79.07)	(58.45)	(15.22)	(51.55)
Post*Baseline ASC Share	-1.09	2.47**	0.34	0.86	-5.39**	-3.42***	-0.08	3.90**
	(1.46)	(0.95)	(0.42)	(0.70)	(2.07)	(10.07)	(1.11)	(1.75)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	441	360	360	441	441	360	360	441
Unique Counties	49	40	40	49	49	40	40	49
	Means	Means	Means	Means	Means	Means	Means	Means
Baseline ASC Share	49.5	61.3	39.0	49.3	49.5	61.3	39.0	49.3
Outcome (by setting)	1297.9	335.2	76.1	603.0	2642.1	1004.1	260.1	1245.6
Scaled Effect at Mean	-53.96	151.41	13.26	42.40	-266.81	-209.65	-3.12	192.27

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level. "Baseline ASC Share" is a continuous variable that reflects the percent (%) of 2005 relevant cases performed within an ASC for a given county. Analytic data are restricted to counties with relevant ambulatory procedures over the full 9-year study period.

TABLE 4—COUNTY LEVEL DIFFERENTIAL CHANGES IN ASC MEDICARE FFS PROCEDURE VOLUME ACCORDING TO LOW VERSUS HIGH BASELINE ASC RELIANCE

	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy
	(1)	(2)	(3)	(4)
Post	148.69*	1589.88***	3.89**	73.66**
	(78.91)	(54.86)	(1.87)	(36.23)
Post*High ASC	-424.57**	-295.24**	-20.18	285.66*
Reliance	(210.22)	(123.23)	(91.53)	(153.40)
County FE	Yes	Yes	Yes	Yes
N	297	243	243	297
Unique Counties	33	27	27	33
High ASC Reliance Baseline Outcome Mean	3976.3	1296.7	765.9	1810.7

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level. "High ASC Reliance" is equal to one for counties in the top third of the relevant Baseline (2005) ASC Share variable distribution (variable used in Table 3 results) and zero otherwise. Analytic data are restricted to counties in the first and third terciles for Baseline ASC Share measure belonging to a given procedure type and with relevant ambulatory procedures over the full 9-year study period.

TABLE 5—POLICY EFFECT ON INDIVIDUAL PROVIDERS' TOTAL MEDICARE FFS COLONOSCOPY VOLUME

	All Treated Providers Included	Low ASC Reliance as Treatment Group	High ASC Reliance as Treatment Group
	(1)	(2)	(3)
Post	-12.96*	-12.96*	-12.96*
	(7.34)	(7.34)	(7.35)
Post*Treated	-16.78**	-3.95	-28.66**
	(8.31)	(7.93)	(12.13)
Provider FE	Yes	Yes	Yes
N	6,498	3,141	3,132
Unique Providers	722	349	348
Pre-Period ASC Provider Outcome Mean	225.1	174.0	262.2

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county where the individual provider performs the majority of the relevant procedures during the 2005-2006 period. The analytic sample is restricted to providers serving the Medicare market over the 9-year study period. The treatment groups ("Treated") are composed of individual providers relying on ASCs to perform cases in the pre-policy period. Columns 2 and 3 further refine the treatment groups based on the degree of reliance (i.e., bottom and top third for average ASC share of relevant cases during 2005-2007, respectively). Throughout all three columns, the control comparison group is composed of individual providers that exclusively delivered these services to Medicare patients within Hospital Outpatient Department (HOPD) settings at baseline.

TABLE 6—POLICY EFFECT ON INDIVIDUAL PROVIDERS' TOTAL MEDICARE FFS SPINAL INJECTION VOLUME

Post	3.69
	(7.56)
Post*Treated	-50.97***
	(15.14)
Provider FE	Yes
N	1,674
Unique Providers	186
Pre-Period ASC Provider Outcome Mean	227.6

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county where the individual provider performs the majority of the relevant procedures during the 2005-2006 period. The analytic sample is restricted to providers serving the Medicare market over the study period. The treatment group is composed of individual providers relying on ASCs to perform cases in the pre-policy period. The control comparison group is composed of individual providers that exclusively delivered these services to Medicare patients within Hospital Outpatient Department (HOPD) settings at baseline.

