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DEMANDING CUSTOMERS: CONSUMERIST PATIENTS AND QUALITY OF CARE

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ABSTRACT

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Keywords: consumerism, health care quality, physician time, time allocation, time budget

JEL categories: I12, I11, D82

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I. INTRODUCTION

The attention of the US health policy community has increasingly focused on quality problems in recent years. The shortfalls are well documented. In one of the most often-mentioned studies, McGlynn et al. (2003) examined 439 markers for quality of care for 30 different conditions and found that, on average, patients receive only 54.9 percent of recommended care. These omissions have significant costs. According to the National Committee on Quality Assurance (NCQA, 2005, p. 10), gaps in health care quality lead to $2.8 - $4.2 billion in additional medical costs, costs that would not have been incurred if high-quality care had been delivered initially. The costs of low quality are felt well beyond the healthcare sector. They account for between 39,000 and 83,000 preventable deaths each year, 83.1 million additional sick days and $13 billion in lost productivity (NCQA, 2005, p. 10).

Over the past several decades, the US health care system has transformed from a model dominated by private insurance companies that contracted with individual physicians and/or providers to one in which managed care organizations played a very active role, and finally to one in which decision making power once again devolved to individual patients and physicians. However, rather than solving the problem of quality, this evolution has led to continuing widespread problems of quality, what the Institute of Medicine (IOM, 2000) has termed the "Quality Chasm"

For most economic goods, market competition among private suppliers is the principal tool for promoting quality and controlling costs. Traditional fee-for-service reimbursement fosters competition. Since patients are free to choose any provider, they will flock to those who provide high quality care. And, given that quality attracts patients, providers have an incentive to improve quality. However, the parts of health care quality that are easy to observe (e.g., courtesy

in the doctor's office) are often not relevant for health outcomes, while the salient indicators of quality for health outcomes (e.g., risk-adjusted morbidity and mortality) are notoriously difficult to observe. As a result, we would not expect market forces to do a good job of focusing providers' attention on the most critical aspects of quality. Further, since patients cover only a small portion of their costs at the point of consumption, we might expect inadequate cost control to accompany gold plating of observable quality indicators and the misalignment of quality incentives, (Relman, 1993). Indeed, costs did skyrocket during the era when fee-for-service dominated and competition among doctors flourished.

Managed care rose to prominence in the early 1980s, largely as a response to the excesses of the fee-for-service system. Cost-control was probably its major objective, but there were also strong hopes that it would promote quality. Several features of managed care offered promise in these two domains. Many managed care plans offer "one-stop shopping"; that is, patients may receive all of their care within the managed-care network. In theory, this should promote better quality of care by improving treatment continuity and information exchange among providers. Moreover, managed care organizations have strong incentives to provide preventive care (Dysinger, 1996), which may both promote quality of care and yield future cost savings. Empirical evidence indicates that managed care in fact is associated with greater use of preventive services (Balkrishnan et al., 2002; Rizzo, 2005). Having all care delivered under one roof may promote greater efficiencies in production and/or economies of scale in service, leading to cost savings (Sullivan, 2000; Brown and Pagan, 2006). Moreover, given capitation, the underlying financial incentives could help to hold down costs.

While costs were constrained as manage care blossomed, especially during the mid-1990s, health care costs resumed their upward trend in the late 1990s. Moreover, both patients and

providers became increasingly disenchanted with restrictions on treatment choices imposed by managed care, believing that they had impaired quality, a phenomenon that became known as "Managed Care Backlash" (Blendon et al., 1998; Enthoven and Singer, 1998; Miller and Luft, 1997, 2002, Miller 2006). Patients thought their inability to choose among physicians more broadly hurt quality, and insisted on changes. In response to these patient pressures, restrictions on physician choice in the HMO model declined significantly in the late 1990s; many HMOs now offer broad access (Robinson, 2001; Draper et al., 2002). At the plan level, increases in health insurance premiums and copayments (Kaiser Family Foundation, 2007) have no doubt prompted consumers to increase scrutiny of their plan and treatment options.

Perhaps as a reaction to their dissatisfaction with managed care, consumers in recent years have come to play a much more active role in their personal medical care decisions (Robinson, 2005), a phenomenon that has become known as "consumerism" (Teutsch, 2003; Rosenthal and Milstein, 2004; Dutta-Bergman, 2003; Havlin et al., 2003).[1] At the same time, there has been a rapid increase in the availability of medical information to consumers, from health-care report card programs, direct-to-consumer advertising, and particularly over the internet.

As in the case of private competition and managed care, many have argued that consumerism will provide a lever to improve quality. As patients learn more about their medical needs and the quality of different providers, they will flock to the best ones, which will, in turn, give providers an incentive to increase quality. Further, since the success of modern medical treatment often requires high levels of compliance by patients, consumerism promises the additional benefit that, more-informed patients will be better patients. Moreover, to the extent that physicians value patient input and involvement in decisionmaking, more inquisitive and

questioning patients may be seen as desirable and complementary to the physician's efforts to provide high-quality care. For example, consumers – who have greater interest in their health than do their physicians – might do considerable research on their conditions, which could complement or stimulate the relevant knowledge of the doctor. More knowledge by consumers could make them better able or more willing to follow the doctor's instructions, for example in taking prescribed medications.

While the potential of consumerism to improve quality is clear, there is a darker side to the phenomenon, and *a-priori,* the relationship between consumerism and quality of care is indeterminate. On the negative side, consumerist patients might follow their own beliefs, as opposed to those of their more knowledgeable physicians, in effect undermining the physician's clinical autonomy, taking more physician time, and perverting the agency relationship. A recent article on physician interactions with consumerist patients is quite telling:

> *A few months ago, Dr. David Golden says, he had to fire a patient for being obnoxious. The patient had a cough. After examining him, Golden recommended a medication. But the patient did his own research and became worried about side effects. "He said, 'But I read about this on the Internet, and I know this and I know that, and I know I'm right.' "remembered Golden, an allergist in Maryland. Golden says he tried to explain why the side effects weren't as bad as the patient thought, and why the medicine would take care of his cough. "But he wasn't open to discussing anything. He countermanded everything I said. So I told him, `You know it all, so go take care of yourself. I'm not your doctor any more.' "Golden says he's all for empowered and educated patients, but some patients have*

become so empowered, they're actually putting their care in jeopardy. "I've been doing this for 28 years, and unquestionably it's gotten much worse," Golden says. (Cohen, 2008)

While such negative interactions are far from an inevitable consequence of consumerist patients, there is no debate that more consumer involvement in decisionmaking has altered the doctor-patient relationship. Virtually all observers agree. A recent editorial (2005) in *the Lancet,* focused on consumerism and the doctor-patient relationship, but left open the question of effects on quality:

Patients have a wealth of information at their fingertips through the internet. What most do not have, however, is the skill and knowledge to sift useful and valid information and evidence from useless or harmful advice. In a mutually beneficial and effective patient-doctor partnership, medical expertise and knowledge need to be an accepted and valued part of that interaction, just as much as doctors need to have the time and skills to communicate preventive measures and treatment choices to patients appropriately (p. 343)

Consumerist proclivities also have the potential to strongly affect the physician's time allocation, possibly in a negative fashion. Time is the prime scarce resource in the doctor-patient relationship, and is a fundamental input into quality of care. It is the focus of our theoretical model, and a central element of our empirical study. In this respect, consumerism could be

beneficial if it enabled patients to effectively demand more time from their doctor – who often has an incentive to move on – when their condition merits more care and attention.

On the down side, consumerist patients may in effect be "time hogs," the "demanding customers" of our title, who describe their symptoms and knowledge at length, perhaps recognizing that more minutes with the doctor may benefit them, if only marginally, even as it takes critical time from others. In the worst case, physicians may have to spend extra time and effort dissuading consumerist patients from requested treatments of dubious value. Recognizing that consumerism could affect the productivity of physician time positively or negatively, the effect of consumerism on the quality of care becomes an empirical issue, which we seek to resolve in this study.

We wish to understand the effects of consumerism on the time physicians have to work with their patients, and the resulting effects on quality of care. To date, there is no direct evidence on the effects of consumerism on either time adequacy for office visits or the quality of care. An ideal research design would relate the prevalence of consumerist practices, say the proportion of consumerist patients within a particular physician practice, to objective measures of health outcomes, e.g., frequency of cardiovascular events, or intermediate measures of quality, such as whether diabetics have their eyes and feet examined regularly. Unfortunately, to our knowledge, there are no studies that come close to linking either of these forms of data to consumerist behavior. Good objective measures of quality, in particular, are extremely difficult to find in the literature.

Given these limitations, we turn to a second-best measure. We use a significant data set that reports on the degree of consumerism within physicians' practices, and physicians' own assessments of whether they have the ability to deliver high quality care. While a physician's

reports of the prevalence of consumerism in his practice and his perceived ability to provide quality health care are not perfect measures, studying their relationship provides important insights into the link between consumerism and quality at the level of the physician practice.

Our investigation employs a unique dataset that includes information on physician perceptions about the quality of care indicators in their practices, as well as a measure of consumerism, to test the model empirically. The results are striking. We find that increased consumerism is perceived to *adversely* affect the quality of care a physician delivers. Moreover, the magnitudes of these negative relationships appear to be substantial.

The rest of this paper is divided into six parts. Part II presents the theoretical model. Part III describes the data and variables. The estimation strategy is spelled out in Part IV, and the results are given in Part V. Part VI distills the results and their policy implications.

