Does the Profitability of an Outpatient Surgery Influence Where it is Performed? A Look at Ambulatory Surgery Centers and Hospitals.

(Draft Only – Please do not quote)

Mike Plotzke[1]
Washington University in Saint Louis
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Abstract:

Physicians who both perform outpatient surgery and own Ambulatory Surgery Centers (ASCs) decide which of their patients they treat at their ASC and which they treat at local hospitals. This paper asks if the profitability of an outpatient surgery impacts where it is performed. Physician owners of ASCs may prefer to treat their profitable patients at an ASC, because as a partial owner, a physician would receive a portion of the facility fee that was generated from treating the patient. If the physician were to treat the same patient at a hospital, he would receive none of the facility fee. Although many hospital administrators provide anecdotal stories that physicians treat their most profitable patients at ASCs, this paper is the first to empirically examine the question for a large sample of hospitals. I find that higher profit patients do have a higher probability of receiving treatment at an ASC compared to the hospital. In this paper, I use the National Survey of Ambulatory Surgery (NSAS) to obtain information on a large sample of elderly patients undergoing outpatient surgery. I obtain information on the revenues generated by performing those surgeries and estimates on the cost of performing surgery from the Centers for Medicare and Medicaid Services (CMS). The findings of this paper imply future research should examine how a hospital's performance is influenced after an ASC enters a hospital's market.

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[1] Department of Economics, Washington University in Saint Louis, Saint Louis, MO 63130
Email: mplotzke@wustl.edu Telephone: (314) 935-5670, Fax: (314) 935-4156
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1. Introduction

If a physician who performs outpatient surgeries owns an Ambulatory Surgery Center (ASC), will financial incentives that come from ownership influence which patients he treats at his ASC and which he treats at a Hospital Outpatient Department (HOPD)? A physician who owns an ASC may treat his most profitable patients at an ASC and his least profitable patients at a local HOPD. By doing that a physician maximizes his income because he receives a share of the facility fee his patients pay the ASC, but receives none of the facility fee his patients would pay to the HOPD. Determining whether this behavior occurs has important implications. It is possible that a physician who treats his least profitable patients at a HOPD may reduce the profitability of the HOPD. This could be problematic since hospitals often claim they subsidize certain healthcare services, like uncompensated care, with the profit earned from their HOPD.[2] On the other hand, if this sorting behavior does not cause these externalities, physicians could reduce healthcare expenditures if they treated more patients at an ASC. Outpatient surgeries cost less to perform at an ASC because they do not have the same overhead as hospitals.[3] For example, ASCs do not have emergency rooms and are not expected to provide uncompensated care to the poor. As a result, purchasers of healthcare can negotiate lower rates for surgeries performed at ASCs. This is true for Medicare which has lower reimbursement rates for many of the surgeries performed at ASCs compared to at HOPDs.[4] Medicare could further reduce their healthcare expenditures by offering incentives to increase the volume of procedures performed at ASCs.[5]

To see if the profitability of a patient influences where that patient is treated, this paper utilizes the National Survey of Ambulatory Surgery (NSAS). That dataset contains information on a large sample of patients who have undergone outpatient surgery. I also use information from the Center for Medicare & Medicaid Services (CMS) that describes the profitability of each surgery. I then use a probit model to estimate if the potential

[2] See Abelson (2004)
[3] See Kelly (2003)
[4] For 2004, 2150 Medicare procedures had a higher facility fee in the hospital compared to the ASC.
[5] Possible incentives could include subsidies to fund the construction of ASCs or easing the regulatory burned of opening an ASC.

profitability of a surgery impacts where a physician performs that surgery. My results indicate that the most profitable patients in the sample have the highest probability of receiving treatment at an ASC.

1.1 Background

An ASC differs from a hospital due to its small size and the limited number of healthcare services it offers. ASCs provide outpatient surgery and few of the ancillary services a hospital might provide.[6] As shown in Table 1, ASCs are typically for-profit freestanding clinics solely owned by physician investors.[7] Also shown in Table 1, the number of ASCs has grown steadily over the last decade. The increased number of ASCs has increased the total number of outpatient surgeries performed and is also responsible for shifting many outpatient surgeries away from hospitals. According to Casalino, Devers, and Brewster (2003) in 2001, 3,371 Medicare certified ASCs competed for patients amongst themselves and approximately 3,859 HOPDs.

Possibly, the number of ASCs has grown because of the increased compensation and freedom they provide their physician owners. During the second half of the 1990's, Reed and Ginsburg (2003) found that physician's incomes fell by roughly 5.0%. Investing in an ASC may be one way for physicians to supplement their income. Physicians who own ASCs collect both the physician's fee from their professional services and receive a share of the profit from the facility fee. Physicians who perform surgeries in the hospital collect the same physician fee as they would if they performed the surgery in the ASC but they would not receive any portion of the facility fee.[8] It is important to note that all physicians face a financial incentive to perform those surgeries that provide the highest professional fees. However, owning an ASC exacerbates this incentive because it provides the physician owner with two income streams.

