Int J Health Care Finance Econ (2010) 10:149–170
DOI 10.1007/s10754-009-9075-1

Medicare Part B reimbursement and the perceived quality of physician care

Christopher S. Brunt · Gail A. Jensen

Received: 16 February 2009 / Accepted: 17 November 2009 / Published online: 4 December 2009

Abstract The maximum amount physicians can charge Medicare patients for Part B services depends on Medicare reimbursement rates and on federal and state restrictions regarding balance billing. This study evaluates whether Part B payment rates, state restrictions on balance billing beyond the federal limit, and physician balance billing influence how beneficiaries rate the quality of their doctor's care. Using nationally representative data from the 2001 to 2003 Medicare Current Beneficiary Survey, this paper finds strong evidence that Medicare reimbursement rates, and state balance billing restrictions influence a wide range of perceived care quality measures. Lower Medicare reimbursement and restrictions on physicians' ability to balance bill significantly reduce the perceived quality of care under Part B.

Keywords Balance billing · Participation · Mandatory assignment · Medicare part B

JEL Classification I10 · I11 · I18

Introduction

Medicare Part B is the portion of the Medicare program that covers most outpatient medical services. Medicare has an established fee schedule with approved rates for all Part B services. Physicians have the option of *accepting assignment* when receiving Medicare beneficiaries, which means they will accept the Medicare approved rate as payment in full for services pro-

C. S. Brunt (✉)
Department of Finance and Economics, School of Business, Lake Superior State University,
650 W. Easterday Ave, Sault Sainte Marie, MI 49783, USA
e-mail: cbrunt@lssu.edu

G. A. Jensen
Institute of Gerontology, Department of Economics, Wayne State University, 87 East Ferry Street,
226 Knapp Building, Detroit, MI 48202, USA
e-mail: gail.jensen@wayne.edu

vided. If they do not accept assignment, they can bill beneficiaries for some amount above the Medicare approved rate, and Medicare will reimburse the beneficiary for Medicare's portion (80% of the established Medicare rate). The practice of billing a beneficiary for more than the approved rate is called *balance billing*.

From a patient's perspective, it is both less expensive and more convenient if the physician accepts assignment. In this case, the patient's copay is limited to 20% of the Medicare approved rate (assuming the patient has already met their annual Part B deductible). If a patient's physician does not accept assignment, the patient must pay the physician's full charges, including the balance billed amount, and later will receive a reimbursement from Medicare for its obligation.

Medicare Part B experienced many modifications through the Omnibus Budget Reconciliation Act of 1989 (OBRA89). Physicians' fees were altered, and in many cases drastically reduced, through changes in the Medicare payment system. Legislators imposed national limits on beneficiary liability through balance billing restrictions, and the "customary, prevailing, and reasonable charge" (CPR) system, formerly used to establish Medicare approved rates, was replaced by a resource based relative value system, which pays according to procedural intensity. Many states have subsequently enacted more stringent restrictions and conditions on balance billing.

The purpose of this paper is to examine the impact of Medicare reimbursement levels and the presence of balance billing restrictions on care quality after the full implementation of OBRA89. It makes a significant contribution to the existing literature in three ways. First, it identifies the effects of Medicare reimbursement rates on the quality of outpatient office visits using direct patient assessments of care quality. Second, it uses nationally representative data from the 2001–2003 Medicare Current Beneficiary Survey (MCBS). Finally, it evaluates the effects of balance billing restrictions and Medicare payment rates simultaneously, thereby correcting an omitted variable bias that is present in the existing empirical literature on the effects of Medicare reimbursement policy, and in so doing, it bridges the gap between two closely related bodies of literature.

The paper is organized as follows. The rest of this section briefly reviews the legislative history of physician payment under Medicare, and describes current state balance billing restrictions. The second section develops a simple model of physician behavior assuming profit maximization, that is used to derive several testable hypotheses related to aspects of reimbursement. Section three reviews the relevant prior literature on physician responses to reimbursement policy. Following this, section four describes the methods and data used for the empirical analysis, and section five reports the key findings. The last section concludes the paper with a qualitative summary of the broad findings that emerge.

Legislative background

Prior to 1984, beneficiaries on an office visit could face balance billing or assignment without any clear pattern. This made out-of-pocket copays unpredictable for beneficiaries and was mildly unpopular. In an effort to support the assignment option, and make pricing more clear for beneficiaries, Congress passed the Deficit Reduction Act of 1984 (DEFRA84), which forced a physician to make a choice: accept assignment for all Medicare patients for a 12-month period (called participation), or continue on a claim-by-claim basis (called

non-participation). The act also put a freeze on non-participating physicians' Medicare fees and prevented them from increasing patient's bills. Meanwhile, participating physicians' fees were updated every 15 months, causing participation in the program to become relatively more profitable over time.[1]

The Omnibus Budget Reconciliation Act of 1986 (OBRA86) continued the incentive toward participation by placing limits on non-participating physician fee increases, by establishing a four percent differential between participating and non-participating prevailing charges, and by setting limits on the extent to which actual charges could grow.[2] In most states assignment rates continued to climb after the passage of the act. Nationwide, assignment rates rose from 51 to 77% between 1983 and 1988, and they kept rising until 2001 when they reached a plateau of 99% KFF (2009).

Despite the implementation of OBRA86, and rapidly growing participation rates throughout all states, Massachusetts enacted legislation in 1986 requiring all physicians to accept assignment or else lose their state medical license. In 1987, Connecticut, Rhode Island, and Vermont passed restrictions on balance billing, limiting it altogether for lower income patients.

With large growth in Medicare spending, and inflationary incentives created by the CPR payment system,[3] Congress considered revising Medicare payments in the late 1980s. Regardless of the method of revision, physicians' were going to face serious reductions in payments, and if they had the option to balance bill, much of the burden caused by fee reductions could be shifted to beneficiaries. This possibility was a major concern since beneficiary balance billing liability had already reached $3.97 billion in 1989, without any cost reduction measures by Congress.[4]

Concerned with this potential financial burden on beneficiaries, Congress began considering mandatory assignment legislation, akin to what most New England states had already passed. Such legislation could reduce much of the burden and uncertainly attached to medical care costs and prevent physicians from having beneficiaries make up any reductions in Medicare approved rates.

Opponents of mandatory assignment legislation argued that it might increase program costs, reduce access to care, and increase intensity of services. Holahan and Zuckerman (1989) cautioned that mandatory assignment might reduce access by spurring physicians with sufficient private demand to leave the Medicare market, and increase Medicare costs through potentially higher demand from beneficiaries (who would now face only Medicare copayments and not any balance bills). They also expressed concern that physicians might become more sensitive to Medicare fees and that Medicare might need rate increases comparable to those occurring in the private market to sustain beneficiary access to care.[5] Sammons (1989) argued that setting Medicare fees for so many services without allowing physicians the option to balance bill could effectively lock-in incorrect prices and remove the safety valve guaranteeing access to high quality health care for beneficiaries.

[1] For full analysis of the act, see HCFA (1984).

[2] For full analysis of the act, see HCFA (1986).

[3] The CPR payment system payed physicians according to percentile distributions of *other* physicians' fees.

[4] This is based on the GAO (1989) inflation adjusted to 2007 dollars.

[5] Since market rate increases were far in excess of normal inflation, Medicare could increase its costs through mandatory assignment.