II. THEORETICAL MODEL: HOW CONSUMERISM AFFECTS QUALITY

Consumerist patients know more than their less-informed peers about their own health and medical treatments, and usually have greater concerns about their health. The critical theoretical question is how these characteristics translate into the ultimate quality of care delivered to them and to patients as a whole. Our basic model addresses the doctor's allocation of time to two classes of patients, consumerist and ordinary, assuming that she has a fixed patient load.[2] The fixed patient load implies that the doctor's revenue is effectively fixed, and so we treat the doctor as if she maximizes the average quality of the patients she treats. A more complex model, where patient load could vary and physicians were concerned with income as well, would not change the qualitative nature of the results.

When the doctor spends t minutes with an ordinary patient, health quality is produced

according to $h_o=h(t)$. It is assumed that $h(t)$ is strictly increasing and strictly concave, with $h(0)=0$ and $h'(0)<\infty$. That is, there are positive but decreasing returns to time with any patient, and quality for zero time is normalized to 0. To simplify, we assume that all patients suffer the same representative condition.

The health-time relationship for an ordinary patient is $h_o=h(t)$. Suppose that fraction μ, $0 \leq \mu \leq 1$, of patients coming into the doctor's office is consumerist. Consumerist patients differ from ordinary patients in two ways, which cut in opposite directions. First, because they are more knowledgeable and concerned, they can enhance productivity from time spent with the doctor. For example, they may be more effective in describing symptoms, or better able to follow instructions. The consumerist's potential to enhance the productivity of time spent with the doctor is represented by the parameter $a \geq 1$, which multiplies the productivity of an entire doctor-patient encounter of a given length.

Second, despite their superior knowledge and attentiveness, they may take the doctor's time for low priority activities through continual probing. They may hope to convince the doctor of their expertise or to secure more information for themselves, expecting in the process to benefit from more time from the doctor, or they may simply be information "vacuum cleaners." Thus they might inquire "Couldn't this be condition X?" They may ask to have things explained, when that adds little or no value, or they may inquire about irrelevant treatments. The parameter p, where $0 \leq p \leq 1$, represents the fraction of the doctor's time with the consumerist devoted to high- as opposed to low-productivity communication. A minute of low productivity communication has productivity b, where $b<1$. Thus if a physician spends t minutes with a consumerist patient, the *effective* time spent with that consumerist is $t_e = (p+b(1-p))t$. For notational convenience, let $r = p + b(1-p)$.

Taking both factors into account, the time-health relationship for a consumerist patient is thus $h_c = a\, h(r\, t)$. Suppose that the doctor's average time spent per patient must less than or equal to T. The quality-maximizing doctor, able to identify types, chooses how much time to spend with each consumerist and each ordinary patient. Let t_o denote the time spent with each ordinary patient, and let t_c denote the time spent with each consumerist, the doctor's problem is to choose t_o and t_c in order to maximize average quality subject to the constraint that average time per patient be less than or equal to T:

$$\max_{t_o, t_c} (1-\mu) \left[h(t_o) \right] + \mu a h(r t_c) \ ,$$
$$s.t. \ (1-\mu) \ t_o + \mu t_c \le T.$$

Deriving and analyzing the first-order conditions for this problem shows that, if the doctor devotes a positive amount of time to each type of patient, her optimal choices solve:

$$h'(t_o^*) = ar h'(r t_c^*) \ ,$$

where asterisks denote optimal values of t_o and t_c. Note the factor ar, which multiplies the marginal value of health for consumerist patients on the right-hand side of this expression. This factor represents the net effect of the two aspects of consumerism (i.e., that consumerists are more productive patients, but possibly less efficient users of the doctor's time). When $ar>1$, the first effect outweighs the second, while if $ar<1$, the second effect outweighs the first. Thus, if the doctor sees both types of patients (i.e., spends a positive amount of time with each type), then if $ar<1$, effective time spent with ordinary patients is greater than effective time spent with consumerists ($t_o^* > r t_c^*$) while the opposite conclusion holds ($t_o^* < r t_c^*$) if $ar>1$.

While the doctor's time allocation is of some interest, our ultimate goal is to characterize the effect of consumerism on quality. That is, we want to determine a positive fraction μ of consumerist patients affects average quality. To facilitate intuition and illustrate possibilities, it is

useful to consider the extreme case where marginal utility from quality is linear up to some limit, after which it falls to zero. That is, let $h(t) = kt - \frac{1}{2} t^2$ for $0 \leq t \leq k$ and $h(t) = \frac{1}{2} k^2$ for $t > k$.[3]

There are two basic cases to consider: $ar>1$, and $ar<1$.[4]

Case 1: $ar>1$. In this case, the consumerists' better use of the doctor's information ($a>1$) outweighs their tendency to take up the doctor's time for low-valued interactions. The marginal utility of the t^{th} minute spent with an ordinary patient is $h'(t) = k-t$, while the marginal utility of the t^{th} minute spent with a consumerist patient is $arh'(rt) = ark-ar^2t$. Thus, when $ar>1$, the marginal-utility of time curve for consumerists lies everywhere above the marginal-utility curve for ordinary patients. See Figure 1.

(Insert Figure 1.)

In this case, when the doctor's time budget is tight, i.e., T is small, the doctor will devote all her time to consumerists, because they are much more effective producers of quality than ordinary patients. As the doctor's time budget increases, the doctor spends more and more total time with the consumerists, working her way down the consumerists' marginal value curve up to the point, shown as t_i, in the figure, where the marginal health benefit of the last minute spent with a consumerist equals the marginal health benefit of the first minute spent with an ordinary patient. Since the marginal health benefit of time for ordinary patients when $t_o = 0$ is $h'(0) = k$, this occurs when $k=ar(k-rT'/\mu)$, or $\mu k(ar-1)/ar^2 = T'$. When the total time budget is T', consumerist patients receive $t_1 = k(ar-1)/ar^2$ minutes of care. At t_i, the doctor begins spending a positive amount of time with each kind of patient. The solution to the doctor's problem is found by solving:

$$\begin{aligned} k - t_o^* &= ark - ar^2 t_c^*, \text{ and} \\ \mu t_c^* + (1-\mu) t_o^* &= T, \end{aligned} \tag{1}$$

which has solution:

$$t_c^* = \frac{T + k(ar-1)(1-\mu)}{ar^2(1-\mu)+\mu}, \text{ and}$$
$$t_o^* = \frac{ar^2T - \mu k(ar-1)}{ar^2(1-\mu)+\mu}. \quad (2)$$

Eventually, as T continues to increase, the marginal health benefit of spending additional time with either type of patient reaches zero. At this point, even if the doctor's time budget continues to increase, the doctor gives no more time to either type of patient. This occurs when $h'(t_o^*) = 0$, or $T'' = k(r+\mu-r\mu)/r$. Thus, the full solution is given by:

$$t_c^* = \begin{cases} T/\mu & \text{if} \quad 0 \le T \le T', \\ \frac{T+k(ar-1)(1-\mu)}{ar^2(1-\mu)+\mu} & \text{if} \quad T' < T \le T'', \\ k/r & \text{if} \quad T > T''; \end{cases} \quad \text{and}$$

and

$$t_o^* = \begin{cases} 0 & \text{if} \quad 0 \le T \le T', \\ \frac{ar^2T-\mu k(ar-1)}{ar^2(1-\mu)+\mu} & \text{if} \quad T' < T \le T'', \\ k & \text{if} \quad T > T''. \end{cases} \quad \text{and}$$

Figure 2 shows t_o^* and t_c^* as functions of the overall time budget, T.

(Insert Figure 2.)

Next, we characterize, for any time budget T, how consumerism affects quality. Since we are primarily interested in determining the impact on quality of the presence of consumerists, the baseline case we consider is one in which all patients are ordinary. In the baseline case, all patients are identical, and each receives T minutes of care. Relative to the situation where every patient is ordinary, since $T/\mu > T$, for $0 \le T \le T'$ were there consumerists in the population, they would get more quality than they would get in a world where no patient was consumerist.

Consumerists also get more quality than they would in the baseline case when $T>T''$, since $ah(r(T/r)) = a\,h(T) > h(T)$. Since t_c^* is a continuous function of T, consumerists would only get less quality than in the baseline case if $t_c^* = T$ for some $T' < T < T''$. It is straightforward to verify that no such solution exists, and hence when $ar>1$ consumerists always receive more quality than do the ordinaries who populate the baseline case.

Next, consider how consumerism affects the quality received by ordinary patients. Note that when $ar>1$, consumerists always receive more time than non-consumerists. Since for $T<T''$, $\mu t_c^* + (1-\mu)t_o^* = T$, this implies that $t_o^* < T$, and hence that ordinary patients receive less quality when consumerists are present than they would in a world without consumerism. For $T \geq T''$, ordinary patients get the same quality with or without consumerists, since the doctor's time-budget constraint does not bind.

Figure 3 shows how quality changes as a function of T. Average quality must be higher with consumerism than without. To see this, note that the marginal quality curve for consumerists lies everywhere above the marginal quality curve for ordinary patients. Thus if the doctor were to devote T minutes to every patient in a world with consumerism, the average quality would be larger with consumerists than without simply, because when $ar > 1$ consumerists convert time into quality more efficiently than do ordinary patients. Given that the doctor is maximizing average quality, average quality must always be higher with consumerism than without.

(Insert Figure 3.)

Case 2: $ar<1$. Unlike in Case 1, here the marginal quality curves for consumerists and ordinary patients cross, as illustrated in Figure 4. Thus, consumerists are no longer always more efficient quality producers than ordinary patients. At low levels of time, the doctor's time is better used to

concentrate on ordinary patients, since the lower quality per minute of the consumerists' information outweighs the fact that they are more productive consumers of the doctor's advice. On the other hand, once time is abundant, the second effect dominates the first, and the maximizing doctor concentrates more time on consumerists.