TABLE 7—ASC ENTRY EFFECT ON INCUMBENT FIRMS' CASE LOADS IN THE PRE-POLICY PERIOD BY FACILITY TYPE

	Hospital Outpatient Departments			**Ambulatory Surgical Centers**		
	Total Cases (in logs)	Total Medicare Cases (in logs)	Total Comm. Cases (in logs)	Total Cases (in logs)	Total Medicare Cases (in logs)	Total Comm. Cases (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)
ASC Entry	-0.155***	-0.110**	-0.127***	-0.035	-0.022	-0.069**
(Lagged One Year)	(0.057)	(0.051)	(0.042)	(0.023)	(0.023)	(0.034)
County Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Unique Facilities	203	203	203	302	298	301

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. The analytic data are restricted to the 2006-2008 period and facilities in operation in 2005 (baseline data year) and through 2008. "ASC Entry" is a binary variable equal to one for incumbent firms located in counties that experienced new ASC entry in a given year. All models control for lagged number of ASC exits and county-level unemployment rates.

TABLE 8—ASC ENTRY EFFECT ON HOSPITALS' CHOLECYSTECTOMY CASE LOADS

	All Laparoscopic	Ambulatory Laparoscopic	Inpatient Laparoscopic	Inpatient Open (Non-Laparoscopic)
	(1)	(2)	(3)	(4)
Post	13.63**	9.60**	4.02	-3.43***
	(6.06)	(4.24)	(3.47)	(0.71)
Post*Pre-Existing ASC	-25.83**	-16.62**	-9.22*	-2.34**
Competition	(10.63)	(7.19)	(5.12)	(0.94)
HOPD FE	Yes	Yes	Yes	Yes
N	1,026	1,026	1,026	1,026
Unique HOPDs	114	114	114	114
Pre-Policy Outcome Mean for Treated	199.0	108.6	90.4	14.7

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. "Pre-Existing ASC Competition" is equal to one for hospitals located in counties with three or more ASCs performing commercial laparoscopic cholecystectomy cases in 2007 and zero otherwise. The control comparison hospitals are those located in counties with zero ASCs performing these procedures as of 2007. Analytic sample is also restricted to hospitals performing cholecystectomies over the full study period.

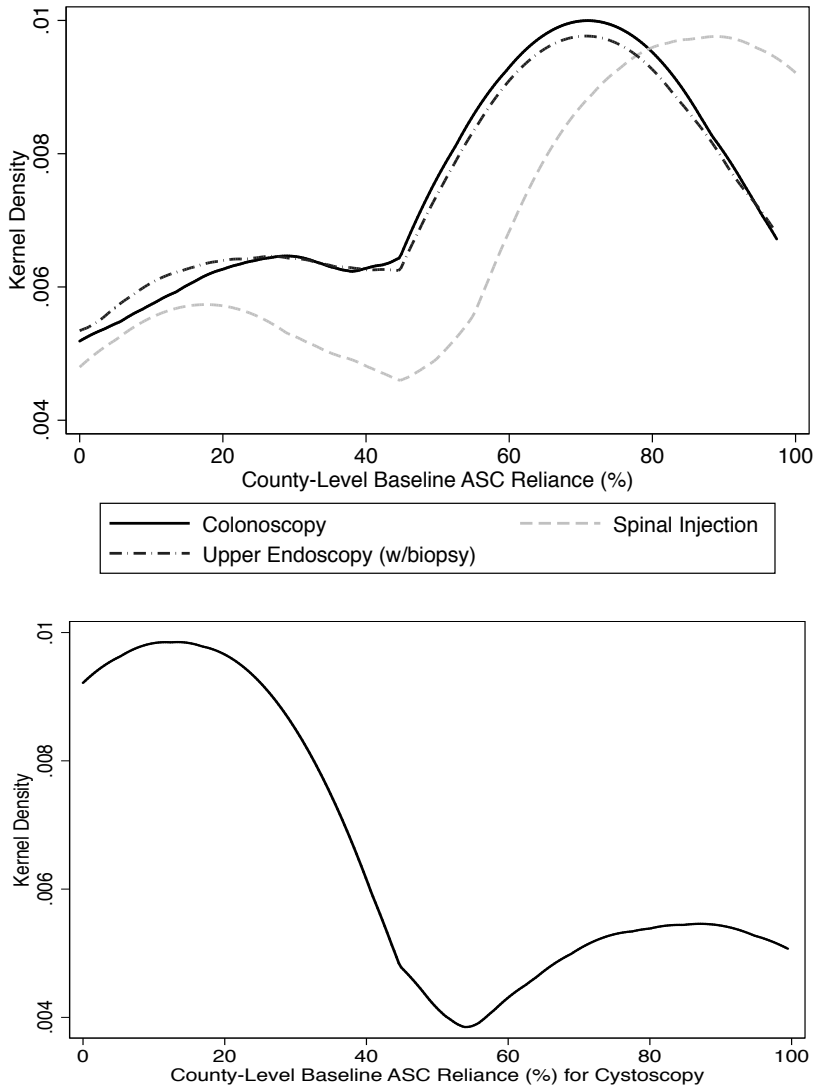
TABLE 9—ASC ENTRY EFFECT ON HOSPITALS' CHOLECYSTECTOMY CASE LOADS BY PRESENCE OF COMMERCIAL "SPLITTERS" PRIOR TO MEDICARE REIMBURSEMENT CHANGE