Table 1 Current state balance billing restrictions (through 2007)

State	Effective date	Description
Connecticut	(1987)	Complete restriction for connecticut medicare assignment program members. Current eligibility for program: Annual 2006 income <$38,115 if single, Annual 2006 income <$51,315 if married
Massachusetts	(1986)	Complete restriction
Minnesota	(1993–1996)	Complete restriction
		Exceptions: medical equipment, and ambulance services
New York	(1990–1994)	Limiting charge of 105%
		Exceptions: office visit CPT codes 99201–99215
		Home visit codes 99341–99353
Ohio	(1995)	Complete restriction
Pennsylvania	(1990)	Complete restriction
Rhode Island	(1990)	Complete restriction
Vermont	(1987)	Restriction if single and income <$25,000
		Married with income <$32,000
		Exceptions: office visit CPT codes 90000–90170
All other states	(1992)	115% Limiting charge

Sources: Connecticut statute 319jj, Massachusetts statute chapter 475, Minnesota statute 62J.25, New York CLS public health code section 19, Ohio code chapter 4769, Pennsylvania Health Care Practitioner's Medicare Fee Control Act, Vermont statute title 33 chapter 65, OBRA89, GAO89

OBRA89 took effect in January 1991 and through it physicians' payments were reformed in two ways: (1) the customary, prevailing, and reasonable charge system[6] was replaced by a standardized Medicare approved rate system (with a transitional period from 1992–1996), and (2) a price ceiling for physician fees was instituted nationally though a balance billing restriction, effective 1991.

Under the new system balance billing is not banned, but it has been limited to 115% of the Medicare approved rate. Medicare approved rates are 5% lower for nonparticipating physicians, so a non-participating physician can bill for only $1.15(.95)r = 1.0925r$, where r is the Medicare approved rate for participating physicians.

Many states have not been satisfied with the Federal mandate limiting balance billing to 115% of the approved rate. Today there are many states with more comprehensive balance billing restrictions. State restrictions take various forms, ranging from complete bans (such as in Massachusetts), lower percentage caps with procedural exceptions (like in New York), and income-based restrictions (such as in Connecticut and Vermont). Table 1 presents a comprehensive summary of current state balance billing restrictions.

Figure 1 compares the payment consequences of two choices a Medicare Part B physician must make given national and state restrictions on balance billing: whether to participate in Medicare, and if not, then whether to accept assignment or balance bill the patient. If a physician chooses not to participate, the physician still has the choice of accepting assignment for a particular visit or balance billing for that visit. If she chooses to balance bill, she is

[6] The CPR system paid a physician a Medicare fee equivalent to the lesser of: the 50th percentile of all physicians' charges for the particular service in the previous year (customary charge), the 75th percentile of all physicians customary charges in their service area (the prevailing charge), or the actual bill (the reasonable charge).

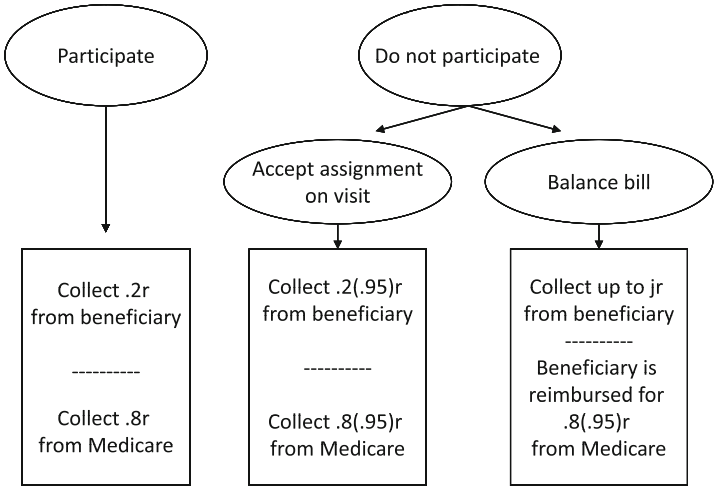

Fig. 1 The physician's assignment option and subsequent payment for visit. *Notation* $r =$ medicare approved rate, $j =$ state balance billing percentage ceiling (in most cases $j = 1.0925$)

subject to a j percentage cap which can be as high as 1.0925 if there are no state restrictions on balance billing, or as low as 0.95 if there is a total ban on balance billing. The figure illustrates how the eventual revenue the physician receives for an office visit depends on: state rules regarding balance billing, Medicare's reimbursement rate, whether the physician participates in Medicare, and if not, whether that particular visit is taken on assignment.

By altering the physician's revenue, reimbursement policy may also affect how much effort or quality the physician puts into that office visit. Our interest centers on how these different facets of reimbursement relate to visit quality. We address this issue both theoretically and empirically. Because our MCBS data are limited to 2001–2003, our focus is not on the effects of changes in Medicare reimbursement policy, per se, but rather on how differences in balance billing rules across the states and differences in Medicare payment rates across physicians affect visit quality. There is enough variation in both of these over this period to address these issues. We turn now to a theory of physician quality choice that clearly illustrates the potential for a payment/quality tradeoff.

Theoretical model

This section develops a simple model of physician behavior under Medicare, assuming profit maximization, which generates the hypotheses to be tested empirically. The model assumes a monopolistically competitive physician whose goal is profit. Patients' demand Q for the individual physician is a function of their co-payment and treatment quality T, where increases in T imply greater treatment quality. For simplicity, we assume the physician treats only Medicare patients, he chooses a level of T uniform across the Medicare patients he treats, and he accepts assignment for either all of his Medicare patients or none of them.[7] Q then takes the following form:

[7] This assumption regarding assignment is very much in line with current practices among physicians given the participating physician and supplier program, and physicians' observed behavior. The assumption that a physician's level of quality is uniform across the Medicare patients he treats may not be entirely accurate, but is maintained here to keep the model tractable.

$$Q = v_0 - f(jr - .80br) + g(T)$$

where j = limiting percentage, r = Medicare rate, b =participation fee differential, v_0 = exogenous demand. To guarantee a maximization solution, a few further assumptions are necessary, specifically that medical care follows the law of demand $f_P > 0$, beneficiaries prefer higher quality $g_T \geq 0$, and that they exhibit diminishing responsiveness across treatment quality $g_{TT} < 0$. The limiting percentage j is the maximum amount a physician can bill for a non-assigned claim. Currently the national j is 1.0925, however j is further restricted by some states as shown earlier in Table 1.

The individual physician faces a cost curve c, which is a function of both quantity and quality:

$$c = w_0 + \gamma(Q) + Z(T)$$

where it is assumed that (1) $\gamma_Q > 0$, (2) $\gamma_{QQ} > 0$, (3) $Z_T > 0$, (4) $Z_{TT} > 0$. Conditions one and three say that increasing the quantity or quality of visits increases their cost, conditions two and four say that increasing visits or quality is increasingly costly when the level of Q or T is higher.

Maximizing profit with respect to quality yields the necessary condition:

$$0 = jrg_T - \gamma_Q g_T - Z_T \tag{1}$$

We now derive a number of hypotheses regarding the effects of reimbursement rules on quality. First, totally differentiating (1) and using the implicit function theorem yields:

$$\frac{\partial T}{\partial j} = \frac{-rg_T(1 + \gamma_{QQ} f_p)}{(jr - \gamma_Q)g_{TT} - \gamma_{QQ} g_T^2 - Z_{TT}} > 0 \tag{2}$$

Equation (2), says that for states with balance billing constraints beyond the federal mandate, we should expect to see reduced quality of treatment. Second, this result also follows:

$$\frac{\partial T}{\partial r} = \frac{-jg_T - \gamma_{QQ} f_p g_T (j - .80b)}{(jr - \gamma_Q)g_{TT} - \gamma_{QQ} g_T^2 - Z_{TT}} > 0 \tag{3}$$

Equation (3) states that lower Medicare approved rates should also lead a physician to reduce treatment quality. Third, another consequence of the model is that:

$$\frac{\partial T}{\partial v_0} = \frac{\gamma_{QQ} g_T}{(jr - \gamma_Q)g_{TT} - \gamma_{QQ} g_T^2 - Z_{TT}} < 0 \tag{4}$$

Equation (4) states that we expect areas with higher non-price sensitive demand (exogenous demand) to have lower treatment quality.