[6] For example, an ASC would not provide inpatient surgery or emergency room services.
[7] Freestanding clinics operate independently of any other healthcare facility, such as a hospital.
[8] See Iglehart (1989)

In addition to earning additional income, physicians may have non-pecuniary reasons for investing in ASCs. For example, a physician may wish to avoid hospital governance.[9] By minimizing the number of patients a physician admits into a hospital, the physician may also minimize the number of administrative tasks he performs at the hospital such as attending staff meetings or serving on committees. The physician may also feel more productive at an ASC compared to a hospital. Iglehart (2005) emphasizes a recent Medpac report that found many physicians claimed they could perform more surgeries at a small privately owned facility because of increased efficiency in transitioning from one surgery to another. Also, the ASC may be more conveniently located or offer nicer amenities for both the physician and patient. Although these factors may be important in determining how a physician chooses where to perform a surgery, this paper will only examine the financial incentives a physicians faces.[10]

2. Model

Since a physician who owns an ASC can treat his patients either at a hospital or at his ASC, he must choose where to perform each surgery. A physician earns different incomes whether he performs a surgery at a HOPD or at an ASC. I assume the physician chooses the setting of each surgery to maximize his income (Y). A physician's income depends on the quantities of procedures he performs at each location as well as the level of reimbursement he receives at each location.

$$(2) \qquad Y = \mathbf{P}_{ASC}\mathbf{Q}_{ASC} + \mathbf{P}_{HOPD}\mathbf{Q}_{HOPD}$$

Q is a vector describing the volume of surgeries the physician performs in each setting.[11]

$$(3) \qquad \mathbf{P}_{ASC} = PhysFee_i + Ownership*(FacFee_i - FacCost_i)$$

[9] See Serbaroli (2004) for a greater explanation of what hospital governance entails.
[10] These non-pecuniary factors would not likely influence whether a physician treats his marginal patient at a hospital or at an ASC. The utility gained from the non-pecuniary features should be the same for all the patients he treats.
[11] I assume that the total quantity and types of surgeries a physician performs is exogenous. Later in the paper I will discuss the appropriateness of this assumption.

(4) $\mathbf{P}_{HOPD} = PhysFee_i$

Equations (3) and (4) describe the fees the physician collects for performing surgery at both the ASC and the HOPD. If the surgery is performed at the ASC, the physician collects both the physician fee and a portion of the facility fee that is commensurate with his ownership. If the surgery is performed at the HOPD, the physician only collects the physician fee. $PhysFee_i$ is the physician fee for surgery i. $FacCost_i$ is the ASC's cost of performing surgery i. $FacFee_i$ is the facility fee the ASC collects for performing surgery i. Ownership describes the percentage ownership in the ASC by the physician.

As I will discuss in the next section, ASCs likely have capacity constraints which may prevent a physician from treating all his patients at an ASC. Therefore at an ASC, a physician would only treat the subset of his patients he considers the most profitable. Therefore, if the expected profit of a particular patient exceeds a certain threshold, the physician would perform that patient's surgery at the ASC. That is,

(5) $$y_i = \begin{cases} 1 & if \quad PhysFee_i + Ownership * (FacFee_i - FacCost_i) \geq \underline{p} \\ 0 & if \quad PhysFee_i + Ownership * (FacFee_i - FacCost_i) < \underline{p} \end{cases}$$

Where a physician performs the surgery at the ASC if $y_i = 1$ and otherwise performs the surgery at the HOPD. _ is the minimum profit required for the physician to perform the surgery at the ASC.

For Medicare patients, $FacFee_i$ may greatly exceed $FacCost_i$ because Medicare bases the facility fees it pays to ASCs on a 1986 survey that asked ASCs how much it cost them to perform surgeries. Since then, Medicare has adjusted the facility fee occasionally to account for inflation. However, they have not adjusted the facility fee to account for changes in technology or productivity. Since the actual cost of performing surgery today may differ from the cost of performing surgery in 1986, there may be many surgeries where $FacFee_i$ may greatly exceed $FacCost_i$. Further, since it is unlikely the cost of

performing surgeries has changed at the same rate for all outpatients surgeries, some procedures will have become more profitable than others. It is these more profitable surgeries that physicians should have a greater incentive to perform at the ASC.

3. Literature Review

Although no paper has examined how profitability influences whether a physician treats a patient at a hospital or ASC, economists have examined how changes in price influence the quantity of healthcare services physicians provide. Rice et al (1999), found that a reduction in Medicare physician fees caused physicians to treat more privately insured patients due to an increase in the relative payments physicians would receive. The authors noted that, "One of the many peculiarities of the US health system is that physicians face markedly different prices when they treat different patients [that have the same condition but different insurance]." In my research, physicians not only face different prices for treating different patients; they can treat the same patient in two locations and receive different incomes. Yip (1998) estimates whether a decline in the Medicare physician fee for performing Coronary Artery Bypass Grafts (CABGs) causes thoracic surgeons to perform more CABGs. Yip found following the fee decrease, physicians performed more CABGs both among their privately insured patients and those patients insured by Medicare. This result implies physicians have a strong income effect.

There are several differences between this paper and the above two paper. Those papers only examined physicians performing a limited number of surgeries. My paper looks at many types of outpatient surgery. Also, my paper examines how physicians choose where they perform surgery based on their patient's expected profit, not whether they treat more patients following a change in price. The last key difference between those papers and this paper is that in those papers it is unclear how easily physicians can substitute between treating privately insured patients and those patients insured by Medicare. Federal regulations may prevent a physician from refusing care to a patient insured by Medicare. Conversely, in my paper, it may be much easier for a doctor to substitute particular surgeries between the ASC and the HOPD following a price change.

Economists have also examined how physicians induce demand in health care facilities that they own. Due to a principal-agent problem between the physician and the patient, a physician can provide more than the optimal amount of medical services in order to increase his income. Hillman et al (1990) found, "doctors who own imaging machines ordered four times as many imaging tests as those referring to independent radiologists. Further, they charged more than independent radiologists for similarly complex procedures." Mitchell and Scott (1992) also found that same result for physicians who own radiation therapy facilities. One potential weakness in these studies is that ownership is a binary variable: either a physician does or does not own a healthcare facility. However, physicians with low levels of ownership may respond to financial incentives differently than those physicians with high levels of ownership. Although I am currently unable to account for this with the data used in this project, I hope to precisely control for ownership in future research.