	Medicare FFS Ambulatory Cases	Commercial Ambulatory Cases
	(1)	(2)
Post	4.42***	1.56
	(1.03)	(2.08)
Post*Pre-Existing	-2.98*	-12.44***
Splitters	(1.71)	(3.77)
HOPD FE	Yes	Yes
N	1,629	1,629
Unique Hospitals	181	181
Pre-Policy Outcome Mean for Treated	32.4	112.9

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. Pre-Existing Splitters" is equal to one for hospitals with at least one provider performing cholecystectomies at the hospital as well as an ASC in 2007 (i.e., splitting cases between the two settings). The control comparison hospitals are those with zero cholecystectomy splitters performing these cases within the hospital in 2007.

APPENDIX RESULTS

Appendix Figure 1—County-Level ASC Reliance at Baseline (2005) and by Procedure Type



Notes: Analytic data are from Florida AHCA ambulatory procedure discharge records and based on the 2005 reporting year. Top panel includes colonoscopy, spinal injection, and upper endoscopy. The bottom panel shows the density plot for cystoscopy procedures in isolation due to its departure from the other three procedure types.

Appendix Table 1—Changes In Hospital Outpatient Department Medicare Ffs Procedure Volume For Providers Relying On ASCs At Baseline

	Colonoscopy	Spinal Injection
	(1)	(2)
Post*Baseline ASC Reliance	0.99***	0.88***
	(0.17)	(0.12)
Provider FE	Yes	Yes
N	5,580	1,332
Unique Providers	620	148
Mean Baseline ASC Reliance	60.0	88.0
Mean Outcome	42.0	16.4
Scaled Effect at the Mean	59.4	77.4

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county where the individual provider performs the majority of the relevant procedures during the 2005-2006 period. The analytic sample is restricted to providers serving the Medicare market over the study period and those with some non-zero ASC relevant cases at baseline (i.e., the sample excludes those that only performed cases within HOPDs).

Appendix Table 2—Total ASC Volume Event Studies for Counties with Low Versus High Baseline ASC Reliance

	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy
	(1)	(2)	(3)	(4)
2005*High ASC Reliance	149.75	164.03*	-24.65	-137.30
	(162.78)	(83.77)	(54.92)	(82.19)
2006*High ASC Reliance	69.40	152.29*	-51.12	-19.43
	(81.22)	(80.56)	(43.87)	(39.35)
2008*High ASC Reliance	5.71	-48.10	16.31	129.42
	(150.41)	(63.28)	(57.70)	(90.57)
2009*High ASC Reliance	-299.65	-75.29	1.40	240.59*
	(192.53)	(98.63)	(78.70)	(130.87)
2010*High ASC Reliance	-541.25**	-110.19	-56.79	195.80
	(227.89)	(140.83)	(80.63)	(156.05)
2011*High ASC Reliance	-433.43**	-152.99	-81.16	275.36
	(211.55)	(148.06)	(77.64)	(180.18)
2012*High ASC Reliance	-426.28*	-309.77**	-41.26	273.82
	(222.49)	(128.30)	(98.61)	(186.51)
2013*High ASC Reliance	-414.23	-442.48***	-111.08	285.49
	(257.75)	(130.67)	(94.33)	(206.66)
County FE	Yes	Yes	Yes	Yes
N	297	243	243	297
Unique Counties	33	27	27	33

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level. "High ASC Reliance" is equal to one for counties in the top third of the relevant Baseline (2005) ASC Share variable distribution (variable used in Table 3 results) and zero otherwise. Analytic data are restricted to counties in the first and third terciles for Baseline ASC Share measure belonging to a given procedure type and with relevant ambulatory procedures over the full 9-year study period.