To summarize, this model predicts that for a profit maximizing physician office visit quality depends on Medicare's reimbursement rate, the stringency of limits on balance billing, determined by both Medicare and the state, and factors that shift the demand for office visits. In particular, this model predicts a reduced quality when Medicare-approved rates are lower, and when balance billing constraints are more restrictive than the federal mandate. We will use the MCBS to empirically test these predictions. Before proceeding, however, it is useful to review prior research examining how physicians respond to reimbursement policies.

Prior research

We briefly summarize two bodies of literature, as both are relevant: studies related to the effects of Medicare payments on physicians, and studies related to the effects of balance billing restrictions. Both have a basic foundation in an early model of physician behavior developed by Sloan et al. (1978), hereafter referred to as the SMC model.[8]

The SMC model had three main assumptions: (1) a physician faces a downward sloping demand curve due to product differentiation and geographical spacing, (2) a physician sees different patient types giving rise to a kinked marginal revenue curve (in contrast to our model above), and (3) a physician maximizes profit. The basic conclusions of the SMC model were that relative payments determine the quantity of services supplied to each group of patients, and that groups paying relatively larger amounts receive a higher volume of services than other groups, which pay less.

The SMC model was adapted by Holahan and Zuckerman (1991) to consider mandatory assignment. Their model produced the following conclusions: (1) A ban on balance billing could stop price discrimination among Medicare participants, thus resulting in a transfer of money from physicians to beneficiaries, (2) The quantity of assigned claims increases under a ban on balance billing, but there is also a potential for non-price rationing in markets with pre-existing excess demand, (3) Beneficiaries who previously were balance billed retain more of their own money, which may increase the quantity of services they demand, (4) Medicare may increase its outlays under a ban on balance billing if patients increase the quantity of care they demand.

A limitation of the SMC model is that it ignores care quality. Yet, decreasing quality may be one way that physicians respond when the payment rate is restricted. Glazer and McGuire (1993) addressed this deficiency in the SMC model by assuming a monopolistically competitive physician who could differentiate quality between two groups of patients, a higher paying group, and a fee only group. They used an implicit utility framework, and placed competing physicians along the spectrum of a line. Their model produced the following predictions: (1) The fee only group receives a lower quality of services if quality discrimination is possible, and (2) When balance billing and quality discrimination are prohibited, patients who are served under the fee only system receive lower quality than when quality discrimination is permitted.

Economists have tested some aspects of each of these three models. We now turn to these studies. There has been relatively little work on the effects of reimbursement on the quality of care for Part B services, but existing research related to Part A, HMOs, and Medicaid suggests quality and Medicare fees have a positive relationship. Hadley et al. (2001), used aggregate beneficiary data to find that higher Medicare fees under Part A for Breast Conservancy Surgery (BCS) increased the probability of BCS utilization.[9] Since most women prefer BCS as opposed to mastectomy, this suggests that higher fees imply higher quality.[10] Their results were further validated by Hadley et al. (2003) for the individual beneficiary.

Konetzka et al. (2006) examined the relationship between Medicare Part A payments for care in skilled nursing facilities and found reductions in Medicare payments increased the likelihood of patients having pressure sores and urinary tract infections. Dafny (2005)

[8] There is also an extensive literature analyzing the effects of Medicare payments in the context of supplier induced demand, and small area variation models, which are not discussed here.

[9] They also find higher payment rates for mastectomy operations to reduce the probability of BCS utilization.

[10] See Lucci et al. (2004) for complete analysis of quality outcomes for BCS.

found little evidence that increases in Medicare Part A payments for hospital care reduced in-hospital death rates, which could be perceived as a measure of quality.

Several studies have examined physicians' behavioral incentives and quality among HMOs at a group practice and at a physician level. A review of these studies can be found in Hellinger (1998) and Armour et al. (2001). One of the more recent studies, Reschovsky et al. (2006) found physicians reporting that they faced financial incentives to reduce services also reporting lower ability to provide quality care.

Regarding Medicaid and quality, there is a general consensus that fees and quality are positively related. Recently Decker (2007) found that higher Medicaid fees increase a Medicaid beneficiary's visit time with the physician. Consistent with this positive relationship between quality and price are the findings of studies by Shen and Zuckerman (1990), and Gray (2001). The former found higher Medicaid payment rates to have a positive effect on a Medicaid recipient's probability of satisfaction with care, and the latter found an inverse relationship between Medicaid fees and the risk of having a low birth weight infant.

Only one prior study has examined the effects of balance billing restrictions under Medicare Part B on various aspects of physician services. McKnight (2007) used data from 1984 to 1996 to evaluate the impact of balance billing restrictions before and after the nationally-imposed price ceiling created by OBRA89. Her identification strategy used a dummy variable which indicating whether a beneficiary resided in a state and year with a balance billing restriction in place, and included state and year effects with a state specific linear time trend. She examined the effects of the restrictions on beneficiary out-of-pocket liability, quantity, and was the first to empirically evaluate their impact on care quality. She found a reduced likelihood of a follow-up telephone call to be the only significant reduction in care quality in the presence of balance billing restrictions.

McKnight was the first to evaluate the effects of balance billing restrictions on care quality under Medicare Part B using a modern empirical strategy, but this significant contribution is not without limitations, which may explain why much of her analysis found insignificant effects. First, her estimated models did not include the Medicare reimbursement rate as an independent variable, despite the fact that the reimbursement rate is a theoretically important determinant of quality (as shown in the prior section), and that empirically, reimbursement rates have been found to be a key determinant of quality, at least under Part A. Medicare approved rate differentials between assigned and non-assigned claims varied throughout the period of her data[11] and payment rates became much more differentiated for different locations through the implementation of the relative value system's geographic cost component.[12] Not accounting for the Medicare payment rates with so many simultaneous changes leaves McKnight's analysis vulnerable to omitted variable bias. Unless Medicare payment rates are uncorrelated with other variables in her models, her estimated effects for balance billing restrictions are likely to be biased and inconsistent (Kmenta 1986). Additionally, omitting this key variable would have led her to overestimate the residual variance, thereby increasing the likelihood of finding insignificant effects of balance billing restrictions on quality.

A second limitation is that OBRA89 contained more than just a balance billing provision, it also contained important fee structure changes, with drastic reductions in payment rates, but these changes in fees were not accounted for in her analysis. If the effects of the price

[11] Through the DRA83, there was a non participating physician payment freeze, while participants' fees were updated regularly.

[12] Additionally, the number of Medicare localities, used for regions of payment, were consolidated from 240 different payment localities to 210 through OBRA89 in 1989 and have subsequently been reduced to a total of 89 payment localities today, creating further change and variation in payments over time [see Smith and Gallagher (1999)].

changes dominate the effects of balance billing restrictions, it increases the likelihood of finding insignificant effects for dependent variables. A third limitation is that in many states, the restrictions on balance billing have procedural exceptions, yet these were not accounted for in her analysis. Not distinguishing these procedures from others could obscure the impact of the laws on quality and quantity. Procedural exceptions imply that any evaluation of balance billing restrictions must be procedure sensitive.

While many studies have examined the effects of Medicare fees on quality, none have included control variables for state-level balance billing restrictions, despite the fact that these restrictions are theoretically important. This paper complements and expands on existing studies by evaluating balance billing restrictions and Medicare fees simultaneously while controlling for procedural exceptions.

Data and methods

The main data set for this analysis is the Medicare Current Beneficiary Survey (MCBS) for the years 2001 to 2003. The MCBS is administered annually to a nationally representative subsample of the Medicare population. Each year it gathers data on approximately 16,000 Medicare enrollees across the United States. The data provide a wide variety of health status and quality measures which can be used to analyze the determinants of beneficiaries' perceptions of physician care quality. The MCBS is supplemented with the annual Medicare claims data for each participant in the survey, by U.S Census county population estimates, and by county-level physician densities from the Area Resource File.