(Insert Figure 4.)

For low levels of T, it is optimal for the doctor to devote all of her time to ordinary patients. In this range, each ordinary patient receives $T/(1-\mu)$ minutes of time, and each consumerist receives 0. This is true up until the point where the marginal quality of time spent on ordinary patients equals ark, or $k - T'/(1-\mu) = ark$. Solving, this yields $T^0 = (1-\mu)(1 - ar)k$.

As in the previous case, once the marginal quality for ordinary patients drops to the point where it is worthwhile to spend time on consumerists, the solution to the problem is found by solving the equations in (1), which yields solution (2). This remains the solution up until the point where the marginal utility of quality equals zero, which once again occurs at $T'' = k(r+\mu - r\mu)/r$. Thus the solution to the doctor's problem in Case 3 is given by:

$$t_c^* = \begin{cases} 0 & \text{if} \quad 0 \le T \le T^0, \\ \frac{T + k(ar-1)(1-\mu)}{ar^2(1-\mu)+\mu} & \text{if} \quad T^0 < T \le T'', \quad \text{and} \\ k/r & \text{if} \quad T > T''; \end{cases}$$

and

$$t_o^* = \begin{cases} T/(1-\mu) & \text{if} \quad 0 \le T \le T', \\ \frac{ar^2 T - \mu k(ar-1)}{ar^2(1-\mu)+\mu} & \text{if} \quad T^0 < T \le T'', \quad \text{and} \\ k & \text{if} \quad T > T''. \end{cases}.$$

Clearly, consumerists receive less time than ordinary patients when $0 \le T \le T^0$, and consumerists receive more time than ordinary patients when $T \ge T''$. Since t_c^* and t_o^* increase linearly for $T^0 \le T \le T''$, this implies that there is a critical time level, T^X, such that ordinary patients receive more time for $T < T^X$ and consumerists receive more time for $T > T^X$. Further, t_c^*

increases more rapidly with T than t_o^* for $T^0 \leq T \leq T''$. Figure 5 shows the optimal time spent with each type of patient as a function of T.

(Insert Figure 5.)

Having characterized the solution, we turn once again to the question of how, for any time budget, quality with consumerism compares to quality in the baseline case. For very tight time budgets, $0 \leq T \leq T^0$, consumerists get zero time and hence zero quality, and ordinary patients get more time and quality than they do in the baseline case. Average quality with consumerism is lower than in the baseline case, since the additional time spent on consumerists is spent less productively than it would be in the baseline case.

As before, for very high levels of time, $T \geq T''$, both consumerists and ordinary patients receive time up until the point where the marginal benefit from additional care falls to zero. Thus consumerists receive more quality, and ordinary patients receive the same amount of quality as do the ordinary patients who comprise the baseline case. Over this range, since the maximum quality for a consumerist is higher than the maximum quality for an ordinary patient, average quality is once again higher with consumerism than in the baseline case.

For intermediate levels of T, it is straightforward to show that health quality for consumerists rises more steeply with T than does health quality for ordinary patients (because the marginal quality curve is flatter for consumerists than ordinary patients). This implies that as T ranges from T^0 to T'', the quality curve for consumerists crosses the quality curve for ordinary patients once (Figure 6).

Figure 6 has several notable features. As explained above, for high levels of time, consumerists receive more quality than do the ordinaries of the baseline case, and this increases average quality. For low levels of time, consumerists get zero time, and ordinary consumers

receive more time than in the baseline case. The overall result is that average quality falls relative to the baseline case. The interesting part of the problem is what happens for intermediate time budgets. Since the quality curves are continuous and cross but once, average quality starts lower than in the baseline case, but then rises above it, starting at point *A* in Figure 6.

(Insert Figure 6.)

Another notable feature of Figure 6 is that there is a range of time budgets over which *both* consumerists and ordinary patients do worse than in the baseline case. To see why this must be so, consider the point where the marginal benefit curves for consumerists and non-consumerists cross, labeled T^* in Figure 4. If the time budget is T^*, then the doctor allocates the same amount of time to consumerists and ordinary patients. For that budget, ordinary patients get the same quality that they would get in a world without consumerism, while consumerists get less quality than would every patient in a world without consumerism (since the consumerist's marginal benefit curve lies everywhere below the marginal benefit curve for ordinary patients to the left of T^* in Figure 4).

Now, suppose that the time budget increases slightly to $T^* + \Delta$. Since the consumerists' marginal benefit curve lies above the ordinary patients' marginal benefit curve to the right of T^*, consumerists receive a disproportionate share of this additional time. Thus, ordinary patients get less than $T^* + \Delta$ minutes of time, on average. This implies that they do worse in a world with consumerism than they do without consumerism (since in the latter world they receive $T^* + \Delta$ minutes of time). On the other hand, since at time budget T^* consumerists do strictly worse in a world with consumerism than people do without consumerism, by continuity they also do strictly worse at time budget $T^* + \Delta$. Thus, at $T^* + \Delta$ both consumerists and ordinary patients suffer from the presence of consumerists, and by continuity this is also true for a range of time budgets

around $T^* + \Delta$.

Discussion and Qualifications of the Theoretical Model

The model shows that consumerism may affect quality in many ways, some counter to naïve intuition. This was starkly illustrated by the fact that, provided that the doctor's time-budget binds, consumerism is never Pareto improving. Relative to a world in which all patients are ordinary, consumerism always harms either consumerists or ordinary patients (and sometimes both).

Even in a world where consumerists are more productive users of the doctor's information but do not "waste" the doctor's time (i.e., $a > 1$ and $r = 1$), consumerism harms ordinary patients. Here, the doctor chooses to spend more time with consumerists, since they benefit more from it. However, this necessarily leaves less time for ordinary patients. Although *average* quality increases in this case, ordinary patients suffer. Thus, at the very least, consumerism has distributional consequences that should be taken into account when discussing its merits.

If we introduce the idea that a consumerist may not make efficient use of the doctor's time (i.e., $r < 1$), this raises the possibility that consumerism harms all patients. This is possible when the marginal value of time spent with consumerists is relatively low relative to ordinary patients early on, but higher after some point. In this case, the doctor must spend a lot of unproductive time with consumerist patients before they get information that is (relatively) high-valued, thus leaving little time for ordinary patients. Ordinary patients suffer because they receive too little time from the doctor, while consumerists suffer because they make poor use of the time they take, especially the "early minutes" whose marginal value is low relative to time

spent with ordinary patients.

For the sake of illustration we have assumed that the doctor has a fixed time budget and number of patients. The presence of consumerists imposes an externality, sometimes negative sometimes positive, on ordinary patients and on each other. This would remain true even if the doctor's time budget were elastic, as long as it was not so elastic that she always devoted enough hours to reach a particular level of quality. If the doctor were inclined to vary T substantially, then the doctor would respond to the advent of consumerism by adjusting total working hours. If that adjustment were upwards, obviously, a Pareto improvement could result. If the doctor adjusted the number of patients, increasing their numbers could not lead to a Pareto improvement, and cutting their numbers leads to Pareto noncomparability, since some patients go from being seen to being treated elsewhere. ,

The model presented here is simple. However, the basic insights of the model, that consumerism need not benefit everyone and, in fact, may harm everyone, extend to more complex functional forms. Indeed, the fact that these phenomena arise in such a simple model suggests that they would be readily found in more complex models.

III. DATA AND VARIABLES

Data

We employ physician survey data from the 2000-01 Community Tracking Study (CTS), conducted by the Gallup Poll and maintained at the Center for Studying Health System Change. It includes 12,406 physicians who are engaged in direct patient care for at least 20 hours per

week in 60 selected communities in the United States. The response rate of the CTS physician survey is above 60 percent[5] (Strunk and Reschovsky, 2002). The survey inquires about a physician's percent of consumerist patients, adequacy of time with patients, and the quality of health care s/he delivers, as well as a wealth of information on the physician's specialty, practice and demographic characteristics, income, involvement with managed care arrangements, and perceptions about competitive pressures. After excluding approximately 4 percent of physicians who did not respond to questions about consumerist patients, the study sample includes 11,936 respondents.

Dependent Variables

We consider three dependent variables, each of which provides a slightly different insight into physicians' perceptions of the quality of care they provide. All three quality of care variables are measured on a 5-point Likert scale. Possible physician responses to our three quality questions are: 1) disagree strongly, 2) disagree somewhat, 3) neither agree nor disagree, 4) agree somewhat, and 5) agree strongly.

Our theoretical model recognizes that consumerist patients may take up more physician time than do ordinary patients. Thus, we first seek to examine the effect of consumerism on physicians' perceptions about the adequacy of time with their patients. Although the question does not directly inquire about quality, time adequacy can be viewed as a measure of the physician's view of her ability to provide quality care. If time is inadequate, presumably he could be doing more for patients if he had more time.

Quality Measure 1 (Q_1): S*trength of agreement: I have adequate time to spend with my patients during typical office/patient visits.*

We turn next to two more-direct indicators of quality of care. The first considers whether the physician believes he has adequate time to spend with his patients, the second shows whether the physician believes that he can provide quality of care to all the patients, and the third indicates whether the physician believes that he can keep continuing relationships with patients to promote quality.

Quality Measure 2 (Q_2): *Strength of agreement: it is possible to provide high quality care to all of my patients.*

It is recommended that doctors and patients maintain continuing relationships as a means to promote trust, communication, understanding of the patient's overall condition, and thus quality of care. The third quality question is:

Quality Measure 3 (Q_3): *Strength of agreement: it is possible to maintain the kind of continuing relationships with patients over time that promote the delivery of high quality care.*

Independent Variables

The independent variable of primary interest is a measure of consumerism in the physician's practice. We also employ a number of controls to help isolate the effect of consumerism on out outcome variables.