Appendix Table 3—Total Spending Event Studies for Counties with Low Versus High Baseline ASC Reliance

	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy
	(1)	(2)	(3)	(4)
2005*High ASC Reliance	2.96	-18.93	-2.52	-108.90**
	(104.63)	(40.05)	(20.27)	(50.72)
2006*High ASC Reliance	-41.52	2.19	-12.08	-55.03**
	(44.86)	(29.00)	(16.91)	(20.64)
2008*High ASC Reliance	-88.69	-16.62	-16.34	7.95
	(70.59)	(22.74)	(18.24)	(45.25)
2009*High ASC Reliance	-240.77***	-22.03	-30.70	25.63
	(87.34)	(37.94)	(26.61)	(66.07)
2010*High ASC Reliance	-369.31***	-32.62	-51.52*	-20.41
	(99.50)	(53.49)	(25.68)	(68.63)
2011*High ASC Reliance	-406.78***	-37.23	-66.48**	-42.64
	(90.98)	(70.59)	(26.12)	(68.11)
2012*High ASC Reliance	-353.94***	-100.33	-65.23**	-51.69
	(108.54)	(65.49)	(28.14)	(76.20)
2013*High ASC Reliance	-298.05**	-135.05**	-69.81**	8.83
	(119.71)	(64.14)	(29.57)	(80.98)
County FE	Yes	Yes	Yes	Yes
N	297	243	243	297
Unique Counties	33	27	27	33

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level. "High ASC Reliance" is equal to one for counties in the top third of the relevant Baseline (2005) ASC Share variable distribution (variable used in Table 3 results) and zero otherwise. Analytic data are restricted to counties in the first and third terciles for Baseline ASC Share measure belonging to a given procedure type and with relevant ambulatory procedures over the full 9-year study period.

Appendix Table 4—County Level Changes in Total Medicare FFS Facility Fee Spending ($1000) By Procedure Type

	Continuous ASC Reliance Measure				**Low Versus High ASC Reliance**			
	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy	Colonoscopy	Spinal Injection	Cystoscopy	Upper Endoscopy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-38.64	13.66	-1.78	31.81*	-21.33	25.53	15.90	34.53***
	(37.35)	(25.87)	(18.02)	(18.63)	(40.08)	(25.72)	(15.40)	(10.91)
Post*Baseline ASC Share	-4.78***	-0.65	-0.28	0.41				
	(1.17)	(0.45)	(0.36)	(0.79)				
Post*High ASC Reliance					-280.07***	-51.73	-45.15	42.59
					(98.50)	(49.27)	(29.74)	(69.93)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	441	360	360	441	297	243	243	297
Unique Counties	49	40	40	49	33	27	27	33
Baseline ASC Share Mean	49.5	61.3	39.0	49.3				
High ASC Reliance Baseline Outcome Mean					2114.2	445.7	263.2	948.2

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level

Appendix Table 5—Event Studies for Providers' Total Procedural Output Comparing Those With High Baseline ASC Reliance to Those Using HOPDs Exclusively

	Colonoscopy	Spinal Injection
	(1)	(2)
2005*Treated	19.74*	-27.59
	(10.54)	(24.51)
2006* Treated	11.59	-17.14
	(7.19)	(18.10)
2008* Treated	-6.79	-8.46
	(7.96)	(14.49)
2009* Treated	-7.21	-27.00
	(10.57)	(19.65)
2010* Treated	-17.95	-43.80**
	(12.99)	(16.81)
2011* Treated	-24.49**	-55.36**
	(11.13)	(21.85)
2012* Treated	-30.65**	-80.17***
	(11.93)	(29.32)
2013* Treated	-22.21*	-97.57***
	(12.44)	(32.35)
Provider FE	Yes	Yes
N	3,132	792
Unique Providers	348	88