Model specification

The MCBS collected data on 11 different patient-assessed quality measures that pertain to the beneficiary's "particular place of care." For each measure the beneficiary was read a statement, and was then asked to indicate whether he/she "strongly agreed", "agreed," "disagreed," or "strongly disagree". Table 2 reports each of the statements and their response distributions. Notice that statements 1–7 are positive statements about the physician, so higher levels of patient agreement indicate more favorable impressions of quality. Statements 8–11, in contrast, are negative statements, so higher levels of disagreement indicate more favorable impressions of quality. In reporting the responses we have combined the lowest quality response with its neighboring response because for most statements very few patients gave the worst possible rating. Not surprisingly, the majority of patients have favorable ratings of their doctors. In terms of frequency, the most common patient response to each statement is a second-to-highest rating. Next most common is a highest-possible rating, and the least common response is a negative rating.

Our interest centers on how reimbursement policy affects these ordinal ratings of physician quality. For each statement we coded the responses to it as: (1) most favorable, (2) next most favorable, or (3) unfavorable, where this third category includes both of the two lowest ratings. There were simply too few cases of "worst rating possible" on most statements to permit distinguishing between it and its neighboring rating. Thus, for statements 1 through 7, response codes 1, 2, and 3 correspond to "strongly agree," "agree," and "disagree or strongly disagree," respectively. For statements 8 through 11, on the other hand, response codes 1, 2, and 3 correspond to "strongly disagree," "disagree," and "agree or strongly agree," in that order.

Table 2 Dependent variables, descriptions, and response distributions (for full sample)

Variable	Description	Response		
		Strongly agree	Agree	Disagree
1. Telall	Doctor tells all beneficiary wants to know about medical treatment	3,832	12,992	1,230
2. Ansqux	Servicing doctor answers all of beneficiary's questions	4,646	12,922	565
3. Confid	Beneficiary has confidence in doctor	5,385	11,679	935
4. History	Doctor has good understanding of medical history	5,388	11,936	610
5. Wrong	Doctor has complete understanding of what is wrong with beneficiary	4,792	12,080	963
6. Ckevry	Doctor checks everything when examining beneficiary	5,098	11,828	1,147
7. Compet	Doctor is competent and well-trained	5,835	11,954	192
		Response		
		Strongly disagree	Disagree	Agree
8. Discus	Health problem should be discussed but isn't	2,811	13,805	1,411
9. Expprb	Doctor doesn't explain medical problem to beneficiary	3,040	13,411	1,574
10. Favor	Doctor acts as if doing a favor by talking to beneficiary	4,402	12,798	921
11. Hurry	Doctor at service place seems to be in a hurry	3,100	12,254	2,788

Note: For variables 1–7 "strongly disagree" was merged with "disagree", and for variable 8–11, "strongly agree" was merged with "agree"

Each of these ordinal quality measures is modeled using a partial proportional odds generalized ordered logistic model (PPOGOL)[13] with Stata's Gologit2 command developed by Williams (2006a).

The application of PPOGOL estimates the probability that an individual i in year t has response $y > j$ where $j = 1$ means the beneficiary rates their physician with the most favorable rating possible, $j = 2$ means they give their physician the next most favorable rating, and $j = 3$ means they give their physician an unfavorable rating. Econometrically the model to be estimated for each statement is:

$$P(y_{it} > j) = \frac{e^{\Omega_{\mathbf{it}}\mathbf{B_j}}}{1 + e^{\Omega_{\mathbf{it}}\mathbf{B_j}}}, \quad j = 1, 2, 3 \tag{5}$$

where $\Omega_{\mathbf{it}}\mathbf{B_j} = \beta_{0j} + \mathbf{X_{it}}\boldsymbol{\beta}_{\mathbf{1j}} + \mathbf{Z_{it}}\boldsymbol{\beta}_{\mathbf{2j}} + \mathbf{P_{it}}\boldsymbol{\beta}_{\mathbf{3j}} + \epsilon_{itj}$ and i indexes an individual and t indexes time. Explanatory variables in the model include a vector of patient demographics ($\mathbf{X_{it}}$), area characteristics ($\mathbf{Z_{it}}$), and aspects of reimbursement ($\mathbf{P_{it}}$). In the regression's most

[13] The partial proportional odds method is a combination of ordered logistic and generalized ordered logistic regressions and maintains the categorical ranking of the dependent variable while permitting violations of the proportional odds assumption for specific coefficients. In its most general state, PPOGOL is generalized ordered logit in which none of the evaluated coefficients for a variable are the same across categories of the dependent variable. In its most restrictive state, PPOGOL is ordered logit in which all of the evaluated coefficients for a variable are the same across categories of the dependent variable.

restrictive state, $\beta_{zj} = \beta_{zk} = \beta_z$ for all j, k $\in$ [1, 2, 3] for z=1, 2, and 3, in which case this model reduces to an ordered logit model.

Starting with the highly restrictive ordered logistic specification, the proportional odds assumption was tested, and if necessary, relaxed for each coefficient, until the final specification no longer violated the assumption. Using this method within a categorical context is superior to standard logit because it can detect small movements within the dependent variable. It demonstrates econometric superiority over multinomial logit in that it exploits the ordinal nature of the data.

In the PPOGOL models to be estimated, a negative and significant coefficient for an explanatory variable indicates that the variable significantly improves perceived quality, whereas a positive and significant coefficient indicates that the variable significantly reduces perceived quality.

Explanatory variables

The explanatory variables in each model fall into three groups. The first and most interesting are aspects of reimbursement, ($\mathbf{P_{it}}$), which include the Medicare approved rate (MAR) for the visit, whether there are state balance billing restrictions beyond the federal mandate, and whether the physician balance billed. The first of these may be endogenous. The reason is physicians select their billing codes for Medicare reimbursement according to what they provide during the visit, and they are likely choose higher paying codes when they do more, such as when they spend more time reviewing a patient's medical history, or discussing treatment options with a patient. Thus, the more quality a physician puts into a visit, the more likely she is to choose a higher paying code. This means that the actual Medicare approved rate for a visit may be endogenous.

To address this possibility, we constructed an MAR variable that measures the average amount Medicare paid per visit among visits made by other beneficiaries in that physician's geographic area. Specifically, our instrumental variable, $Average\ MAR$, is constructed for beneficiary i in year t by taking the average of all allowed charges for Part B visits in year t for all beneficiaries within i's FIPS county code (except i) that had a Current Procedural Terminology code of 90000-90090 or 99201-99215.[14] To calculate $Average\ MAR$ we restricted the MCBS sample to respondents who had at least 30 other respondents within their FIPS county code. This was necessary to ensure that the instrument be based on a reasonable sample size of beneficiaries. In using this instrument we are assuming that the average amount Medicare paid per visit for visits made by other beneficiaries in that local geographic area is correlated with the actual MAR for beneficiary $i's$ visit, but is independent of unobservable factors that may have influenced beneficiary $i's$ quality ratings.

State-level balance billing restrictions are examined through the variable *State Restriction*, which indicates whether beneficiary i at time t resides in a state with a balance billing restriction beyond the federal mandate. However, we treat New York as a state with only the federal balance billing restriction, because the vast majority of physician visits have CPT codes of 99212-99215, which are exempt in New York.