Consumerism measure. The CTS physician survey asked physicians the critical question for our purposes, because it provides direct evidence on the extent of consumerism in a physician's patient caseload:

> *During the last month, what percentage of your patients talked about medical conditions, tests, treatments, or drugs they had read or heard bout from various sources other than you, such as the Internet, their friends, relatives, TV, radio, books, or magazines?*

The response to this question gives our measure of the percent of consumerist patients in the physician's patient caseload. As noted earlier, consumerism takes many forms, and any attempt to define or measure it is open to criticism. The strength of this measure is that it captures the features that comprise the essence of consumerism; namely, gleaning medical information from sources other than one's doctor and engaging one's doctor in discussions about alternative treatment options. This measure of consumerism also accords with the one in our theoretical model.

Other explanatory variables. In our analysis, we also control for a variety of physician demographic and practice characteristics that may affect time adequacy and the quality of care. These variables include physician gender, race, board certification status, and domestic or foreign medical graduate. We also control for physician specialty (general/family practice, internal medicine, medical specialty, surgical specialty, psychiatry, and obstetrics/gynecology with general/family practice as the reference group), practice experience (categorized into groups to account for potential non-linearities: less than or equal to 5 years, 6-14 years, 15-24 years, and greater than or equal to 25 years with 6-14 years as the reference group), type of practice (solo/2 physicians practice, group practice with 3 physicians or more, HMO practice, medical school,

hospital, and other practice type, with solo/2 physicians practice works as the reference group), annual practice income and annual hours of work.

To help control for the characteristics of patients within a physician's practice, we include the percent of the physician's revenue from managed care, Medicaid and Medicare. Competitive pressures in the physician's practice area may also affect health care quality. Thus we use binary variables indicating whether the physician perceives his market area to be very competitive, somewhat competitive, or not competitive.

Instrumental variables As will be discussed more fully below, our consumerism measure may be endogenous. To cope with this, we employ instrumental variables estimation. As the first step, we merged the CTS physician survey with the CTS household survey for the same year, utilizing data on the 60 distinct CTS survey areas. The CTS household survey had 59,725 respondents in approximately 33,000 households (Center for Studying Health System Change, 2003b). We then employed information from the household survey to provide instrumental variables for the measure of consumerist patients in each physician's practice area.

The 2000-2001 CTS household survey asked each respondent a direct question about consumerism.

> *During the past year, did you look for or get information about a personal health concern from sources other than your physicians: (1) Internet; (2) friends or relatives; (3) TV or radio; (4) book or magazines; (5) health care professionals (excluding physicians); (6) health care organizations; or (7) somewhere else?*

Respondents in the CTS household survey answered whether s/he got information from each of above 7 sources, and we started by constructing 7 binary variables representing a "yes" or "no" answer each information source. However, these measures were highly collinear because

a respondent may use several sources for medical information. In examining these data, we found that friends or relatives were the most commonly-cited source of information, though other sources were important as well. This is consistent with findings in the previous literature, namely that people often trust the medical information from their friends and relatives besides their doctors (see e.g., Marshall et al., 2000; Schwartz et al., 2005; Wilson et al., 2007). We therefore constructed two instrumental variables from these data:

Instrument 1: A dummy variable equal to 1 if the respondent got medical information about a personal health concern from friends or relatives and equals to 0 otherwise;

and

Instrument 2: A count variable indicating the total number of sources from which the respondent obtained medical information other than his or her physician.

We then calculated the mean values of the two instrumental variables for the 60 CTS survey areas. Each instrumental variable thus measures the extent to which patients in a survey area acquire medical information from sources other than their physicians. We anticipated that both instrumental variables would be strongly and positively correlated with the percentage of consumerist patients that each physician treats. This expectation was fulfilled. Because these two instrumental variables are strongly correlated, however, they are used separately.

III. ESTIMATION STRATEGY

Model Specification

We will estimate the effect of consumerism on each of the three quality measures described above. We assume that the quality of care that a physician perceives take the following functional form:

$$Q = \beta_0 + X\beta_1 + C\beta_2 + \varepsilon \qquad (3)$$

where

Q = quality of care measure: Q_1, Q_2, or Q_3;

X = a vector of physician demographic/practice characteristics;

C = consumerism measure;

β_0 - β_2 = coefficients to be estimated; and

ε = a disturbance term.

The estimated coefficient β_2 shows the effect of consumerism on the quality of care measure, and is the parameter of key interest. If β_2 is positive, then consumerism improves the quality of care. On the other hand, a negative value for this coefficient means that consumerism is associated with lower quality perceived by physicians. Our theoretical model hypothesized that consumerist patients take more physician time, but showed the conditions under which either positive or negative effect on care quality are possible.

Endogeneity. The above specification does not recognize that the measure of consumerism may be endogenous. Endogeneity may enter due to either omitted variables or simultaneity (Wooldridge, 2001). If it is present, the estimated coefficient β_2 in equation (3) will be biased due to correlation between the consumerism measure C and the disturbance term ε. To illustrate a potential source of bias, physicians and patients are not randomly selected, and consumerist patients may choose their physicians based on some criteria that researchers cannot observe. Those physicians who tend to match with consumerist patients may be more tolerant of

these patients, have more time for each patient, and/or may have different views on how consumerism affects their ability to provide high quality of care. The endogeneity due to this matching issue may over-estimate the positive effect of consumerism or under-estimate the negative effect of consumerism.

In addition, endogeneity may arise if people who receive poor care or are in poor health feel a greater need to acquire information about their care. If either were true, then the single-equation approach would over-estimate the negative effect of consumerism or under-estimate the positive effect of consumerism. To address this endogeneity issue, we write the consumerism equation as:

$$C = \alpha_0 + X\alpha_1 + Z\alpha_2 + u \qquad (4)$$

where

Z = instrumental variable(s);

α_0 - α_2 = coefficients to be estimated; and

u = a disturbance term.

If both the quality measure and consumerism were continuous, traditional two-stage least squares would yield a consistent estimate of β_2. But if, as in the present case, all the quality of care measures are ordered and categorical variables, two-stage least squares is not appropriate (Terza, Basu, and Rathouz, 2008).

The control function[6] model as a two-step method is available to consistently estimate the effect of consumerism on the quality of care in this case (Smith and Blundell, 1986; Rivers and Vuong, 1988, Wooldridge, 2001). The first step for implementing the control function approach is to estimate equation (4) via ordinary least squares (OLS) and obtain the estimated residual $\hat{u}$.

Then we append the estimated residual in equation (3) as a new covariate and estimate the following equation:

$$Y = \beta_0 + X\beta_1 + C\beta_2 + \hat{u}\beta_3 + e \quad (5)$$

This estimation approach also provides an exogeneity test of the consumerism variable (Hausman, 1978, 1983; Wooldridge, 2002). Although pure maximum likelihood estimation is more efficient, this two-step method as a limited information procedure is quite straightforward and still produces consistent estimates of the model coefficients β_0 - β_3 (Terza, Basu, and Rathouz, 2008). In addition, maximum likelihood estimation depends on the joint distribution assumed between two disturbance terms, and "sometimes it can be computationally difficult to get iterations to converge" (Wooldridge, 2001). In the case where the second-stage dependent variable is continuous, so that two-stage least squares estimation is appropriate, this two-step method as a limited information procedure produces exactly the same results as two-stage least squares (Anderson, 2005). Due to the two-step feature of the model, the standard errors in the second step will be adjusted by nonparametric bootstrap techniques using 200 replications. Bias-corrected statistical levels are reported for estimated coefficients in the tables.

V. RESULTS

Table 1 provides descriptive statistics for our study sample. The mean values of the three quality measures are respectively 3.40, 3.96 and 3.82 on the ordered and categorical scales between 1 and 5. The independent variable that is our focus is the measure of the percent of patients who are consumerist. On average, physicians have 16.7 percent of patients in this category.

(Insert Table 1)

Associations between consumerism and the quality of care. Before turning to multivariate evidence and the rigorous analysis and testing it allows, Figure 1 provides information on the association between the percentage of a physician's patients who are consumerist and time adequacy measure. As Figure 7 indicates, physicians having more consumerist patients are more likely to answer "disagree" with quality measure Q_1 (time adequacy). This negative correlation is statistically significant at the 1 percent level[7]. The relationship between consumerist patient percentage and the other two quality measures are also negative as shown in Figures 7.

(Insert Figure 7)

Thus, even at the grossest level, it appears that physicians report a negative relationship between consumerism and quality.

Multivariate evidence. It is possible that some third intervening variable affects both consumerism and the quality of care. Hence, it is essential to determine whether these patterns persist in multivariate analysis. Table 2 provides the results of multivariate ordered probit regression analyses predicting the first quality of care measure. In the single equation model, there is a statistically significant, negative relationship between consumerism and quality (Q1). However, the magnitude of the coefficient is small and unlikely to be of practical significance.

(Insert Table 2)

The second and third columns control for endogeneity, each using one of the two instrumental variables. To implement the control function correction for endogeneity, we first estimate the models predicting the percentage of consumerist patients. We use each instrument separately to check the robustness of the results to an alternative choice of instruments. These results, provided in Appendix A1, show that each instrumental variable correlates strongly and

positively with the percentage of consumerist patients; moreover, their coefficients are highly significant. We also perform under-identification and weak identification tests for each instrumental variable. The results of these tests indicate that our instruments are sound. The fitted residuals from the control function models in Table 2 are statistically significant, indicating that the consumerism measure is endogenous. Controlling for endogeneity, we find a negative and significant effect of consumerism on the first quality of care measure. Moreover, the magnitude of this effect is substantially larger in absolute value than that with single equation model: a ten percentage point increase in consumerism would lower the answers to our question by a full point.