Some work has looked at what type of patients are treated at an ASC. Wynn et al (2004) examines some differences between ASCs and HOPDs through an analysis of the patient characteristics and health outcomes of surgeries performed at ASCs versus at HOPDs. In their paper, the authors look at two categories of surgeries, cataract surgeries and colonoscopy. They found that patients undergoing cataract surgery at a HOPD were more likely to be female, older, African American and eligible for Medicaid. Patients treated at a hospital also suffered from more risk factors such as hypertension or diabetes and were considered to be greater health risks when using the Hierarchical Condition Category (HCC) risk scoring system. Patients undergoing colonoscopy at an ASC or HOPD did not differ in their distribution of gender, age, or race. Again though, patients treated at a hospital were more likely to be disabled or eligible for Medicaid. For both categories of surgery, patients in the western part of the country had a higher probability of receiving treatment at the ASC. Also, Wynn et al (2004) found that patients undergoing multiple procedures were more likely to be treated at an ASC rather than at a hospital. I am able to confirm these last two results for a much larger selection of surgeries using the NSAS data. The authors also concluded that regardless of the site of

surgery, adverse outcomes following surgery occur infrequently for both categories of surgery.

4. Motivation

It may seem strange that physicians who own an ASC would not operate exclusively at their ASC since, if $FacFee_i - FacCost_i > 0$, their income would always be larger if they treated all of their patients at an ASC. Physicians who own an ASC may continue to treat patients at a HOPD because of capacity constraints at their ASC. ASCs have multiple owners and a limited number of operating rooms. Also, it is often difficult to expand capacity at ASCs due to state regulations. Therefore, a physician may have to choose which patients to treat at an ASC and which to treat at a HOPD. There also may be some procedures where $FacFee_i - FacCost_i < 0$, making it more profitable for the physician to perform the surgery at the HOPD.

Some anecdotal evidence corresponds with these explanations. Kramer (2004) discusses a 2003 case study that showed following the opening of a surgery center in Spokane, Washington, physicians who owned that ASC split their time between treating patients at the ASC and at a local hospital. Lynk and Longley (2002) presented another case study showed that despite having ownership at St. Luke's ASC in Hammond, Louisiana, physician owners continued to operate at a nearby hospital. As shown in Graph 1, hospital outpatient cases declined after St. Luke's ASC opened. However, Graph 2 shows that the physician owners still performed over a third of their outpatient surgeries at the hospital. This implies that these physicians had to choose which surgeries to perform at their ASC and which to continue performing at the HOPD.

A physician's ability to split their time between ASCs and HOPDs often concerns hospitals enough that hospitals may try to stop the entry of ASCs into their market. Caher (2004) details a case where Rome Hospital in Rome, New York negotiated exclusive contracts with health insurance providers that prevented the providers from

contracting with a local ASC.[12] An obvious reason that hospitals want to limit the entry of surgery centers is to maintain market power. The Hospital Corporation of America (HCA) (which owns over 350 hospitals and other healthcare facilities) estimates, "one third of its lower-than expected earnings per share in its first-quarter financial report for 2003 [was due] to the increase in competition from physician-owned specialty hospitals and ambulatory-surgery centers."[13] Hospitals also want to limit the entry of ASCs because hospitals claim ASCs inhibit their ability to subsidize unprofitable healthcare services. Lauer (2003) interviewed with representatives from two Virginia healthcare systems. Both representatives said many non-profit hospitals use the profit generated from their HOPD to pay for the healthcare of the indigent, emergency room care, burn units, and other unprofitable services. Instead of subsidizing services, hospitals often claim the owners of the ASCs use the profit generated from the facility fee to supplement their income. If physicians move profitable patients from the HOPD into the ASC, this may strain the hospital's ability to provide important healthcare services that ASCs do not provide.

5. Data

To estimate how a patient's profitability influences where he is treated, this paper exploits several data sources. First, I use the National Survey of Ambulatory Surgery (NSAS) to examine a sample of patients insured by Medicare who underwent outpatient surgery during the years 1994 through 1996. To create this sample of patients, the survey constructs two independent random samples of outpatient surgeries at ASCs and hospitals. Each sample includes some high volume facilities with 100% certainty. Remaining facilities were added to the sample by randomly choosing from 189 primary sampling units (PSUs) that corresponded to counties or towns.[14] Then, up to three ASCs of a particular surgical specialty and up to three hospitals were randomly selected from

[12] A similar situation occurred in Aberdeen, SD. The Orthopedic Surgery Specialist (OSS) group opened a new ASC near Avera, a local hospital. Avera feared that physicians would treat the most lucrative patients at the ASC leaving the HOPD to treat the worst. To discourage this, the hospital, "closed hospital's staff to uninvited new applicants in orthopedic surgery, which had the effect of precluding hospital staff privileges for a new surgeon that OSS recruited to its practice."

[13] Casalino, Devers, and Brewster (2003)

[14] The choice of PSUs came from the 1985-1996 versions of the National Health Interview Study (NHIS).

each chosen PSU.[15] The survey contained the following information on each surgery: Whether the surgery was performed at a hospital or ASC, the age and gender of the patient, discharge status, month and year the surgery occurred, the geographic region of the country in which it occurred, source of payment, anesthesia information, and the patient's diagnoses and surgical procedure codes.

From this sample of outpatient surgeries, I want to determine if a patient's profitability influences where he is treated. Since a physician owner is a residual claimant to the ASC's profit; any physician who owns an ASC should only want to perform those surgeries at his ASC which exceed some minimum profit level as shown in equation 5.[16] Therefore to perform the analysis, I must determine how much an ASC collects for performing a surgery and how much it costs the ASC to perform it.