Our analysis also controls for the effects of balance billing on a patient's assessment of visit quality, but allows for such effects only in states that did not have a state restriction on physician balance billing beyond the federal limit. While it is true that physicians in several of

[14] The former codes correspond to non-open surgical procedures (such as immunizations), in addition to, evaluation, and management services. The later correspond to general office visits potentially requiring the development of a medical history, assessing health, and some level of medical decision making.

the restriction states could have also balance billed their patients, there are actually very few instances in our data set where they did. There are simply not enough cases where balance billing occurred in restriction states to allow us to reliably estimate the effects of balance billing in restriction states. Recall, in order to balance bill a patient, the physician must have already chosen not to participate in Medicare, and physicians who chose not to participate are already subject to approved rates that are 5% lower than typical approved rates. Thus, state restrictions make it considerably less profitable for a physician to balance bill, which is why the incidence of balance billing within states with further restriction is so small. Within our sample, the incidence of beneficiaries who were balance billed is 8.38% among states without restrictions (7.4% of the total sample) and 4.9% among states with restrictions beyond the federal mandate (0.5% of the total sample). For these reasons, we limit our examination of the effects of physician balance billing to when it occurs in states subject only to a federal balance billing limit.

A beneficiary-level balance billing variable is subject to endogeneity concerns. The reason is that given the nature of physician and beneficiary choices, it is likely that some beneficiaries are aware that their physician balance bills, whereas others are taken by surprise. Patients in the former group may believe they are getting better care by paying more, and may consequently rate the quality of their physician as high. Some patients in the latter group, however, are sure to be unhappy about receiving unexpected bills, which may lead them to rate their physician poorly, even though the statements are not about billing, per se. Either way, there is likely to be endogneity in a patient-specific measure of balance billing, although the net effect of balance billing on quality assessments in unclear. Given these endogeneity concerns, our model controls for balance billing in states subject to only the federal mandate through the continuous proxy variable, $pbbilled$, which measures the percentage of beneficiaries who were balance billed within beneficiary i's state.

Patient characteristics, ($\mathbf{X_{it}}$), in the model include income, schooling, gender, age, ethnicity, the patient's self-rated overall health, obesity status, and the presence or absence of various morbidities.

Area characteristics, ($\mathbf{Z_{it}}$), in these models include county population, physician density, and whether the visits take place in an urban area. The county population data are from the U.S Census Bureau, and the physician density data are from the Area Resource File. Both variables were cross-walked to service provider zip codes using the U.S. Census Bureau's internal county FIPS (Federal Information Processing Standards) to US zip code database. All models also include time dummies.

Table 3 defines each of the explanatory variables, and reports their summary statistics. For the full sample, the summary statistics for key variables of interest indicate that the approximately 6.2% of beneficiaries in states subject to only the federal mandate have been balance billed by their usual source of care,[15] and that 9.7% of beneficiaries within the sample live in states with restrictions beyond the federal Mandate. The average Medicare approved rate per visit across the sample is \$56.2.[16] Appendix reports descriptive statistics on each of these and all other variables by specialty of the primary care physician.

[15] Note that this does not mean that they are always balance billed, but only that they have been.

[16] This average falls in line with the average approved rates for CPT 99212-99215 codes which are the most common visits under Medicare Part B.

Table 3 Independent variables and descriptions

Variable	Description	Mean	se.
Price factors ($\mathbf{P_{it}}$)			
Pbbilled	Percentage of beneficiaries within state who are been balance billed	0.062	0.049
State restriction	1 if beneficiary resides in a state with a balance billing restriction beyond the federal mandate (exception New York)	0.097	0.295
Average MAR	Yearly average per claim Medicare approved rate for all others within county (measured in hundreds)	0.562	0.068
Patient demographic covariates ($\mathbf{X_{it}}$)			
Income515	1 if \$5,000 < income < \$15,000	0.247	0.431
Income1525	1 if \$15,000 < income < \$25,000	0.25	0.433
Income2545	1 if \$25,000 < income < \$45,000	0.281	0.45
Income45g	1 if \$45,000 > income	0.165	0.371
High school	1 if high school graduate	0.307	0.461
College	1 if college graduate	0.195	0.396
Male	1 if male	0.453	0.498
Age	Age based on social security records	74.404	10.845
Minority	1 if not Caucasian	0.094	0.292
Smoker	1 if smoker at time of interview	0.116	0.32
High blood pressure	1 if beneficiary has had high blood pressure within the last year	0.441	0.502
Stroke	1 if ever had a stroke	0.122	0.327
Cancer	1 if ever had cancer	0.037	0.189
Diabetes	1 if ever had diabetes or high blood sugar	0.173	0.378
Rheumatoid arthritis	1 if ever had rheumatoid arthritis	0.099	0.299
Emphysema, asthma, or COPD	1 if ever had emphysema, asthma, or COPD	0.139	0.346
Excellent health	1 if beneficiary reports having excellent health	0.158	0.365
Very good health	1 if beneficiary reports having very good health	0.278	0.448
Good health	1 if beneficiary reports having good health	0.319	0.466
Fair health	1 if beneficiary reports having fair health	0.177	0.382
Obese	1 if $BMI \geq 30$	0.209	0.407
Area characteristics ($\mathbf{Z_{it}}$)			
Urban	1 if county population density greater than 1000 persons/square mile	0.276	0.447
Physicians per population	Physicians per county population	0.002	0.001
Population per 100,000	County population per 100,000	8.029	15.205
2002	1 if year 2002	0.335	0.472
2003	1 if year 2003	0.33	0.47

Sampling criteria

Models for the 11 quality measures are estimated at the beneficiary-level for MCBS respondents who meet the following criteria: (1) the beneficiary has standard Medicare, Parts A and B, for the entire year, not a Medicare HMO, (2) the beneficiary is at no time Medicaid eligible, (3) the beneficiary has a place where they regularly receive care, and (4) the beneficiary resides in a county with at least 30 other beneficiary/respondents. The first two restrictions

apply because physician reimbursement for beneficiaries in Medicare HMOs and those who have Medicaid is different, and may not bear the same relationship to quality. The third applies because the quality questions were only asked of respondents with a usual source of care, and the fourth applies because this is the group for whom the $Average\,MAR$ variable could be constructed. These restrictions yield a sample of 18,133 beneficiaries.

Since treatment approaches and physician characteristics may differ across specialties, pooling all physicians may introduce unwanted heterogeneity. To address this possibility, models were also estimated for three primary care specialties, as well as for all physicians. The three primary care specialties are family practice, internal medicine, and general practice physicians.

Clustering

Given that many beneficiaries reside in the same state with its own mandates in regard to balance billing, the analysis controls for interdependence between these beneficiaries through the following eight clusters: 1. States with only the federal mandate, 2. Connecticut, 3. Massachusetts, 4. Minnesota, 5. Ohio, 6. Pennsylvania, 7. Rhode Island, 8. Vermont.

Results

This section summarizes the key findings regarding the effects of physician reimbursement on the perceived quality of Part B office visits. In all, 44 models were estimated: 11 models for all visits regardless of the specialty of the attending physician, and 33 models for visits made to family practitioners (11 models), internists (11 models), and general practice medicine (11 models), To save on space, the findings for the patient and area characteristics in these models are not reported or discussed here, although it should be noted that all models included the full set of control variables listed in Table 3.[17] All reported marginal effects for significant coefficients were calculated using Stata's MFX2 package developed by Williams (2006b) and they were evaluated at the means.[18]

State restrictions on balance billing

All of the significant results in Tables 4 and 5 indicate that the perceived quality of care that physicians provide is substantially lower in states that have imposed restrictions beyond the federal mandate. The results for statements (1) and (2) indicate that physicians who are subject to these state restrictions are providing less information to their patients. More specifically, the predicted marginal effects for physicians regardless of specialty indicate that state restrictions reduce the likelihood a beneficiary strongly agrees that the physician tells them all they want to know about the medical treatment (statement 1) by 2.4%, and that the servicing doctor answers all of their questions (statement 2) by 4.6%.

A reduction in physician/patient communication is also evident in the rating models for family practitioners and internists. The predicted marginal effects for family practitioners suggest that a state restriction on balance billing reduces the probability that a beneficiary strongly agrees that the physician tells them all that they want to know about the medical

[17] The full models are available from the authors upon request.