The coefficients on the fitted residuals are positive, indicating that the disturbance terms between the quality equation and consumerism equation are positively correlated (Wooldridge, 2001). What factors might produce this pattern? Patients might have preferences for their physician choices. Consumerist patients, thus being both more informed and more demanding, might prefer physicians who are more likely to have adequate time to spend with patients and are willing to listen to their patients. If so, the single equation model, which does not adjust for patient selection effects, would understate the negative effects of consumerism on the time adequacy measure.

(Insert Table 3)

Tables 3 and 4 report the multivariate results for the other two quality of care measures. The control function models again reveal negative, statistically significant, relationships between consumerism and these quality measures. A ten percentage point increase in consumerism would lower the answers to the quality questions by roughly four tenths of apoint, except for Q_3 and instrument 2, where there is a seven tenths of a point decrease The control function models also

indicate that the consumerism measure is endogenous. Consistent with the results in Table 2, the endogeneity-corrected estimates in Tables 3 and 4 again reveal a stronger negative relationship between consumerism and the quality of care than did the single equation model. Once again, selection effects could explain these patterns – e.g., consumerist patients select higher-quality doctors.

(Insert Table 4)

To gain a better sense of the impact of consumerism, we next consider the impact of increasing consumerism on the distribution of the doctors' responses to the quality questions. Figure 8 calculates the predicted probabilities for the first quality measure (time adequacy) with different consumerism levels, controlling for the endogeneity of consumerism with instrument 1. We set the shares of consumerist patients among all the patients from 5 percent (25th percentile of consumerism measure), 10 percent (50th percentile of consumerism measure), and 20 percent (75th percentile of consumerism measure). We find that, as the share of consumerist patients rises, substantially more physicians disagree strongly or disagree somewhat that they have adequate time to spend with patients, suggesting that consumerist patients do occupy more physician time during office visits. When the level of consumerism lies at the 25th percentile, 6.6 percent of physicians strongly disagree that they have adequate time to spend with patients during typical office visits. These predicted probabilities of disagreeing strongly increase to 13.3 percent when the level of consumerism is 50th percentile and 35.3 percent when the level of consumerism is 75th percentile. Figure 8 also shows the predicted probabilities of agreeing strongly that the physician has adequate time are 55.21 percent, 42.83 percent, and 23.97 percent, respectively, as the levels of consumerism rise from 25th percentile to 75th percentile.

(Insert Figure 8)

The predicted probabilities of the second and third quality of care measures using instrument 1 are reported in Figures 9 and 10. The trends are similar to those in the time measure. The predicted probabilities of quality measures using the instrument 2 are similar to those reported in Figures 8-10 and are available from the authors upon request.

(Insert Figure 9)

(Insert Figure 10)

Though our focus is on the effects of consumerism, this study yields additional insights about the quality of care. For example, other results indicate that physicians in more competitive markets perceive greater difficulty in providing high quality care in the second stage. Greater physician involvement in managed care is also associated with less perceived ability to provide high quality of care. Relative to general/family practitioners (the reference specialty), most physician specialists perceive a greater ability to provide high quality of care. A notable exception is psychiatry, where physicians perceive significantly less ability to provide high quality care. Younger physicians are generally more likely to believe that they can provide high quality of care.

VI. CONCLUSIONS

The changing relationships between physicians and their patients stimulated by the rise of consumerism may have profound implications for the quality of medical care. To date, however, the literature has not examined, much less quantified this relationship. Our theoretical model shows that consumerism need not unambiguously improve quality, while the empirical results show strong and consistent evidence that physicians with more consumerist patients are substantially less likely to believe that they can deliver high quality of care. These results are

found with a single equation model (ordered probit estimation). They are much stronger when we employ instrumental variables to correct for endogeneity of the consumerism measure. The findings apply for each of our three alternative quality indicators.

We should mention a caveat: our results rely on physicians' perception of quality, which may differ from actual quality. However, as long as perceived quality is (positively) correlated with actual quality, and this divergence does not vary systematically with consumerism, our results still have merit.

The negative association between consumerism and our quality of care measures holds potentially serious implications for the success of patient empowerment. Though perhaps more knowledgeable, consumerist patients may turn out to claim excess time to the disbenefit of other patients. If large numbers of patients in a practice are consumerist, a form of rat race may emerge among them. Efforts by many patients to claim disproportionate amounts of time – as may happen with grabby parents on a teacher's night – may lead to none of them getting it, and all being dissatisfied. This raises the additional risk that their physician may feel underappreciated and over attacked.

These findings remind us that providing consumers with more health care information and increasing their role in medical decision making bring costs as well as benefits. Our theoretical model shows the possibility that the net results of consumerism for quality could well be negative. Our empirical results indicate that alas they are.

The rise in consumerism has changed the nature of the agency relationship between physicians and their patients. This agency relationship lies at the heart of the performance on medical markets, as Arrow (1963) noted many years ago. We have long known that faithful

agents are critical for effective medical performance. Modern developments have made it important to study the impact of better-informed but more demanding principals.

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Table 1: Names and summary statistics for study variables, N = 11,936

Variables	Mean		Min	Max
Quality of care 1				
Physicians have adequate time to spend with patients during typical office visits	3.40	(1.42)	1	5
Distribution (%)				
1. disagree strongly	12.93		0	100
2. disagree somewhat	23.19		0	100
3. neither agree nor disagree	2.35		0	100
4. agree somewhat	34.39		0	100
5. agree strongly	27.14		0	100
total	100.00			
Quality of care 2				
Physicians can provide high quality care to all of patients	3.96	(1.22)	1	5
Distribution (%)				
1. disagree strongly	5.10		0	100
2. disagree somewhat	14.56		0	100
3. neither agree nor disagree	1.94		0	100
4. agree somewhat	36.48		0	100
5. agree strongly	41.92		0	100
total	100.00			
Quality of care 3				
Physicians can maintain continuing relationships with patients to promote high quality care	3.82	(1.29)	1	5
Distribution (%)				
1. disagree strongly	7.63		0	100
2. disagree somewhat	15.17		0	100
3. neither agree nor disagree	2.67		0	100
4. agree somewhat	36.15		0	100
5. agree strongly	38.38		0	100
total	100.00			
Consumerist patient percentage	16.71	(16.87)	0	85
Instrumental variables for consumerist patient percentage				
Mean percentage of people in CTS survey areas who get medical information from friends or relatives[1]	19.21	(2.15)	11.91	27.25
Mean number of sources from which people in CTS survey areas get medical information[1]	0.71	(0.08)	0.44	1.02
Other explanatory variables				
Annual practice income in $100,000	1.58	(0.83)	0	4.00
Annual practice hours in 1,000	2.52	(0.81)	0	8.40
Proportion of revenue from managed care	0.46	(0.28)	0	1
Proportion of revenue from Medicare	0.30	(0.23)	0	1
Proportion of revenue from Medicaid	0.15	(0.18)	0	1
Male (dummy variable)	0.74		0	1
Board certified (dummy variable)	0.88		0	1
Foreign medical school graduate (dummy variable)	0.21		0	1
Race (dummy variables)				

White	0.79	0	1
Black	0.04	0	1
other race	0.17	0	1
Practice specialty (dummy variables)			
general/family practice	0.26	0	1
internal medicine	0.21	0	1
pediatrics	0.15	0	1
medical specialty	0.19	0	1
surgical specialty	0.11	0	1
psychiatry	0.04	0	1
obstetrics/gynecology	0.04	0	1
Practice experience (dummy variables)			
less than or equal to 5 years	0.04	0	1
6-14 years	0.40	0	1
15-24 years	0.32	0	1
more than or equal to 25 years	0.24	0	1
Practice type (dummy variables)			
solo/2 physicians	0.35	0	1
group practice >=3 physicians	0.29	0	1
HMO	0.05	0	1
medical school	0.08	0	1
hospital based	0.13	0	1
other practice type	0.10	0	1
Practice market competition status (dummy variables)			
not at all competitive	0.34	0	1
somewhat competitive	0.45	0	1
very competitive	0.21	0	1

Data source: Community Tracking Study (CTS) physician survey 2000-2001.

Note: standard deviations are reported in the parentheses.

1. Instrumental variables are Community Tracking Study (CTS) household survey 2000-2001.

Table 2: Consumerism and quality of care 1

Variables	Q_1: Physicians have adequate time to spend with patients during typical office visits					
	Ordered probit model (coefficient)					
	Single equation model		Control function model			
			Instrument 1[1]		Instrument 2[2]	
Consumerist patient percentage	-0.003	***	-0.098	***	-0.109	***
Fitted residual from the first stage	N/A		0.096	***	0.107	***
Other explanatory variables						
Annual practice income in $100,000	-0.01		-0.03	**	-0.04	**
Annual practice hours in 1,000	-0.14	***	0.02		0.04	
Proportion of revenue from managed care	-0.47	***	-0.19	***	-0.16	**
Proportion of revenue from Medicare	-0.08	*	0.16	***	0.18	***
Proportion of revenue from Medicaid	-0.24	***	-0.84	***	0.91	***
Male	0.16	***	-0.29	***	-0.35	***
Board certified	-0.19	***	-0.18	***	-0.18	***
Foreign medical school graduate	0.07	***	0.07	**	0.07	**
Race						
White (reference)						
Black	-0.02		-0.19	***	-0.21	***
other race	0.07	**	-0.10	**	-0.12	***
Practice specialty						
general/family practice (reference)						
internal medicine	0.03		0.14	***	0.16	***
pediatrics	0.18	***	-0.13	**	-0.16	**
medical specialty	0.22	***	0.16	***	0.15	***
surgical specialty	0.38	***	0.40	***	0.40	***
psychiatry	0.17	***	0.54	***	0.59	***
obstetrics/gynecology	0.29	***	0.71	***	0.76	***
Practice experience						
less than or equal to 5 years	-0.02		0.16	***	0.18	***
6-14 years (reference)						
15-24 years	0.01		-0.15	***	-0.17	***
more than or equal to 25 years	0.30	***	0.08	*	0.06	
Practice type						
solo/2 physicians (reference)						
group practice >=3 physicians	-0.27	***	-0.29	***	-0.30	***
HMO	-0.35	***	-0.34	***	-0.34	***
medical school	-0.24	***	-0.17	***	-0.16	***
hospital based	-0.16	***	-0.32	***	-0.33	***
other practice type	-0.30	***	-0.43	***	-0.44	***
Practice market competition status						
not at all competitive (reference)						
somewhat competitive	-0.08	***	0.01		0.02	
very competitive	-0.11	***	0.13	***	0.16	***

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

N/A: not applicable.