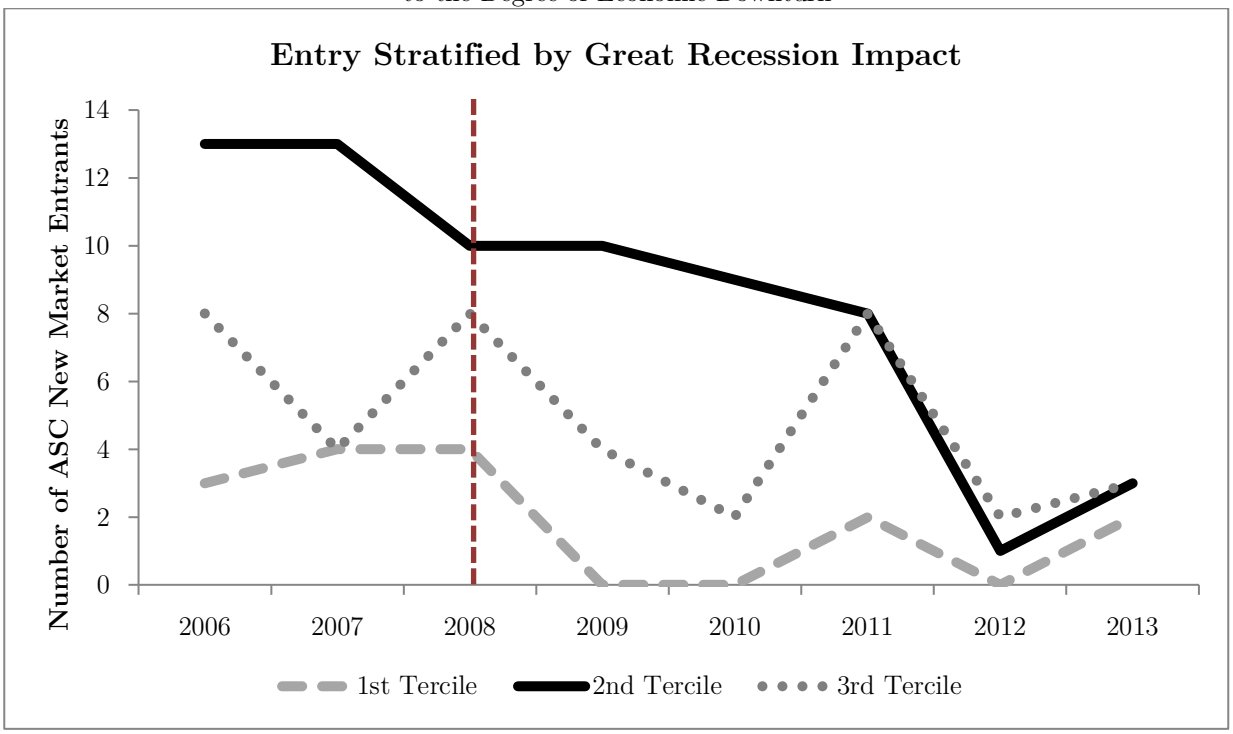
*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county where the individual provider performs the majority of the relevant procedures during the 2005-2006 period. The analytic sample is restricted to providers serving the Medicare market over the study period. The treatment group is composed of individual providers relying on ASCs to perform cases in the pre-policy period (i.e., the "high reliance" groups from main Tables 6 and 7). The control comparison groups are composed of individual providers that exclusively delivered these services to Medicare patients within Hospital Outpatient Department (HOPD) settings at baseline.

Appendix Table 6—Policy Effect on Individual Providers' Total Medicare FFS Procedure Volume

	Cystoscopy			**Upper Endoscopy (w/biopsy)**		
	All Treated Providers Included	Low ASC Reliance as Treatment Group	High ASC Reliance as Treatment Group	All Treated Providers Included	Low ASC Reliance as Treatment Group	High ASC Reliance as Treatment Group
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-13.47	-13.37	-13.47	8.83**	8.83**	8.83**
	(13.53)	(13.57)	(13.59)	(3.66)	(3.66)	(3.66)
Post*Treated	-4.04	8.15	-30.54	1.14	-2.07	-3.64
	(14.15)	(12.93)	(28.26)	(4.68)	(4.82)	(7.00)
Provider FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,080	621	612	6,138	2,826	2,817
Unique Providers	120	69	68	682	314	313
Pre-Period ASC Provider Outcome Mean	113.1	20.4	193.1	128.6	105.7	149.6