[18] Marginal effects were also evaluated for Average MAR at the 25 and 75 percentiles to verify robustness.

Table 4 Summary of effects of reimbursement policy across all physician specialties ($N = 14{,}262$)

Dependent variable	Percentage balance billed	State restriction	Allowed charge
1. Doctor tells all beneficiary wants to know about medical treatment	0.054(0.050)	0.149(0.051)***	−0.325(0.204)
2. Servicing doctor answers all of beneficiary's questions	0.656(0.068)***	0.259(0.077)***	−0.992(0.317)***
3. Beneficiary has confidence in doctor	0.54(0.061)***	0.123(0.123)	−0.722(0.221)***
4. Doctor has good understanding of medical history	0.072(0.220)	0.121(0.141)	−1.275(0.282)***
5. Doctor has complete understanding of what is wrong with beneficiary	−0.157(0.162)	0.062(0.112)	−1.208(0.273)***
6. Doctor checks everything when examining beneficiary	0.215(0.141)	0.108(0.118)	−0.595(0.201)***
7. Doctor is competent and well-trained	0.626(0.252)**	0.163(0.169)	−0.864(0.318)***
8. Health problem should be discussed but isn't	−0.941(0.044)***	0.203(0.138)	−0.581(0.223)***
9. Doctor doesn't explain medical problem to beneficiary	−1.239(0.072)***	0.057(0.175)	−0.225(0.203)
10. Doctor acts as if doing a favor by talking to beneficiary	−0.099(0.024)***	0.290(0.082)***	−1.645(0.256)***
11. Doctor at service place seems to be in hurry	−1.806(0.078)***	−0.114(0.205)	−0.126(0.474)

Estimation method: partial proportional odds ordered logit clustered by restriction type
Negative coefficients indicate an improvement in quality
Each regression used a full set of control variables as presented in Table 3
** $p < 0.05$, *** $p < .01$

treatment (statement 1) by 2.31%. A state restriction reduces the likelihood of strongly disagreeing that their health problem should be discussed but isn't (statement 8) by 1.73%, and reduces the likelihood of strongly disagreeing that the doctor doesn't explain their medical problem to them (statement 9) by .78%.

For internists, a state restriction reduces the probability that a beneficiary strongly agrees that the physician tells them all that they want to know about the medical treatment by 3.2%, and that the servicing doctor answers all of their questions by .79%. State restrictions reduce the likelihood of strongly disagreeing that their health problem should be discussed but isn't by 4.31%, and reduces the likelihood of strongly disagreeing that the doctor doesn't explain their medical problem to them by 1.46%.

A beneficiary's recognition of confidence and competence in his or her physician is shaken in states with balance billing restrictions beyond the federal mandate, although the effects are limited to family practitioners. The marginal effects for Statements (3) and (7) address these traits, respectively, and indicate that for family practitioners the presence of a state restriction

Table 5 Summary of effects of of reimbursement policy for internists ($N = 4{,}454$)

Dependent variable	Percentage balance billed	State restriction	Allowed charge
1. Doctor tells all beneficiary wants to know about medical treatment	0.272(0.305)	0.185(0.077)**	0.177(0.171)
2. Servicing doctor answers all of beneficiary's questions	0.797(0.256)***	0.358(0.082)***	−0.582(0.229)**
3. Beneficiary has confidence in doctor	0.335(0.186)*	0.116(0.137)	0.584(0.35)*
4. Doctor has good understanding of medical history	−0.397(0.228)*	0.017(0.162)	−0.149(0.431)
5. Doctor has complete understanding of what is wrong with beneficiary	0.176(0.148)	−0.002(0.081)	−0.356(0.291)
6. Doctor checks everything when examining beneficiary	0.236(0.118)**	0.044(0.123)	0.411(0.265)
7. Doctor is competent and well-trained	−0.072(0.211)	−0.061(0.177)	0.555(0.572)
8. Health problem should be discussed but isn't	−1.15(0.31)***	0.313(0.107)***	0.334(0.117)***
9. Doctor doesn't explain medical problem to beneficiary	−1.601(0.181)***	0.096(0.058)*	1.025(0.162)***
10. Doctor acts as if doing a favor by talking to beneficiary	−0.180(0.166)	0.196(0.069)***	−0.258(0.455)
11. Doctor at service place seems to be in hurry	−2.473(0.104)***	−0.078(0.145)	0.486(0.266)*

Estimation method: partial proportional odds ordered logit clustered by restriction type
Negative coefficients indicate an improvement in quality
Each regression used a full set of control variables as presented in Table 3
* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

reduces the likelihood that a beneficiary strongly agrees that they have confidence in their physician by 3.59%, and that their physician is competent and well trained by 8.2%.

Some physicians appear less thorough with a patient's medical history in the presence of a state billing restriction, and some present an inferior bedside manner. For example, among beneficiaries seeing family practitioners in states with restrictions beyond the federal mandate, the likelihood of strongly agreeing that the doctor has a good understanding of their medical history (Statement 4) is diminished by 3.83%. Beneficiaries are less likely to strongly disagree that the doctor acts as if doing a favor by talking to them (statement 10) by 6.29% if they see a family practitioner, by 3.89% if they see an internist, and by 4.9% regardless of their physician's specialty.

Balance billing

The effects of physician balance billing decisions in states subject to only the federal mandate was assessed through the variable *pbbilled*. The findings are mixed. There are 15 instances

Table 6 Summary of effects of reimbursement policy for family practitioners ($N = 2{,}672$)

Dependent variable	Percentage balance billed	State restriction	Allowed charge
1. Doctor tells all beneficiary wants to know about medical treatment	0.24(0.19)	0.169(0.067)**	−1.367(.868)
2. Servicing doctor answers all of beneficiary's questions	−0.481(.08)***	0.147(0.113)	−2.767(0.74)***
3. Beneficiary has confidence in doctor	1.089(.24)***	0.194(0.047)***	−2.63(0.517)***
4. Doctor has good understanding of medical history	0.854(0.328)***	0.203(0.067)***	−1.725(0.479)***
5. Doctor has complete understanding of what is wrong with beneficiary	0.24(0.214)	0.003(0.067)	−0.402(0.449)
6. Doctor checks everything when examining beneficiary	−0.303(0.234)	0.154(0.154)	0.113(0.519)
7. Doctor is competent and well-trained	1.469(0.264)***	0.435(0.124)***	−2.003(0.605)***
8. Health problem should be discussed but isn't	−0.728(0.236)***	0.18(0.058)***	−2.148(0.252)***
9. Doctor doesn't explain medical problem to beneficiary	−1.236(0.096)***	0.069(0.040)*	−0.844(0.543)
10. Doctor acts as if doing a favor by talking to beneficiary	−0.105(0.115)	0.442(0.211)**	−2.870(0.508)***
11. Doctor at service place seems to be in hurry	−0.169(0.187)	0.043(0.158)	0.224(0.783)

Estimation method: partial proportional odds ordered logit clustered by restriction type
Negative coefficients indicate an improvement in quality
Each regression used a full set of control variables as presented in Table 3
* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

here where *pbbilled* significantly improves perceived quality, but 13 instances where it significantly reduces it. In all cases, however, the implied marginal effect of balance billing on perceived quality is extremely small, given that the state averages are between 0–19%. For example, a 1% increase in the percentage of beneficiaries state-wide who indicate that their usual source of care balance bills them implies a .12% increase in the probability that a beneficiary strongly disagrees that their health problem should be discussed but isn't. For all other significant coefficients, the calculated marginal effects of a 1% increase in the state Medicare population that is balance billed changes the probability of strongly agreeing under statements 1–7, and strongly disagreeing under statements 8–11, by anywhere from −.30% and .38%. Thus, we find a mix of very small but significant effects.