[1] Instrument 1 is mean percentage of people in CTS survey areas who get medical information from friends or relatives.

[2] Instrument 2 is Mean number of sources from which people in CTS survey areas get medical information.

Table 3: Consumerism and quality of care 2

Variables	Q_2: Physicians can provide high quality care to all of patients					
	Ordered probit model (coefficient)					
	Single equation model		Control function model			
			Instrument 1[1]		Instrument 2[2]	
Consumerist patient percentage	-0.004	***	-0.037	**	-0.037	**
Fitted residual from the first stage	N/A		0.033	**	0.034	*
Other explanatory variables						
Annual practice income in $100,000	0.08	***	0.07	***	0.07	***
Annual practice hours in 1,000	-0.08	***	-0.03		-0.02	
Proportion of revenue from managed care	-0.22	***	-0.12	**	-0.12	*
Proportion of revenue from Medicare	-0.02		0.07		0.07	
Proportion of revenue from Medicaid	-0.32	***	-0.53	***	-0.53	***
Male	0.14	***	-0.02		-0.02	
Board certified	-0.05		-0.05		-0.05	
Foreign medical school graduate	0.04		0.04		0.04	
Race						
White (reference)						
Black	-0.06		-0.12	**	-0.12	**
other race	0.09	***	0.03		0.03	
Practice specialty						
general/family practice (reference)						
internal medicine	0.12	***	0.16	***	0.16	***
pediatrics	0.35	***	0.24	***	0.24	***
medical specialty	0.12	***	0.10	***	0.10	***
surgical specialty	0.14	***	0.14	***	0.14	***
psychiatry	-0.25	***	-0.12		-0.12	
obstetrics/gynecology	0.17	***	0.32	***	0.32	***
Practice experience						
less than or equal to 5 years	0.10	**	0.16	***	0.16	***
6-14 years (reference)						
15-24 years	-0.06	**	-0.11	***	-0.12	***
more than or equal to 25 years	0.13	***	0.05		0.05	
Practice type						
solo/2 physicians (reference)						
group practice >=3 physicians	0.03		0.02		0.02	
HMO	0.31	***	0.31	***	0.31	***
medical school	0.04		0.06		0.06	
hospital based	0.08	**	0.02		0.02	
other practice type	-0.04		-0.08	**	-0.08	*
Practice market competition status						
not at all competitive (reference)						
somewhat competitive	-0.08	***	-0.05	*	-0.05	*
very competitive	-0.16	***	-0.08		-0.08	

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

N/A: not applicable.

[1] Instrument 1 is mean percentage of people in CTS survey areas who get medical information from friends or relatives.

[2] Instrument 2 is Mean number of sources from which people in CTS survey areas get medical information.

Table 4: Consumerism and quality of care 3

Variables	Q_3: Physicians can maintain continuing relationships with patients to promote high quality care					
	Ordered probit model (coefficient)					
	Single equation model		Control function model			
			Instrument 1[1]		Instrument 2[2]	
Consumerist patient percentage	-0.002	***	-0.040	**	-0.070	**
Fitted residual from the first stage	N/A		-0.039	**	0.069	**
Other explanatory variables						
Annual practice income in $100,000	0.07	***	0.06	***	0.05	***
Annual practice hours in 1,000	-0.04	***	0.03		0.08	**
Proportion of revenue from managed care	-0.41	***	-0.30	***	-0.21	***
Proportion of revenue from Medicare	0.03		0.12	*	0.20	***
Proportion of revenue from Medicaid	-0.03		-0.27	**	-0.46	***
Male	0.04		-0.14	*	-0.29	***
Board certified	-0.07	**	-0.06	*	-0.06	*
Foreign medical school graduate	0.12	***	0.12	***	0.12	***
Race						
White (reference)						
Black	0.10	*	0.03		-0.03	
other race	0.15	***	0.08	**	0.03	
Practice specialty						
general/family practice (reference)						
internal medicine	-0.06	*	-0.01		0.03	
pediatrics	0.17	***	0.04		-0.05	
medical specialty	-0.11	***	-0.13	***	-0.14	***
surgical specialty	-0.09	**	-0.08	**	-0.08	*
psychiatry	-0.30	***	-0.15	*	-0.03	
obstetrics/gynecology	-0.12	**	0.05		0.18	*
Practice experience						
less than or equal to 5 years	0.17	***	0.25	***	0.30	***
6-14 years (reference)						
15-24 years	-0.13	***	-0.19	***	-0.24	***
more than or equal to 25 years	0.02		-0.07		-0.14	***
Practice type						
solo/2 physicians (reference)						
group practice >=3 physicians	0.04		0.03		0.02	
HMO	0.38	***	0.38	***	0.38	***
medical school	0.09	**	0.12	***	0.14	***
hospital based	0.05		-0.02		-0.07	
other practice type	0.02		-0.03		-0.07	
Practice market competition status						
not at all competitive (reference)						
somewhat competitive	-0.12	***	-0.08	***	-0.05	*
very competitive	-0.22	***	-0.12	**	-0.04	

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

N/A: not applicable.

[1] Instrument 1 is mean percentage of people in CTS survey areas who get medical information from friends or relatives.

[2] Instrument 2 is Mean number of sources from which people in CTS survey areas get medical information.

Figure 1: Marginal Benefit: *ar* > *1*.

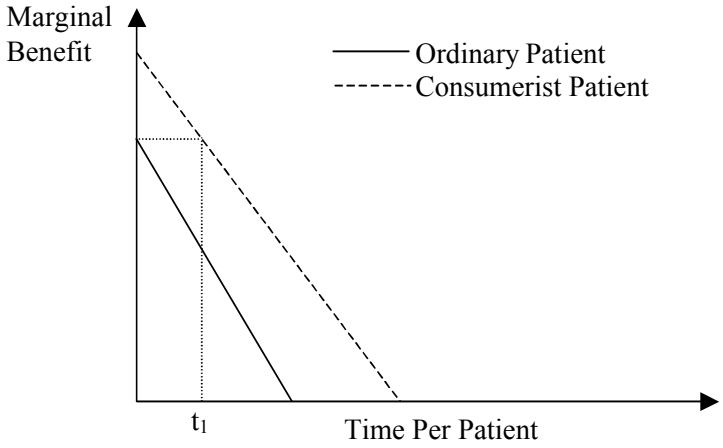


Figure 2: Optimal Time Allocation: *ar* > *1*.

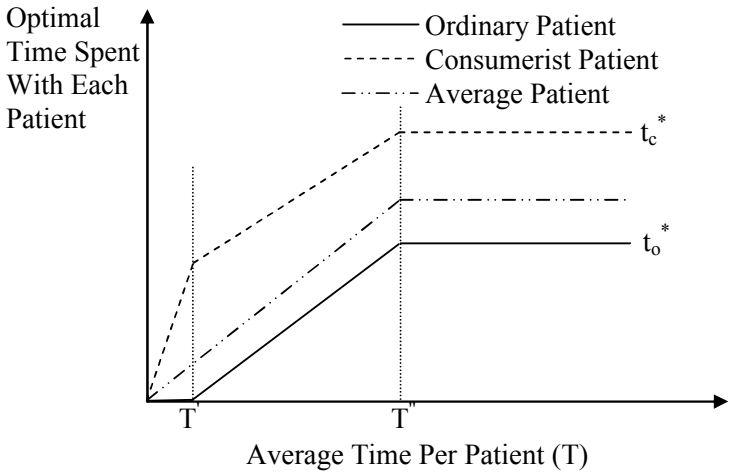


Figure 3: Optimal Quality: *ar* > *1*.