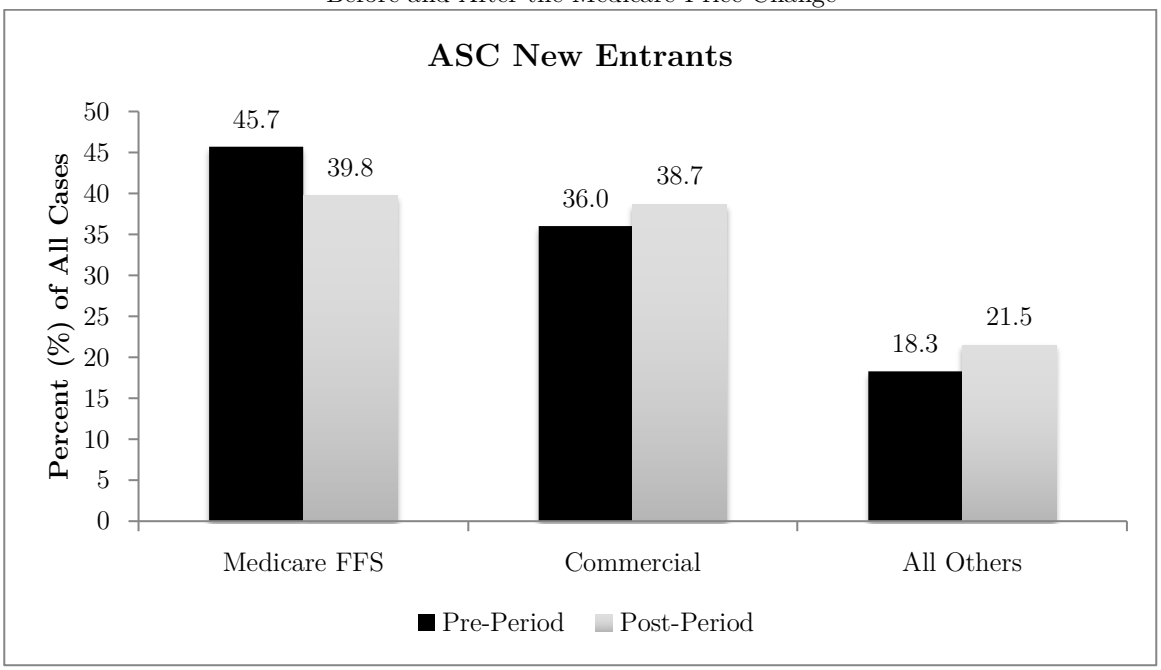
*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county where the individual provider performs the majority of the relevant procedures during the 2005-2006 period. The analytic sample is restricted to providers serving the Medicare market over the 9-year study period. The treatment groups ("Treated") are composed of individual providers relying on ASCs to perform cases in the pre-policy period. Columns 2 and 3 (and 5 and 6) further refine the treatment groups based on the degree of reliance (i.e., bottom and top third for average ASC share of relevant cases during 2005-2007, respectively). Throughout all columns, the control comparison group is composed of individual providers that exclusively delivered these services to Medicare patients within Hospital Outpatient Department (HOPD) settings at baseline.

Appendix Figure 2—Ambulatory Surgical Center Entry Over Time According to the Degree of Economic Downturn