Average medicare approved rates

The findings for *Average MAR* in the models for all-specialties and for family practitioners in Tables 4 and 6 indicate that higher Medicare approved rates significantly increase perceived

treatment quality, although most of the effects are small in magnitude. For a beneficiary who regularly sees a physician (regardless of specialty), a 20% ($11.21) increase in Medicare's average allowed charge per visit in their county raises the likelihood of strongly agreeing: that their doctor answers all of their questions (statement 2) by 2.1%, that they have confidence in their doctor (statement 3) by 1.7%, that their doctor has a good understanding of their medical history (statement 4) by 3%, that their doctor has a complete understanding of what is wrong with them (statement 5) by 2.64%, that their doctor checks everything when examining them (statement 6) by 1.34%, and that their doctor is competent and well-trained (statement 7) by 2.12%. A 20% increase in Medicare's average allowed charge per visit also increases the likelihood of strongly disagreeing: that their health problem should be discussed but isn't (statement 8) by .34%, and that their doctor acts as if they are doing a favor by talking to them (statement 10) by 3.37%.

While family practitioners also exhibit a positive relationship between Medicare's average approved rate per visit and perceived quality, the magnitude of the marginal effects for this specialty are much larger. Among beneficiaries seeing family practitioners, a 20% ($10.80) increase in Medicare's average approved rate increases the likelihood that they strongly agree with statement 2 by 4.88%, statement 3 by 6.3%, statement 4 by 3.65%, and statement 7 by 4.39%. It also increases the likelihood they strongly disagree with statements 8 and 10 by 2.35 and 4.89%, respectively.

The results for internists are mixed with respect to Medicare's average allowed charge per visit. Only one of the five significant coefficients implies an increase in quality as Medicare's approved rate increases, the other four significant coefficients suggest a decrease. However, most of the marginal effects for internists are very small. For example, a 20% ($11.60) increase in Medicare's average allowed charge per visit increases the likelihood that a patient strongly agrees that their attending internist answers all of their questions by 1.37%, but decreases the likelihood they have confidence in the doctor by 1.49%. It also reduces the likelihood of strongly disagreeing that their health problem should be discussed but isn't, that the doctor explains their medical problem to them, and that their doctor seems to be in a hurry by .57, 1.85, and .87%, respectively.

For General Practitioners four of the six significant coefficients reveal a marked improvement in perceived quality as Medicare's approved rate increases. The magnitude of the marginal effects are similar to those discussed above for the all-physicians model. Only two significant coefficients indicate a reduction in perceived quality and they relate to statements 1 and 2. A 20% ($11.04) increase in Medicare's average approved rate per visit reduces the likelihood a beneficiary strongly agrees that their doctor tells them all they want to know about their medical treatment by 2%, and that their doctor answers all of their questions by 1.16% (Table 7).

Conclusions

This paper has examined, both theoretically and empirically, how the quality of a physician office visit varies with three facets of Medicare reimbursement: the presence of state-level balance billing restrictions beyond the federal limit, actual physician balance billing of the patient, and Medicare's approved payment rate for that visit. Two broad findings emerge from our analysis of MCBS data covering the 2001–2003 period. First, state-level restrictions on a physician's ability to balance bill Medicare patients, which currently exist in eight states, have negative and significant effects on the perceived quality of physician office visits. In states with such restrictions our findings indicate an erosion in the

Table 7 Summary of effects of reimbursement policy for general practitioners ($N = 5{,}131$)

Dependent variable	Percentage balance billed	State restriction	Allowed charge
1. Doctor tells all beneficiary wants to know about medical treatment	0.289(0.083)***	0.018(0.067)	1.229(0.067)***
2. Servicing doctor answers all of beneficiary's questions	1.214(0.130)***	0.138(0.132)	0.321(0.321)*
3. Beneficiary has confidence in doctor	0.711(0.156)***	−0.099(0.122)	−0.051(0.254)
4. Doctor has good understanding of medical history	0.047(0.186)	−0.035(0.259)	−1.005(0.433)**
5. Doctor has complete understanding of what is wrong with beneficiary	−0.198(0.139)	−0.009(0.203)	−1.220(0.367)***
6. Doctor checks everything when examining beneficiary	0.996(0.173)***	0.042(0.192)	−0.507(0.213)**
7. Doctor is competent and well-trained	0.496(0.344)	−0.002(0.324)	−0.369(0.38)
8. Health problem should be discussed but isn't	−1.507(0.135)***	0.085(0.214)	−0.132(0.290)
9. Doctor doesn't explain medical problem to beneficiary	−2.001(0.135)***	−0.065(0.306)	−0.022(0.348)
10. Doctor acts as if doing a favor by talking to beneficiary	−1.017(0.103)***	0.104(0.067)	−1.716(0.162)***
11. Doctor at service place seems to be in hurry	−2.439(0.04)***	−0.239(0.223)	−0.326(0.442)

Estimation method: partial proportional odds ordered logit clustered by restriction type
Negative coefficients indicate an improvement in quality
Each regression used a full set of control variables as presented in Table 3
* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

communication between physicians and their patients. We find that beneficiaries in these states are 2–5% less likely to strongly agree that their physician is telling them all they want to know about their medical treatment, or that their physician answers all of their questions. Beneficiaries seeing family practitioners In these states are also less likely to strongly agree they have confidence in their doctor, or that the doctor is competent and well trained. In every instance where state restrictions have a significant effect on perceived quality, and we find many, the effect is adverse. These findings suggest the state balance billing restrictions are essentially forcing beneficiaries to accept lower treatment quality in exchange for saving some money at the doctor's office. In effect, these state regulations are denying beneficiaries the opportunity to pay higher prices for higher quality care.

Second, there is a positive and significant relationship between the perceived quality of a visit and Medicare's approved rate for the visit. This gradient, however, is quantitatively rather small. For example, in areas where Medicare's approved rate per visit is 20% below average, beneficiaries are only 3% less likely to strongly agree their doctor has a

good understanding of their medical history, and 3.37% less likely to strongly disagree their doctor acts as if they are doing a favor by talking to them. When compared to the effects of state balance billing laws, these effects are quite small. Physicians whose specialty is family practice appear to be the most responsive to changes in the Medicare approved rate.

Our findings confirm the predictions from economic theory, as developed by Holahan and Zuckerman (1991), by Glazer and McGuire (1993), and by us earlier in this paper. Holahan and Zuckerman's model predicted that balance billing restrictions could result in non-price rationing, and this paper has found evidence that reductions in perceived quality indeed occur whenever state restrictions exceed the federal limit. Glazer and McGuire's model predicted that beneficiaries served under the participation option receive lower care quality, and those served under a fee only system (a complete balance billing restriction) also receive lower quality of care. This paper provides evidence, which suggests that both of these predictions are true in terms of the patient's perspective on quality.

While this study has uncovered differences in perceived quality in response to Medicare billing policies, the time frame of our data limit our ability to say much about the effects of the current federal limit on balance billing. The problem is we lack data from the time when physicians could balance bill freely. Based on our findings for the current state laws on balance billing, we suspect that perceived visit quality may have declined somewhat following introduction of the federal ban. Without data from that period, however, it is impossible to say by how much perceived quality may have declined.

This is the first study to examine the effects of reimbursement on the perceived quality of physician office visits under Medicare Part B. Yet, our results in many ways parallel the results from Medicare Part A examinations of how hospital quality responds to DRG payments, as well as studies of the effects of Medicaid payment on quality of care. Here we find higher payment rates under Medicare Part B are associated with better quality care on office visits, at least in the eyes of patients.