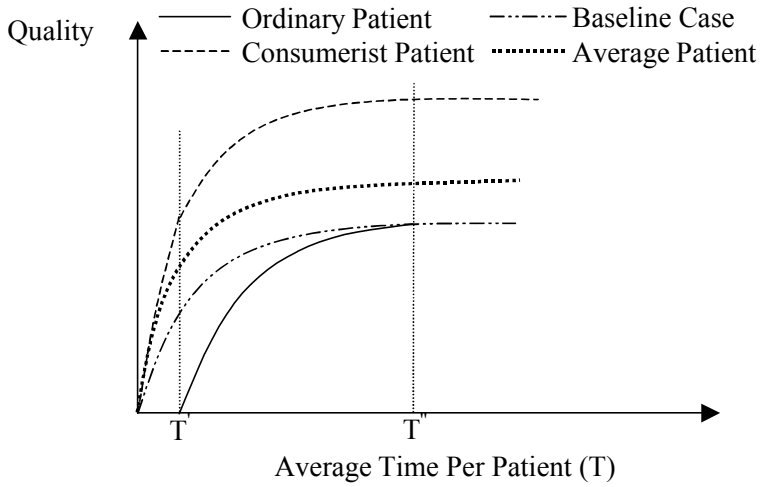


Figure 4: Marginal Benefit: *ar<1.*

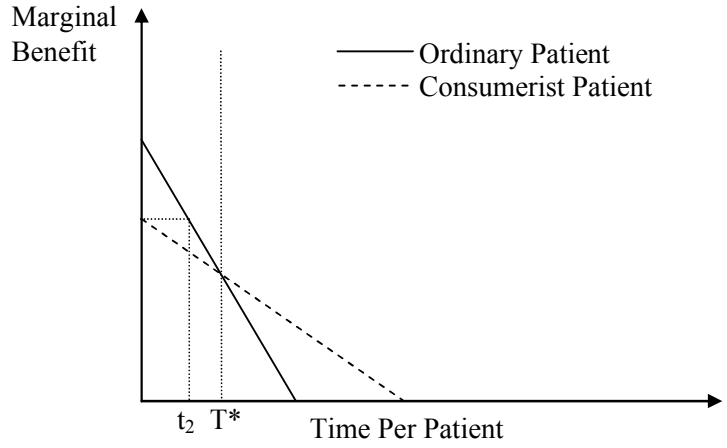


Figure 5: Optimal Time Allocation: *ar* < *1.*

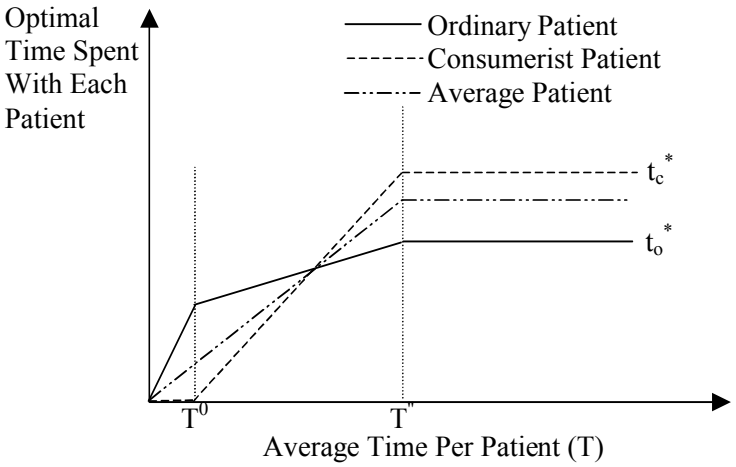


Figure 6: Optimal Quality: *ar<1.*

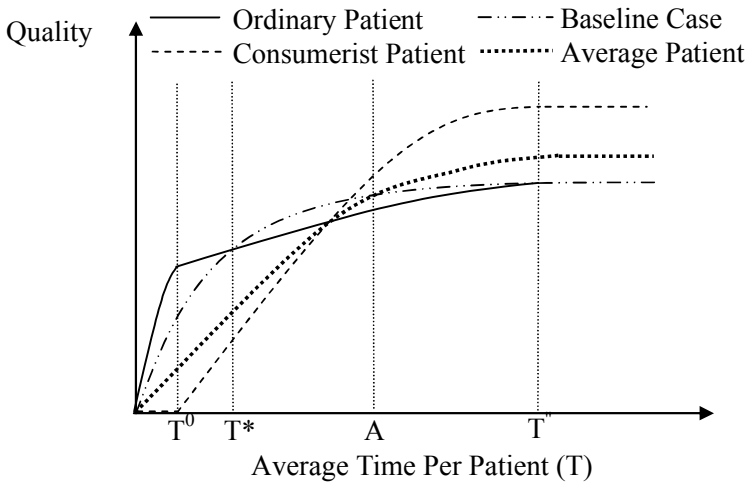
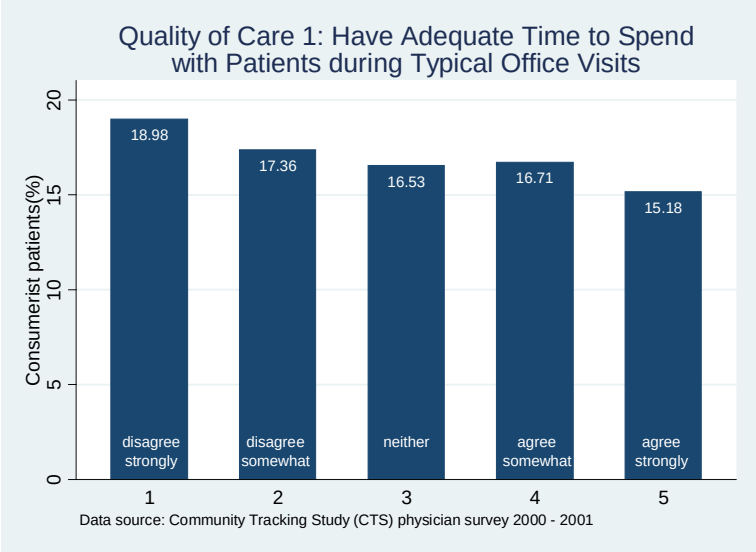
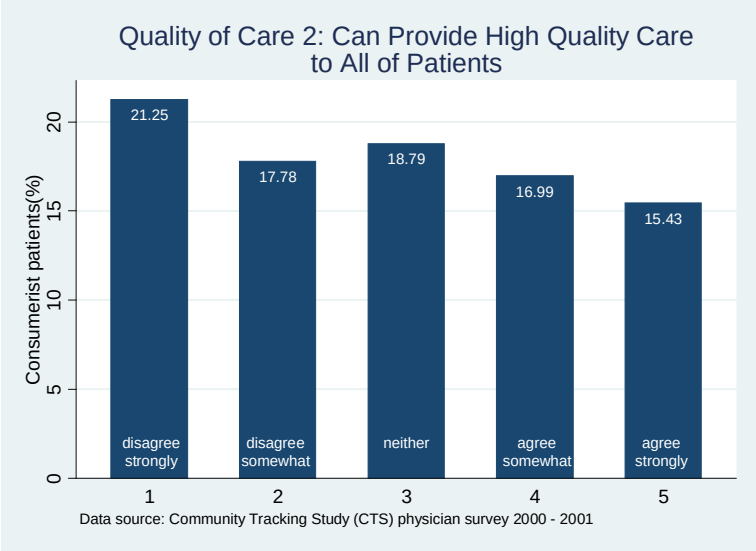