The ASC facility fee for each surgery comes from the Center for Medicare & Medicaid Services (CMS) website.[17] Medicare currently groups 2,464 surgical procedures into 9 reimbursement categories. Since all the procedures in a category are reimbursed at the same rate, but do not necessarily cost the same amount to perform, certain procedures are more profitable to perform than others.[18] To determine the ASC's profit from performing a surgery, the ASC's cost of performing that surgery must also be known. Unfortunately, virtually no cost data exists regarding surgeries performed at ASCs. CMS conducted ASC cost surveys in 1986 and 1994, however, they claim to no longer have access to these surveys. Therefore, indirect estimates of surgical costs must be used. Since 2000, CMS annually estimates the mean and median cost of performing a particular surgery at a HOPD. While the mean and median cost of performing a surgery at a HOPD would

[15] ASCs may have been over sampled as a result of this method. Imagine if a PSU has 10 hospitals but only 3 ASCs. If 3 ASCs and 3 hospitals were sampled from that PSU, there will be more observations of outpatient surgeries from ASCs in that PSU than if the authors just did a random sample of every outpatient surgery performed in that PSU.

[16] The minimum profit level will likely equal zero if a physician faces no capacity constraints at the ASC. If a physician faces capacity constraints (which is likely), his minimum profit level will exceed zero. That is, the physician would only perform those surgeries at his ASC which were the most profitable.

[17] http://www.cms.hhs.gov/suppliers/asc/

[18] For example, two of the nine categories contain over half of the surgeries Medicare allows ASCs to perform. The surgeries within these categories are very diverse. Therefore, there is also diversity in how much profit can be made from each surgery.

differ in absolute terms from the mean and median cost of performing that surgery at an ASC, the relative cost between the ASC and the HOPD should be similar for most surgeries. This assumption comes from MedPac's recent suggestion to Congress that Medicare's reimbursements rates for ASCs and HOPDs be aligned.

> "**Using similar procedure groups and relative weights in the ASC and HOPD payment systems would make it easier to align rates for the same services across settings. Although the actual rates might not be the same in each setting, the relative payment difference between a colonoscopy and uppergastroinestinal endoscopy, for example, would be similar in each site of care"**[19]

This means the actual cost of performing a surgery at an ASC would differ from the actual cost of performing a surgery at a HOPD but the relative costs should be similar for most surgeries. Using this assumption, I can estimate the profitability of performing a procedure in an ASC with the below expression.

$$(6) \qquad profrate_i = \frac{FacFee_i}{HOPDMedianCost_i}$$

Where i = Surgery i and $HOPDMedianCost_i$ represents the 2002 median cost of performing surgery i at the hospital.

Using this method, I can rank every surgery that was performed in the NSAS by its profitability. However, this measure does not give the absolute level of profit for each surgery. Using the information available, it would be impossible to determine if the difference between the ASC facility fee and the cost of performing the surgery at the ASC would exceed a physician's minimum profit level.

An alternative measure of profitability comes from a proposed rate change Medicare tried to implement in 1998. As mentioned previously, Medicare bases its ASC facility fee schedule on a 1986 survey that measured the cost of performing surgery at an ASC. Nowadays, it's unlikely the current fee schedule represents the true cost of performing

[19] MedPac, "Ambulatory surgical center services: Assessing payment adequacy and updating payments (Chapter 3F, March 2004 report)"

surgery. As a result, CMS has attempted, without success, to update this system several times during the 1990's. For example, in 1998, CMS constructed a new method for grouping outpatient surgeries, the Ambulatory Payment Classification (APC). CMS grouped procedures into an APC that were clinically similar and cost similar amounts to provide. Using the APC system, the roughly 2,464 ASC approved surgeries were divided into 137 reimbursement categories rather than the 9 currently used. Compared to the current ASC reimbursement system, reimbursements for each APC category should be relatively closer to the actual cost of performing a surgery from that APC. This system was never implemented for ASCs, but CMS did publish the proposed reimbursement rates for this system.[20] If the proposed reimbursement rates are a good estimate of how much it actually costs to perform a surgery at an ASC, the difference between the actual and proposed reimbursement rate should provide a rough estimate for how much the actual pay rate differed from the actual cost of performing a surgery.

$$\text{PayDiff}_i = \text{FacFee}_i - \text{ProposedPayRate}_i \tag{7}$$

Where ProposedPayRate_i equals CMS's proposed ASC Facility Fee for Surgery i

Alternatively, I can also use the 1998 proposed ASC rates to construct a profit ratio that is similar to the *profrate* variable.

$$\text{PayDiffRatio}_i = \frac{FacFee_i}{ProposedPayRate_i} \tag{8}$$

Using all of the above data, I construct a probit model to estimate the effects of a patient's profit on the setting of a surgery. Health economists often use binary choice models to examine factors that influence admissions into healthcare facilities. Burns and Wholey (1992) used a conditional logit model to test how various hospital and patient characteristics influenced hospital choice decisions. Whynes et al (1996) used a probit analysis to determine which of two hospitals in Britain a physician would admit his

[20] Federal Register, Health Care Financing Administration, "Medicare Program; Update of Ratesetting Methodology, Payment Rates, Payment Policies, and the List of Covered Surgical Procedures for Ambulatory Surgical Centers Effective October 1, 1998," June 12, 1998.

patients into. In that study, the author's used survey responses about hospital characteristics as independent variables to predict the referral decision of the physicians.

One downfall in my model is that I cannot control for many important characteristics influencing admissions into HOPDs and ASCs. For example, the NSAS does not contain information on which specific physician performs the surgery. Therefore, I cannot control for how much ownership that physician has in an ASC. Also, the survey does not identify which ASC or HOPD a patient was treated at. Another limitation is that the NSAS describes each patient's surgery using The International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) system. However, Medicare reimburses surgeries using the Current Procedural Terminology (CPT) system.[21] I was able to obtain a crosswalk that links these two coding systems, but, the crosswalk does not provide a 1-1 match for all codes. A particular ICD-9-CM code may be associated with multiple CPT codes. To see how much this impacts my results, I ran multiple regressions, one using the full sample of ICD-9-CM codes and another using a sample of only those ICD-9-CM codes that had a unique match to a CPT code.[22]

6. Methodology

Despite these limitations, this paper performs a basic analysis of the NSAS data that provides preliminary results to motivate future research. As shown in equation (9), the model regresses the location of surgery (either at the hospital or the ASC) on the profit measure of that surgery and a variety of controls.

$$(9) \qquad \Pr(y_i = 1 \mid x) = \Phi(a + b_1 profmeas_i + dControls + e)$$

[21] That is, if a patient had an arthroscopy in the NSAS, the ID code for the arthroscopy in the NSAS would not match the ID code for the arthroscopy in the Medicare data that describes how profitable the surgery is.
[22] In the full sample of ICD-9-CM codes, if a code matches to more than one CPT code, the reimbursement and cost information for all the matched CPT codes are averaged so the ICD-9-CM code is reimbursed at that average amount and costs that average amount to perform.