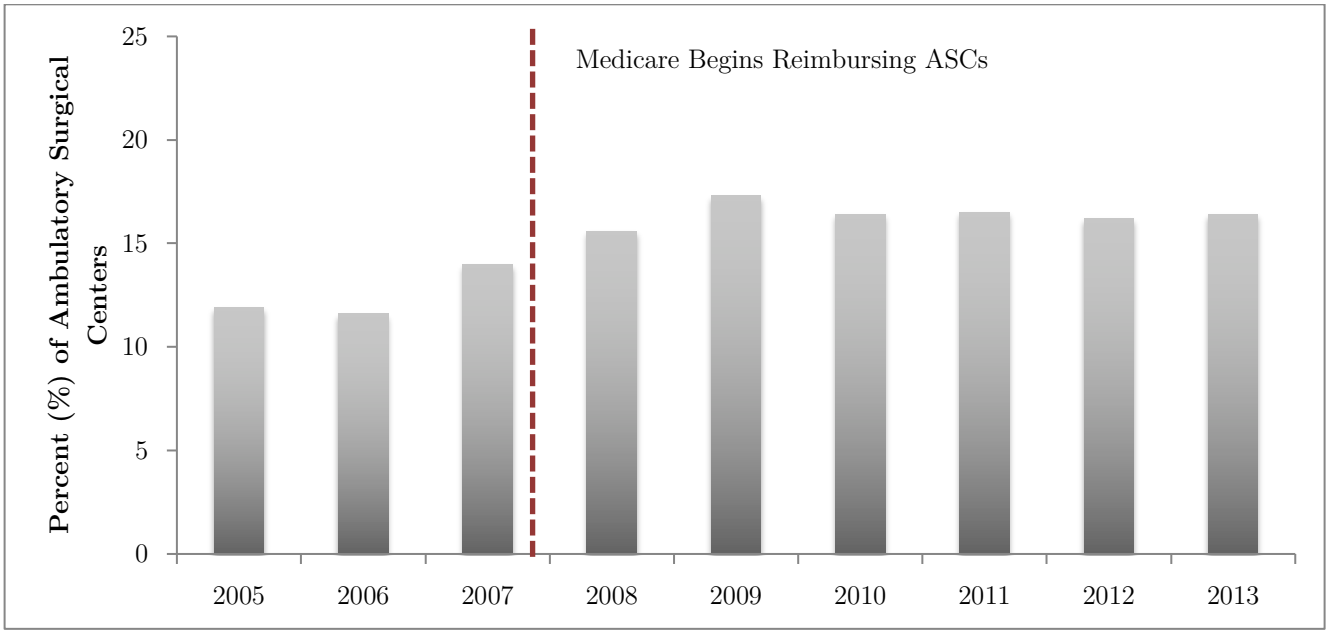
Notes: Florida AHCA discharge data capturing the universe of ambulatory surgical cases and facilities per year. Restricted to facilities that newly entered the Florida market between 2006 and 2013. Tercile groupings reflect the relative change in the county unemployment rate between 2007 and 2010.

Appendix Figure 3—Payer Breakdown for ASC New Market Entrants
Before and After the Medicare Price Change



Notes: Florida AHCA discharge data capturing the universe of ambulatory surgical cases and facilities per year. Restricted to facilities that newly entered the Florida market between 2006 and 2013. Post-period are the years after the Medicare FFS facility fee cut.

Appendix Figure 4—Percent of ASCs Delivering Laparoscopic Cholecystectomy Procedures to the Commercial and/or Medicare Markets



Notes: Analytic data are from Florida AHCA ambulatory procedure discharge records. Laparoscopic cholecystectomy cases are identified by the reported HCPCS (CPT) codes within each discharge record.

Appendix Table 7—ASC Entry Effect On Incumbent Firms' Case Loads In The Pre-Policy Period

	Hospital Outpatient Departments			**Ambulatory Surgical Centers**		
	Total Cases (in logs)	Total Medicare Cases (in logs)	Total Comm. Cases (in logs)	Total Cases (in logs)	Total Medicare Cases (in logs)	Total Comm. Cases (in logs)
	(1)	(2)	(3)	(4)	(5)	(6)
One New ASC	-0.158***	-0.122**	-0.132***	-0.022	-0.012	-0.049
(Lagged One Year)	(0.056)	(0.051)	(0.042)	(0.027)	(0.027)	(0.038)
Multiple New ASCs	-0.150**	-0.090	-0.117**	-0.062***	-0.043*	-0.111***
(Lagged One Year)	(0.067)	(0.063)	(0.054)	(0.022)	(0.024)	(0.030)
County Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Unique Facilities	203	203	203	302	298	301

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. The analytic data are restricted to the 2006-2008 period and facilities in operation in 2005 (baseline data year) and through 2008. All models control for lagged ASC exit and county-level unemployment rates.

Appendix Table 8—Event Studies for Medicare Laparoscopic Cholecystectomy Payment Policy Effects on Incumbent Hospital Outpatient Department Case Volumes

	All Laparoscopic Cases	Ambulatory Cases	Inpatient Cases	Inpatient Non-Laparoscopic Cases
	(1)	(2)	(3)	(4)
2005*Treated	9.58	9.95	-0.38	0.19
	(8.77)	(7.21)	(4.78)	(0.88)
2006* Treated	4.58	7.06	-2.47	-0.56
	(5.41)	(3.89)	(3.81)	(1.28)
2008* Treated	-14.71*	-11.63**	-3.08	-2.75**
	(7.49)	(5.25)	(4.52)	(1.25)
2009* Treated	-10.02	-6.32	-3.70	-0.50
	(9.95)	(6.28)	(6.81)	(1.17)
2010* Treated	-11.93	0.17	-12.09*	-2.18*
	(11.26)	(8.26)	(7.04)	(1.22)
2011* Treated	-23.90*	-11.83	-12.07**	-2.21
	(12.60)	(9.16)	(5.35)	(1.40)
2012* Treated	-30.18**	-16.51*	-13.67***	-3.15**
	(12.65)	(9.67)	(5.11)	(1.31)
2013* Treated	-35.98**	-19.57*	-16.41***	-4.01***
	(13.36)	(10.88)	(5.00)	(1.27)
HOPD FE	Yes	Yes	Yes	Yes
N	1,026	1,026	1,026	1,026
Unique HOPDs	114	114	114	114
Pre-Period Treated Outcome Mean	199.0	108.6	90.4	14.7