Figure 7: Bivariate relationship between consumerism and quality of care





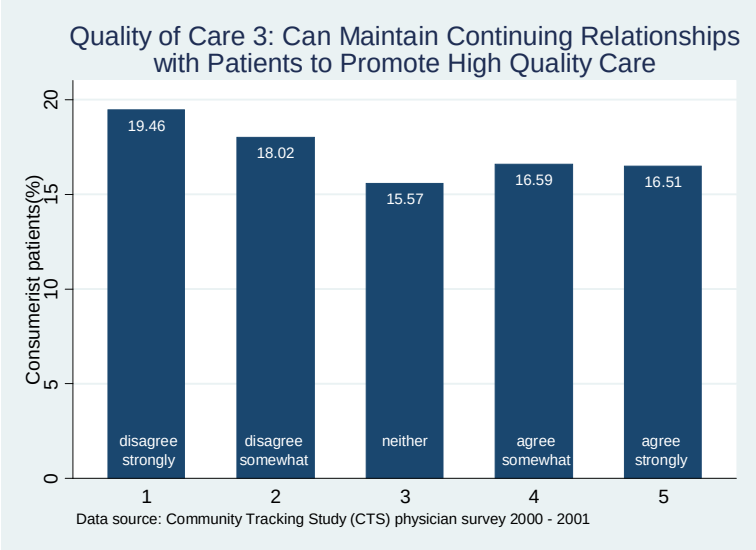


Figure 8: Predicted probabilities of Quality of Care 1 by levels of consumerism

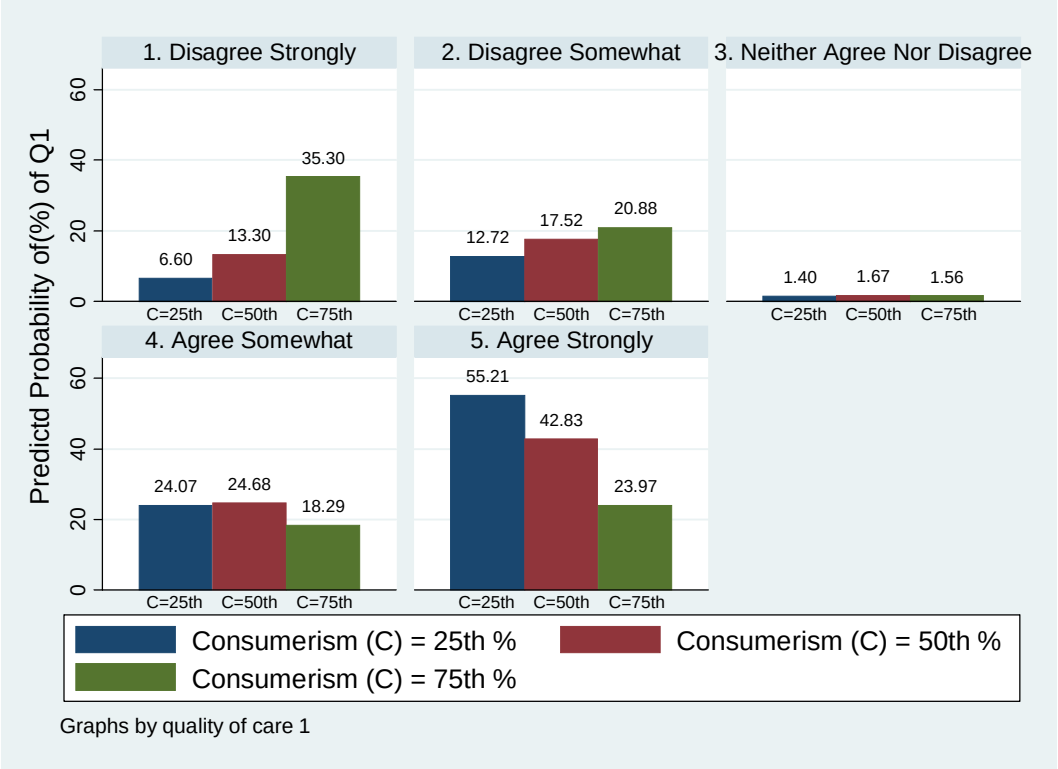


Figure 9: Predicted probabilities of quality of care 2 by levels of consumerism

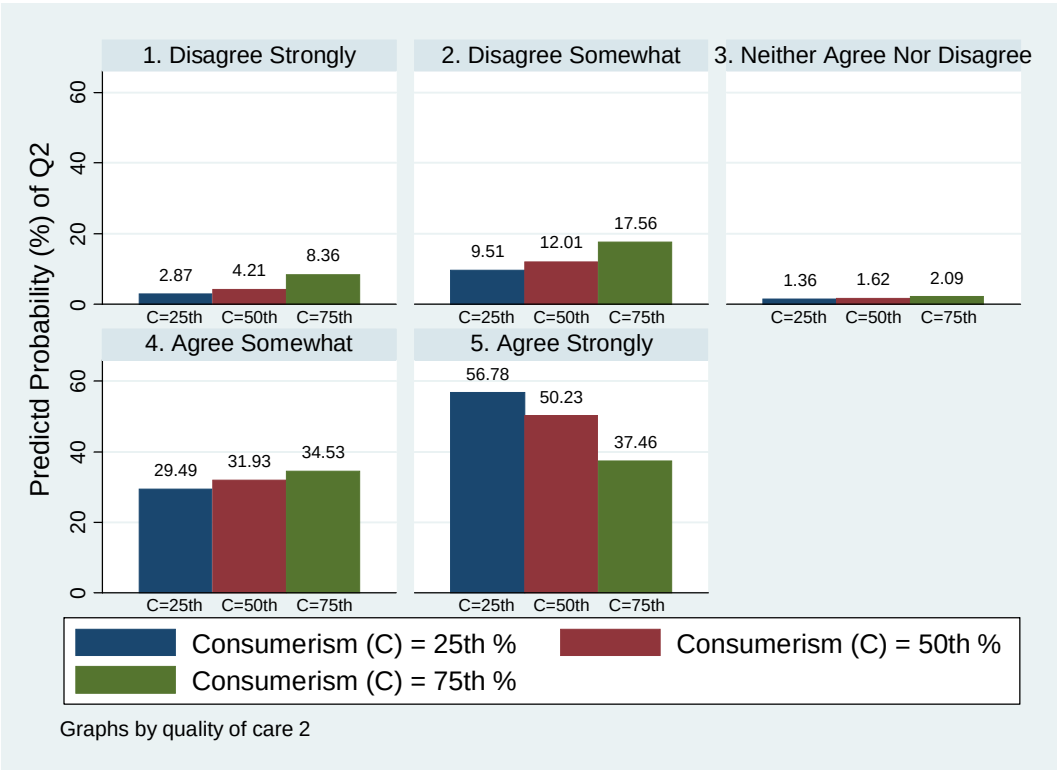
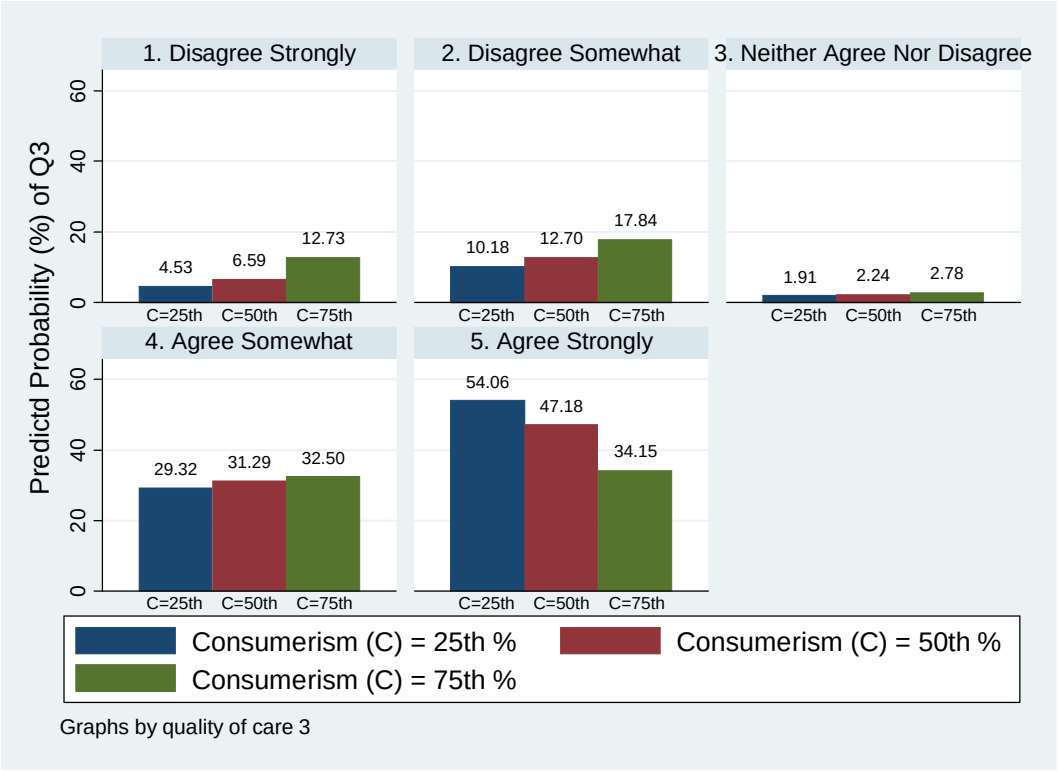


Figure 10: Predicted probabilities of quality of care measure 3 by levels of consumerism



Appendix A1: Estimation of the first stage

Variables	Consumerist patient percentage The first stage estimation			
	Instrument 1		Instrument 2	
Instrumental variables for consumerist patient percentage				
Instrument 1: mean percentage of people in CTS survey areas who get medical information from friends or relatives	0.30	***	N/A	
Instrument 2: mean number of sources from which people in CTS survey areas get medical information	N/A		6.90	***
Other explanatory variables				
Annual practice income in $100,000	-0.25		-0.25	
Annual practice hours in 1,000	1.74	***	1.75	***
Proportion of revenue from managed care	2.78	***	2.75	***
Proportion of revenue from Medicare	2.74	***	2.74	***
Proportion of revenue from Medicaid	-6.05	***	-6.06	***
Male	-4.71	***	-4.72	***
Board certified	0.03		0.03	
Foreign medical school graduate	-0.10		-0.10	
Race				
White (reference)				
Black	-1.83	**	-1.85	**
other race	-1.74	***	-1.77	***
Practice specialty				
general/family practice (reference)				
internal medicine	1.05	**	1.07	**
pediatrics	-3.24	***	-3.22	***
medical specialty	-0.69		-0.69	
surgical specialty	0.04		0.05	
psychiatry	3.74	***	3.73	***
obstetrics/gynecology	4.36	***	4.37	***
Practice experience				
less than or equal to 5 years	1.94	***	1.92	***
6-14 years (reference)				
15-24 years	-1.69	***	-1.68	***
more than or equal to 25 years	-2.35	***	-2.35	***
Practice type				
solo/2 physicians (reference)				
group practice >=3 physicians	-0.23		-0.24	
HMO	0.08		0.04	
medical school	0.81		0.80	
hospital based	-1.57	***	-1.55	***
other practice type	-1.30	**	-1.30	**
Practice market competition status				
not at all competitive (reference)				
somewhat competitive	0.93	***	0.94	***
very competitive	2.48	***	2.49	***
Constant	10.13	***	11.00	***
Tests for instrumental variables				
Under-identification test, Anderson LM statistic	18.20		13.58	
Weak identification test, Crag-Donald Wald statistic	18.19		13.57	

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
N/A: not applicable.

ENDNOTES

[1] The term "consumerism" is also used in a different context with a quite different meaning. It is sometimes associated with "consumer-driven health plans," which feature high deductibles, often coupled with health savings accounts. See Wilensky (2006).

[2] For explanatory purposes, we will treat the physician as female and patients as male.

[3] While this assumption facilitates the analysis, the graphical arguments show that the qualitative results generalize to more general functional forms. Further, the goal of the model is to illustrate that the relationship between consumerism and quality is complex, and that consumerism need not improve quality. Given that this is true for the simple functional form employed here, it is all the more likely to be so in less well-behaved environments.

[4] For brevity, we do not present the knife-edge case where ar=1. The analysis is available from the authors.

[5] A review of the CTS database concluded that "there was little evidence of a systematic under representation among demographic and practice characteristics available for all physicians from the American Medical Association Masterfile" (Center for Studying Health System Change, 2003a, p. C19-C20).

[6] Terza, Basu, and Rathouz (2008) term this model as two-stage residual inclusion estimation.

[7] By the test of analysis of variance (ANOVA).