$Profmeas_i$ could either be $profrate_i$, $paydiff_i$, or $paydiffratio_i$. I also control for age and age squared since an older patient is likely unhealthier than a younger patient and may be a worse candidate for treatment at the ASC. I control for gender, year of surgery, whether or not the patients underwent multiple procedures, and whether or not the patient pays for his procedure with two types of insurance. I include dummies for surgeries that took place in the northeast, midwest, and southern portion of the countries. The western portion of the country is the base case. In certain models, I include dummies that describe either the part of the body or system of the body where the operation occurred. Certain types of surgeries may be more profitable and more likely to be performed at an ASC. These dummies include nervous system, eye, ear, nose/mouth, respiratory system, cardiovascular system, digestive system, urinary system, male genital, female genital, musculoskeletal system, integumentary, endocrine system, lymphatic system, obstetric procedures, and miscellaneous procedures.

7. Results

The probit model analyzes two different samples of patients from the NSAS, the full sample of Medicare patients and the matched sample of Medicare patients who had surgery identified by an ICD-9 code that uniquely matches a CPT code. The full sample has around 82,000 observations depending on the specification and the matched sample has around 33,000 observations depending on the specification. The matched sample represents surgeries described by 185 different ICD-9 codes, the full sample represents surgeries described by 554 different ICD-9 codes. Summary statistics for the full and matched sample are presented in tables 2 and 3. Across the two samples, most of the variables have similar summary statistics. In the matched sample, patients undergoing multiple procedures are more common. In both samples, surgeries on the eye and digestive system are overwhelmingly the most common type of procedure performed. Tables 4 and 5 provide the estimates of the coefficients for each probit specification. Tables 6 and 7 measure the change in probability of being treated at an ASC when an observation goes from being the mean observation in the sample to one standard deviation above the mean in only the profit measure.

Table 4 shows the results of the simplest model, which exclude any surgery type dummies. In each model, the profit measure variables are significant and positive, implying that as a patient's surgical procedure increases in profitability, he has a greater probability of receiving treatment at an ASC. Large regional variations in the likelihood of admittance into an ASC exist, undergoing surgery in the western part of the United States improves the chance a patient is admitted into an ASC. Also, patients undergoing multiple procedures in one surgical encounter are more likely to be admitted into an ASC. Both of these findings agree with Wynn et al's (2004) analysis of HOPDs and ASCs. Other results are less clear, like how in 1996, patients are less likely to be admitted into the ASC then in 1994. Older people (who are presumably less healthy) are slightly more likely to be admitted into the ASC, but at a decreasing rate. Patients change from being more likely to be admitted into an ASC versus less likely around 81 years of age.

As shown in Table 5, the results of the model do not change substantially when I control for the type of surgery that is performed. All of the profit measure variables, except for *PayDiff* in the full sample, are positive and significant. However, when these surgery controls are included, a patient who undergoes multiple procedures during one surgery now corresponds with a decrease in the probability of admission into the ASC. Also, the signs of some of the year dummy coefficients switch when comparing the results from the full sample and the matched sample.

Tables 6 and 7 show the change in probability when an observation goes from having the average characteristics of the sample to one standard deviation above the mean in only the profit variable. When the surgery type is not controlled for (Table 6), increasing the profitability by one standard deviation causes anywhere from a 12% to 21% increase in the probability of admission into an ASC. However, when the surgery type is controlled for (table 7), increasing profitability has a much smaller effect, and in the case of the P*ayDiff* variable, has no effect at all. This implies that certain surgery types which may be more profitable have a higher probability of admittance into an ASC. However,

within a particular surgery type, differences in profitability may not influence admission into a hospital or ASC.

Several characteristics I cannot control for could bias my finding that all else being equal, as a patient becomes more profitable he has a higher probability of receiving treatment at an ASC. I cannot control for any characteristics of the physician who performs the surgery. Physicians have different levels of ownership in ASCs and may not respond equally to a patient's potential profit. For example, if a physician has a small amount of ownership, the income he would collect from the ASC facility fee may be small in comparison to the physician fee. Therefore, physicians with small levels of ownership may treat patients at an ASC but may not go to the trouble of sorting his patients into ASCs or HOPDs by profit. If this happens, the coefficient on the profit variables should be biased downward.

For the analysis, I have information regarding the reimbursements and costs of performing surgery on Medicare patients. However, physicians who treat Medicare patients may also treat privately insured patients. Assuming that physician owners rank all their patients in terms of their potential profitability and treat them at the ASC or HOPD based on that ranking, the coefficients of the *profmeas* terms in my sample should still be greater than 0, but my coefficient estimates may be biased up or down. However, not including privately insured patients in my model may make sense. While, I have no information on how often private insurance providers have updated their ASC reimbursement rates, I will assume they update their rates more frequently than Medicare. If private insurers have updated their ASC reimbursement rates more frequently, then the difference between the private insurance reimbursements and the cost of performing that surgery at the ASC should be small. If this difference does not exist, it's less likely that physicians will selectively refer patients to one facility versus another based on that patient's profit.