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. "Treated" is equal to one for hospitals located in counties with three or more ASCs performing commercial laparoscopic cholecystectomy cases in 2007 and zero otherwise. The control comparison hospitals are those located in counties with zero ASCs performing these procedures as of 2007. Analytic sample is also restricted to hospitals performing cholecystectomies over the full study period.

Appendix Table 9—Diff-in-Diff Estimates for Medicare Laparoscopic Cholecystectomy Payment Policy Effects on Incumbent Hospital Outpatient Department Case Volumes Stratified by Payer Type

	Medicare FFS				**Commercially Insured**			
	All Laparoscopic Cases	Ambulatory Cases	Inpatient Cases	Inpatient Non-Laparoscopic Cases	All Laparoscopic Cases	Ambulatory Cases	Inpatient Cases	Inpatient Non-Laparoscopic Cases
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	6.78*	5.95***	0.83	-2.65***	6.84**	3.65	3.19*	-0.78***
	(3.49)	(1.78)	(2.36)	(0.65)	(3.07)	(2.85)	(1.67)	(0.19)
Post*Treated	-9.88**	-5.25**	-4.63	-0.54	-15.95**	-11.37*	-4.59*	-1.80***
	(4.58)	(2.06)	(3.11)	(0.83)	(7.03)	(5.79)	(2.58)	(0.30)
HOPD FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026
Unique HOPDs	114	114	114	114	114	114	114	114
Pre-Period Treated Outcome Mean	55.6	20.3	35.3	8.4	143.4	88.3	55.1	6.3

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. "Treated" is equal to one for hospitals located in counties with three or more ASCs performing commercial laparoscopic cholecystectomy cases in 2007 and zero otherwise. The control comparison hospitals are those located in counties with zero ASCs performing these procedures as of 2007. Analytic sample is also restricted to hospitals performing cholecystectomies over the full study period.

Appendix Table 10—Diff-in-Diff and Event Study Estimates for Medicare Laparoscopic Cholecystectomy Payment Policy Effects on Incumbent Hospital Outpatient Department Case Ambulatory Surgical Volumes Stratified by Payer Type

	Medicare FFS		**Commercial**	
	(1)	(2)	(3)	(4)
Post	4.42***		1.56	
	(1.03)		(2.08)	
Post*Treated	-2.98*		-12.44***	
	(1.71)		(3.77)	
2005*Treated		-2.26		-0.36
		(2.44)		(4.99)
2006* Treated		-1.33		-1.04
		(1.48)		(3.69)
2008* Treated		-3.02*		-2.55
		(1.66)		(3.35)
2009* Treated		-1.67		-5.78
		(2.55)		(3.83)
2010* Treated		-1.66		-3.25
		(2.06)		(5.48)
2011* Treated		-5.99**		-18.66***
		(2.34)		(5.41)
2012* Treated		-6.09**		-21.31***
		(2.49)		(4.66)
2013* Treated		-6.65***		-25.93***
		(2.22)		(5.52)
HOPD FE	Yes	Yes	Yes	Yes
N	1,629	1,629	1,629	1,629
Unique HOPDs	181	181	181	181
Pre-Period Treated Outcome Mean	32.4	32.4	112.9	112.9

*** P value at 0.01 level ** P value at 0.05 level * P value at 0.10 level, standard errors clustered at the county level based on facility location. "Treated" is equal to one for hospitals with existing surgeons performing commercially insured cases within the hospital ***as well as*** performing such cases within ASCs in 2007 and zero otherwise. The control comparison hospitals are those within the presence of commercial "splitters" for these cases in 2007. Analytic sample is also restricted to hospitals performing cholecystectomies over the full study period.