One fruitful area for future research would be to focus on the impact of outpatient reimbursement policy on more objective measures of care quality, such as process-oriented or outcome-based measures. It may be that much more than just patient perceptions are being affected. Such research may be able to shed light, for example, on whether a patient's risk of an adverse event, such as hospitalization, increases when quality is reduced in outpatient settings. The cost of tightening physician outpatient reimbursement could be larger than simply reduced care quality in outpatient settings. If the probability of an adverse health event rises as a result, there will be real costs in terms of patients' health, as well as increases in Medicare outlays for hospital care under Part A. Quantifying the nature of these trade-offs is important and timely, especially given current interest in containing Medicare spending.

Diluting the quality of an office visit is one method of physician non-price rationing in response to lower reimbursement. Keep in mind that markets may clear in other ways, as well, not just through reductions in quality. Research on volume responses, patients' access to primary care and specialty services, and a possible substitution of care in other settings than physicians' offices, is necessary to fully understand the effects of physician reimbursement on markets for health care.

Acknowledgements This research was supported by a student award program grant from the Blue Cross and Blue Shield of Michigan Foundation. We thank Mark Pauly, Allen Goodman, Li Way Lee, Josh Hendrickson, Paul Fisher and two anonymous referees for providing helpful comments on an earlier version of the paper,

and the Institute of Gerontology and Department of Economics at Wayne State University for assistance with acquiring the MCBS data.

Appendix

See Table 8.

Table 8 Summary statistics by specialty

Variable	Family practice		General practice		Internal medicine	
	Mean	se.	Mean	se.	Mean	se.
Income515	0.261	0.439	0.271	0.445	0.176	0.381
Income1525	0.269	0.444	0.266	0.442	0.22	0.414
Income2545	0.283	0.451	0.28	0.449	0.301	0.459
Income45g	0.131	0.338	0.129	0.335	0.244	0.43
High school	0.336	0.472	0.329	0.47	0.274	0.446
College	0.153	0.361	0.153	0.36	0.286	0.452
Male	0.447	0.497	0.447	0.497	0.427	0.495
Age	74.738	10.529	74.804	10.623	75.364	8.947
Minority	0.086	0.281	0.094	0.292	0.073	0.26
Smoker	0.113	0.316	0.111	0.314	0.089	0.284
High blood pressure	0.467	0.506	0.448	0.501	0.475	0.506
Stroke	0.128	0.334	0.123	0.329	0.127	0.333
Cancer	0.036	0.186	0.034	0.181	0.04	0.197
Diabetes	0.174	0.379	0.181	0.385	0.176	0.38
Rheumatoid arthritis	0.106	0.307	0.102	0.303	0.098	0.297
Emphysema, asthma, or COPD	0.138	0.345	0.139	0.346	0.139	0.346
Excellent health	0.163	0.369	0.151	0.358	0.16	0.366
Very good health	0.28	0.449	0.272	0.445	0.299	0.458
Good health	0.313	0.464	0.33	0.47	0.318	0.466
Fair health	0.181	0.385	0.184	0.387	0.167	0.373
Obese	0.215	0.411	0.216	0.412	0.203	0.402
Percentage balance billed	0.058	0.048	0.063	0.050	0.064	0.047
State restriction	0.129	0.335	0.102	0.302	0.074	0.262
Average MAR	0.541	0.055	0.552	0.067	0.576	0.067
Physicians per population	0.002	0.001	0.002	0.001	0.003	0.001
Population per 100,000	4.527	9.651	6.639	13.501	10.231	17.037
Urban	0.138	0.345	0.226	0.418	0.365	0.481
2002	0.335	0.472	0.333	0.471	0.336	0.472
2003	0.352	0.478	0.332	0.471	0.329	0.47

References

Armour, B., Pitts, M., Maclean, R., Cangialose, C., Kishel, M., Imai, H., & Etchason, J. (2001). The effect of explicit financial incentives on physician behavior. *Archives of Internal Medicine, 161*(10), 1261–1266.

Dafny, L. S. (2005). How do hospitals respond to price changes? *American Economics Review, 95*(5), 1525–1547.
Decker, S. L. (2007). Medicaid physician fees and the quality of medical care of medicaid patients in the USA. *Review of Economics of the Household, 5*(1), 95–112.
GAO. (1989). Impact of state mandatory assignment programs on beneficiaries. Technical report, United States General Accounting Office.
Glazer, J., & McGuire, T. G. (1993). Should physicians be permitted to balance bill patients. *Journal of Health Economics, 12*(3), 239–258.
Gray, B. (2001). Do medicaid physician fees for prenatal services affect birth outcomes? *Journal of Health Economics, 12*(3), 571–590.
Hadley, J., Mandelblatt, J. S., Mitchell, J. M., Weeks, J. C., Guadagnoli, E., & Hwang, Y. (2003). Medicare breast surgery fees and treatment received by older women with localized breast cancer. *Health Services Research, 38*(2), 553–573.
Hadley, J., Mitchell, J., & Mandelblatt, J. (2001). Medicare fees and small area variations in breast-conserving surgery among elderly women. *Medical Care Research and Review, 58*(3), 334–360.
HCFA. (1984). Legislative summary for deficit reduction act of 1984. Technical report, Health Care Finance Administration.
HCFA. (1986). Legislative summary for the omnibus reconciliation act of 1986. Technical report, Health Care Finance Administration.
Hellinger, F. (1998). The effect of managed care on quality—A review of recent evidence. *Archives Of Internal Medicine, 158*(8), 833–841.
Holahan, J., & Zuckerman, S. (1989). Medicare mandatory assignment—An unnecessary risk. *Health Affairs, 8*(1), 65–79.
Holahan, J., & Zuckerman, S. (1991). *Regulating Doctors Fees*, chapter The Role of Balance Biling in Medicare Physician Payment Reform., pp. 143–169. American Enterprise Institute Press.
KFF. Medicare assignment rates for physician services for calendar years 1983, 1988, 2001, 2002, and 2003. Kaiser Family Foundation, URL http://www.statehealthfacts.org/comparetable.jsp?cat=6&ind=341.
Kmenta, J. (1986). *Elements of econometrics* (2nd ed.). New York: Macmillan Publishings Co.
Konetzka, T. R., Norton, E. C., & Stearns, S. C. (2006). Medicare payment changes and nursing home quality: Effects on long-stay residents. *International Journal of Health Care Finance Economics, 6*(3), 173–189.
Lucci, A., Shoher, A., Sherman, M. O., & Azzizadeh, A. (2004). Assessment of the current medicare reimbursement system for breast cancer operations. *Annals Of Surgical Oncology, 11*(12), 1037–1044.
McKnight, R. (2007). Medicare balance billing restrictions: Impacts on physicians and beneficiaries. *Journal of Health Economics, 26*(2), 326–341.
Reschovsky, J. D., Hadley, J., & Landon, B. E. (2006). Effects of compensation methods and physician group structure on physicians' perceived incentives to alter services to patients. *Health Services Research, 41*(4, Part 1), 1200–1220.
Sammons, J. H. (1989). Physician payment reform : Don't forget the patient. *Health Affairs, 8*(1), 132–137.
Shen, Y. C., & Zuckerman, S. (1990). The effect of medicaid payment generosity on access and use among beneficiaries. *Health Services Research, 40*(3), 723–744.
Sloan, F., Mitchell, J., & Cromwell, J. S. (1978). *Private physicians and public programs*. Lexington: Lexington Books.
Smith, S., & Gallagher, P. E. (Eds.). (1999). *Medicare RBRVS: The physician's guide 1999*. Chicago: American Medical Association.
Williams, R. (2006). Generalized ordered logit/ partial proportional odds models for ordinal dependent variables. *The Stata Journal, 6*(1), 58–82.
Williams, R. (2006b). Mfx2: Stata module to enhance mfx command for obtaining marginal effects or elasticities after estimation. Statistical Software Components, Boston College Department of Economics, May. URL http://ideas.repec.org/c/boc/bocode/s456726.html.