A large potential problem in my analysis is that physicians who own ASCs, or who at least are able to treat patients at an ASC, may disproportionately treat profitable patients

compared to those physicians without ownership. This is a major problem and would cause an upward bias in my estimates of the profit coefficients. However, there are a few reasons to believe patients may be exogenously assigned to physicians. Patients might be referred to a surgeon by a general practitioner who may not be certain what precise surgery the patient needs and therefore would not know how profitable the patient is. Also, patients themselves may seek out physicians with ownership in ASCs with the hope of being treated at an ASC. In which case, it seems unreasonable that a patient would know if he was a profitable patient and then select a physician based on his profitability. A physician, to some degree, may be able to alter his patient load by referring unprofitable patients to another physician. Laws have been written to prevent this type of behavior, but it is unclear whether they have been effective.

8. Conclusion

This paper provides preliminary results that more profitable patients have a higher probability of being treated at an ASC. This seems like a reasonable finding given the financial incentives of physicians who own ASCs. Future work should incorporate datasets (such as the Medicare Claims Database) that contain information on outpatient surgeries, patient's health, and what physicians perform the surgery. Then detailed ownership information of each physician obtained from the state agencies that oversee the licensing of ASCs could be used to analyze how the profit of a patient influences where he is treated. This way, many of the potential problems that may arise from using the NSAS (such as the possibility of physicians with ownership treating more profitable patients than those physicians without ownership) could be addressed. Future work also needs to focus on measuring the potential externalities (such as the possibility that hospitals cannot offer as many unprofitable healthcare services when competing against ASCs) that occur when physicians own ASCs.

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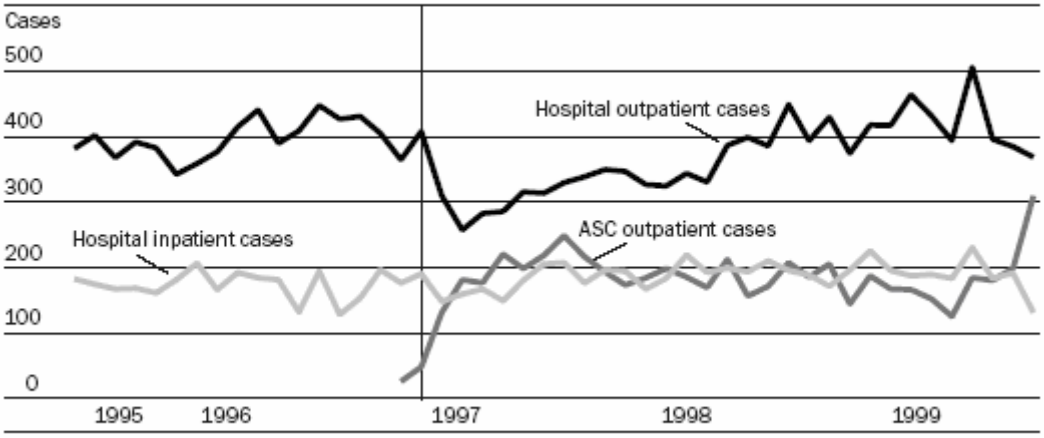
Appendix

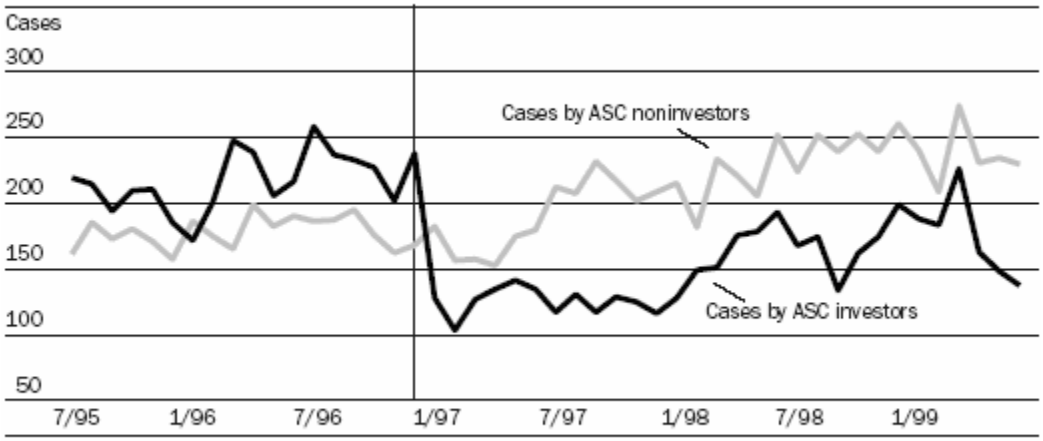
Inpatient And Outpatient Surgery Volume At North Oaks Medical Center And St. Luke's Surgicenter, 1995–1999



SOURCE: North Oaks and St. Luke's files.
NOTE: Vertical line marks the first full month of St. Luke's ambulatory surgery center (ASC) operations.

Graph 1

Outpatient Surgery At North Oaks Medical Center: Volume Of Procedures By Investor And Noninvestor Physicians, 1995–1999



SOURCE: North Oaks and St. Luke's files.
NOTE: Vertical line marks the first full month of St. Luke's ambulatory surgery center (ASC) operations. Investors include eighteen physicians.

Graph 2

Table 1

National Characteristics of Medicare-certified ambulatory surgical centers, 1997-2004

	1997	1998	1999	2000	2001	2002	2003	2004
Number of Facilities	2462	2644	2786	3028	3371	3597	3887	4136
New Facilities	237	228	162	295	446	309	365	315
Exiting and Merged facilities	40	46	20	53	103	83	75	66
Net percent growth from previous year	8.70%	7.40%	5.40%	8.70%	11.30%	6.70%	8.10%	6.40%
	Percent of all centers							
For profit	93%	94%	94%	94%	94%	95%	95%	96%
Nonprofit	6	6	6	6	5	5	5	4
Freestanding	99	99	99	99	99			
Hospital Owned and Operated	1	1	1	1	1			
Urban	90	89	89	88	88	87%	87%	87%
Rural	10	11	11	12	12	13	13	13

Source: MedPAC analysis of provider of services file from CMS

Table 2
Summary Stats for Full Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Facility	83742	0.534	0.499	0.000	1.000
Age	83742	75.455	6.571	65.000	99.000
Sex	83742	0.393	0.489	0.000	1.000
Multiple Procedure?	83742	0.544	0.498	0.000	1.000
Year95	83742	0.338	0.473	0.000	1.000
Year96	83742	0.344	0.475	0.000	1.000
Northeast	83742	0.219	0.414	0.000	1.000
Midwest	83742	0.240	0.427	0.000	1.000
South	83742	0.360	0.480	0.000	1.000
Nervous	83742	0.023	0.150	0.000	1.000
Eye	83742	0.547	0.498	0.000	1.000
Ear	83742	0.005	0.069	0.000	1.000
Nouse/Mouth	83742	0.009	0.096	0.000	1.000
Respiratory	83742	0.015	0.120	0.000	1.000
Cardiovascular	83742	0.008	0.087	0.000	1.000
Digestive	83742	0.236	0.425	0.000	1.000
Urinary	83742	0.059	0.236	0.000	1.000
MaleGenital	83742	0.007	0.085	0.000	1.000
FemaleGenital	83742	0.008	0.089	0.000	1.000
Musculoskeletal	83742	0.040	0.196	0.000	1.000
integumentary	83742	0.036	0.185	0.000	1.000
Miscellaneous Procedure	83742	0.004	0.064	0.000	1.000
Endocrine	83742	0.000	0.007	0.000	1.000
Lymphatic	83742	0.003	0.053	0.000	1.000
Obstetric	83742	0.000	0.000	0.000	0.000
ProfRate	81751	0.883	0.330	0.058	10.857
PayDiff	82693	93.856	123.708	-826.000	586.000
Unique Observations		83742.000			
Unique ICD9 codes		554.000			

Table 3
Summary Statistics for Matched Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
fac	34117	0.586042	0.492548	0	1
age	34117	75.68998	6.532439	65	99
sex	34117	0.368086	0.482292	0	1
multiproc	34117	0.771053	0.420162	0	1
year95	34117	0.339977	0.473708	0	1
year96	34117	0.341707	0.474289	0	1
northeast	34117	0.209895	0.40724	0	1
midwest	34117	0.242313	0.428489	0	1
south	34117	0.346426	0.475838	0	1
nervous	34117	0.002755	0.052419	0	1
eye	34117	0.754961	0.430117	0	1
ear	34117	0.001641	0.040482	0	1
nosemouth	34117	0.00211	0.045891	0	1
respiratory	34117	0.004866	0.069585	0	1
cardiovasc~r	34117	0.002081	0.045572	0	1
digestive	34117	0.130023	0.336334	0	1
urinary	34117	0.01275	0.112196	0	1
malegenital	34117	0.012428	0.110787	0	1
femalegeni~l	34117	0.002843	0.053246	0	1
musculoske~l	34117	0.031509	0.174692	0	1
integument~y	34117	0.031451	0.174535	0	1
miscproc	34117	0.005335	0.072844	0	1
edocrine	34117	5.86E-05	0.007656	0	1
lymphatic	34117	0.005188	0.071842	0	1
obstetric	34117	0	0	0	0
AVGprofitA~t	33983	0.837037	0.195806	0.057809	10.85714
AVGPayDiff	33782	176.9595	109.608	-768	586
Unique Observations		34117			
Unique ICD9 codes		185			

Table 4

Probit model of a patient's profitability on the location of surgery

	Full Sample			Matched Sample		
profrate	**0.6874** **[0.0203]***			**0.2046** **[0.0440]***		
paydiff		**0.0024** **[0.0000]***			**0.0022** **[0.0001]***	
paydiffratio			**0.6149** **[0.0305]***			**0.7389** **[0.0605]***
Age in years	**0.0805** **[0.0136]***	**0.0604** **[0.0135]***	**0.0842** **[0.0134]***	0.0079 [0.0213]	-0.026 [0.0216]	-0.0067 [0.0215]
Age Squared	**-0.0005** **[0.0001]***	**-0.0004** **[0.0001]***	**-0.0005** **[0.0001]***	0 [0.0001]	0.0002 [0.0001]	0 [0.0001]
Sex	0.0028 [0.0093]	0.0138 [0.0092]	0.0001 [0.0092]	**0.0647** **[0.0146]***	**0.0799** **[0.0148]***	**0.0741** **[0.0147]***
multiproc	**0.4163** **[0.0097]***	**0.0916** **[0.0097]***	**0.2738** **[0.0091]***	**0.5292** **[0.0169]***	**0.2367** **[0.0199]***	**0.4441** **[0.0181]***
year95	**0.0274** **[0.0111]****	0.0169 [0.0111]	**0.0204** **[0.0110]+**	**-0.0328** **[0.0174]+**	**-0.0526** **[0.0175]***	**-0.0428** **[0.0175]****
year96	0.0003 [0.0111]	**-0.0316** **[0.0111]***	-0.0119 [0.0110]	**-0.0642** **[0.0174]***	**-0.1244** **[0.0177]***	**-0.0944** **[0.0178]***
northeast	**-0.3085** **[0.0145]***	**-0.3191** **[0.0144]***	**-0.3188** **[0.0143]***	**-0.5792** **[0.0223]***	**-0.5796** **[0.0226]***	**-0.5749** **[0.0225]***
midwest	**-0.4938** **[0.0141]***	**-0.4874** **[0.0140]***	**-0.4825** **[0.0139]***	**-0.563** **[0.0216]***	**-0.5663** **[0.0217]***	**-0.5652** **[0.0217]***
south	**-0.3467** **[0.0131]***	**-0.3352** **[0.0130]***	**-0.336** **[0.0129]***	**-0.4881** **[0.0202]***	**-0.5018** **[0.0204]***	**-0.4956** **[0.0203]***
secondins	**0.4376** **[0.0105]***	**0.4362** **[0.0105]***	**0.4512** **[0.0104]***	**0.4684** **[0.0167]***	**0.4581** **[0.0169]***	**0.4651** **[0.0169]***
Constant	**-3.9713** **[0.5203]***	**-2.6022** **[0.5162]***	**-4.2332** **[0.5148]***	-0.6359 [0.8190]	0.8489 [0.8282]	-0.7336 [0.8237]
Observations	81751	82693	82693	33983	33782	33782
Pseudo R-squared	0.06	0.07	0.05	0.06	0.08	0.07

Robust standard errors in brackets

+ significant at 10%; ** significant at 5%; * significant at 1%

Table 5

Probit model of a patient's profitability on the location of surgery including controls for surgical type

	Full Sample			Matched Sample		
profrate	**0.3241** **[0.0195]***			**0.2897** **[0.0812]***		
paydiff		0 [0.0001]			**0.0009** **[0.0001]***	
paydiffratio			**0.0694** **[0.0192]***			**0.1685** **[0.0640]***
Age in Years	0.0155 [0.0139]	0.0174 [0.0138]	0.0176 [0.0138]	-0.0286 [0.0217]	-0.0328 [0.0218]	-0.0314 [0.0218]
Age Squared	-0.0001 [0.0001]	-0.0001 [0.0001]	-0.0001 [0.0001]	0.0002 [0.0001]	0.0002 [0.0001]	0.0002 [0.0001]
Sex	**0.0481** **[0.0099]***	**0.0404** **[0.0098]***	**0.0416** **[0.0098]***	**0.0718** **[0.0152]***	**0.0703** **[0.0153]***	**0.0698** **[0.0153]***
multiproc	**-0.1073** **[0.0116]***	**-0.1742** **[0.0108]***	**-0.1713** **[0.0106]***	**0.0651** **[0.0219]***	0.0296 [0.0227]	**0.0603** **[0.0218]***
year95	**0.019** **[0.0115]+**	**0.0218** **[0.0114]+**	**0.0213** **[0.0114]+**	**-0.0347** **[0.0177]****	**-0.0407** **[0.0177]****	**-0.0352** **[0.0177]****
year96	0.0116 [0.0115]	**0.0236** **[0.0114]****	**0.0202** **[0.0114]+**	**-0.0666** **[0.0179]***	**-0.0835** **[0.0183]***	**-0.0653** **[0.0180]***
northeast	**-0.3796** **[0.0151]***	**-0.393** **[0.0150]***	**-0.3907** **[0.0150]***	**-0.6204** **[0.0229]***	**-0.6152** **[0.0230]***	**-0.6159** **[0.0230]***
midwest	**-0.4886** **[0.0147]***	**-0.482** **[0.0146]***	**-0.4822** **[0.0146]***	**-0.5815** **[0.0221]***	**-0.5821** **[0.0221]***	**-0.5826** **[0.0221]***
south	**-0.3694** **[0.0137]***	**-0.3587** **[0.0135]***	**-0.3587** **[0.0135]***	**-0.5207** **[0.0208]***	**-0.5305** **[0.0209]***	**-0.5282** **[0.0209]***
secondins	**0.4137** **[0.0110]***	**0.4258** **[0.0109]***	**0.4249** **[0.0109]***	**0.4523** **[0.0171]***	**0.4492** **[0.0171]***	**0.4506** **[0.0171]***
Constant	-5.8 [0.0000]	-5.4513 [0.0000]	-5.5355 [0.0000]	-4.1432 [0.0000]	-3.6747 [0.0000]	-3.8949 [0.0000]
Includes controls for surgery type?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81751	82693	82693	33983	33782	33782
Pseudo R-squared	0.14	0.13	0.13	0.1	0.1	0.1

Robust standard errors in brackets

Model includes (but the table does not report results for) the following surgery type dummies: nervous system, eye, ear, nose/mouth, respiratory system, cardiovascular system, digestive system, urinary system, male genital, female genital, musculoskeletal system, integumentary, endocrine system, lymphatic system, obstetric procedures, and miscellaneous procedures.

+ significant at 10%; ** significant at 5%; * significant at 1%

Table 6
Measuring the change in probility from being the mean observation to the mean observation plus one standard deviation in the profit variable

	Full Sample (No Controls for Surgery Type)			Full Sample (Controls for Surgery Type)		
	paydiff	profrate	paydiffratio	paydiff	profrate	paydiffratio
Pr(y =1|x)	0.5397	0.5405	0.5391	0.5409	0.5426	0.5409
Pr(y=1|Profit Variable = Mean + Std Dev, x)	0.6521	0.6287	0.606	0.5402	0.5846	0.5485
Pr(y=1|Profit Variable = Mean + Std Dev, x) - Pr(y=1|x)	0.1125	0.0882	0.0669	-0.0007	0.0421	0.0076
95% Confidence Interval for Change in Probabilities	[0.1087, 0.1163]	[0.0832, 0.0931]	[0.0605, 0.0733]	[-0.0061, 0.0048]	[0.0372, 0.0470]	[0.0035, 0.0118]
Percent change from Pr(y=1|x) to Pr(y=1|Profit Variable = Mean + Std Dev, x)	0.20826385	0.163182239	0.124095715	-0.001294139	0.077405087	0.014050656
Mean of profit variable	93.855864	0.88253255	1.2014726	93.855864	0.88253255	1.2014726
Standard Deviation of profit variable	-123.70797	-0.32963036	-0.27765606	-123.70797	-0.32963036	-0.27765606
Controls for Surgery Type?	No	No	No	Yes	Yes	Yes