Provider Choice of Quality and Surplus

Karen Eggleston, Nolan Miller, and Richard Zeckhauser*

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Abstract

We study the quality choices of institutional health-care providers, such as hospitals, assuming that the utility function of the key organizational decision-maker includes both quality of care and financial surplus. An increase in the decision-maker's rate of surplus retention leads to a decrease (increase) in quality if his coefficient of relative risk aversion is less than (greater than) 1, as is likely when the decision-maker faces prosperous (difficult) financial conditions. Such behavior is consistent with "target income behavior," where the target income is surplus sufficient to break even. An increase in productive efficiency always leads the provider to increase quality.

*Eggleston, Department of Economics, Tufts University; Miller, Kennedy School of Government, Harvard University; Zeckhauser, Kennedy School of Government and Visiting Professor at Harvard Business School.

1 Introduction

An extensive literature examines the objectives of those who provide health care, including hospitals, and HMOs and other insurers, not only physicians (Newhouse 1970; Pauly 1987; Sloan 2000). Most analyses posit that providers are primarily concerned with the quality of care they provide, and their financial returns. Quality of care can be interpreted broadly to include such concepts as access, principally for the poor, and scale of operation.[1] Some formulations posit one or the other of these variables as the principal objective, with the other serving as a constraint. Other analyses impose constraints on one or both variables, but posit a range where unconstrained optimization applies. Much of the discussion in the literature relates to the disparity or similarity in objective functions across different ownership types, e.g., for-profit, nonprofit, and government.

We focus on institutional health-care providers, such as hospitals and nursing homes, rather than individual providers, such as doctors or nurses. Our analysis assumes that the utility function of the key organizational decision-maker, such as a hospital or health plan CEO, includes both quality of care and financial surplus. Thus, our approach is consistent with Hart and Holmstrom's (2002) theory of firm scope, which emphasizes the importance of managers' private benefits and internalizing noncontractible decisions. Our model features a specific form of private benefits: utility from quality. This "private benefit" could stem from innate concern for patients, social and professional norms, or value from being attached to

[1] The Institute of Medicine defines quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (IOM 2001, p.232).

a firm with a reputation for high-quality health care.

We investigate the consequences for quality when the decision-maker's rate of financial surplus retention increases. If, for example, the provider reduces its "organizational slack," secures better terms from its workers, suppliers, or grantors, or (at a for-profit provider) secures a larger bonus incentive or equity interest, its rate of surplus retention increases. How will the provider's choice of quality change in response? Understanding the answer to this question is critical for policymakers seeking to spur quality improvement. How will a provider – a nursing home, behavioral health carve-out, etc. – change quality in response to an increase in percentage fee? Will a nursing home chain that sells a significant equity stake, thus retaining less of any given surplus, have an incentive to change the quality of the personnel it hires and the facilities it maintains? To what extent will reducing tax rates merely increase profits of providers who pay taxes, or change their incentives to invest in quality enhancement?

We find that an increase in surplus retention produces two countervailing effects. First, it increases the decision-maker's surplus, holding quality constant. In response, the decision-maker spends some of the additional surplus to increase quality. We call this the wealth effect, a term from consumer theory. Second, an increase in surplus retention increases the rate at which the decision maker's surplus must be sacrificed in order to increase quality. This leads the decision-maker to decrease quality. Again, drawing on consumer theory, we call this the substitution effect.

Which effect dominates depends on the decision-maker's level of relative risk aversion. We will show that if the coefficient of relative risk aversion is less than one, then an increase in surplus retention leads to a decrease in quality; however, an increase in surplus retention leads to an increase in quality if the coefficient of relative risk aversion exceeds 1. If the decision-maker exhibits decreasing relative risk aversion as his wealth increases (i.e., he becomes less risk averse with respect to gambles proportional to wealth), then in "flush times" the substitution effect will dominate, and quality will likely decrease with surplus retention. In "hard times," when wealth effects are more important, quality will rise with surplus retention.

Strong wealth effects imply a kind of organizational "target income behavior," where the decision-maker strives to achieve a specified target income. We illustrate the connection between our main result and target income behavior by examining a model in which the decision-maker faces an explicit breakeven constraint. We also show that while an increase in surplus retention may decrease quality, an increase in productive efficiency always leads the provider to increase quality.

Probably the most closely related work is McGuire and Pauly (1991), which we discuss below. They focus on supplier-induced demand and overprovision under fee-for-service payment; we focus on the provider's incentive to stint on quality, the pervasive concern under prospective payment, capitation, or other forms of "supply-side cost sharing" (Ellis and McGuire 1990; Newhouse 2002). Like McGuire and Pauly, we use a representative agent's utility function, but we are concerned with agency problems of corporate governance, rather than an individual physician's labor-leisure trade-off.

In the remainder of this paper, we first present the model and analysis, developing two key propositions. We then briefly discuss their relationship to organizational slack, productive efficiency, competition, innovation, and the ownership structures of health care provider organizations.

2 The Model and Analysis

Consider a provider organization with a central decision-maker who values both quality provided to patients and retained surplus (profit). The provider is paid at least partially prospectively. Examples are a hospital under the Prospective Payment System (PPS) or a capitated managed care plan.

Let q denote quality above some minimum contractible level, $s(q)$ denote the per-patient surplus when quality is q, and $u(w)$ be the decision-maker's utility function for money. Functions $s(q)$ and $u(w)$ are assumed to be twice differentiable, with $s(0) > 0$ (i.e., at the minimum contractible quality, $q = 0$, per-patient surplus is positive), $s''(q) < 0$, $u'(w) > 0$ and $u''(w) < 0$. Although the provider may be rewarded with higher surplus for quality above the minimum, eventually the provider faces a trade-off between quality and profit, i.e., $s'(q) < 0$ for sufficiently large q. This assumption, which implies some supply-side cost sharing at the margin, distinguishes the model from that of McGuire and Pauly (1991), who focus on a physician's incentive to induce demand under fee-for-service payment, where surplus always increases with volume.[2] In the McGuire-Pauly model, a provider's concern for her patients is reflected in a disutility from inducing excessive volume. By contrast, our provider's concern for patients takes the form of boosting quality despite a loss in surplus

[2] See McGuire (2000) for a discussion of physician agency and empirical evidence on supplier-induced demand, one form of "supply-side moral hazard" (e.g. Newhouse 2002, pp.81-83).

from doing so.

The provider's utility function is additively separable in quality and retained surplus, y, and takes the form:

$$v(q,y) = q + u(y), \tag{1}$$

where quality is normalized so that utility is linear in q. Our independent variable is $b \in (0,1)$, the fraction of surplus retained by the provider. Retained surplus is therefore given by $bs(q)$ when quality is q, and the provider's maximization problem (PP) is:

$$\max_{q \geq 0, y \geq 0} v(q,y) \tag{PP}$$
$$s.t.\ \ y \leq bs(q).$$

Since $v(q,y)$ is strictly quasiconcave in quality and the constraint set is strictly convex, (PP) has a unique solution, which we denote (q^*, y^*). Throughout the paper we assume that q^* and y^* are strictly positive and finite.

Figure 1 illustrates the provider's quality choice for a given rate of surplus retention, b. Curve $y = bs(q)$, the constraint from (PP), can be thought of as the production possibility frontier for transforming quality into retained surplus and vice-versa. The dashed lines represents the provider's utility isoquants. Solving (PP) given b leads the provider to choose point (q^*, y^*), where the utility isoquant is tangent to the constraint, $y = bs(q)$. Thus, although similar, our problem differs from the standard optimization problem from consumer theory in that, in our case, the budget set is nonlinear.

As is illustrated in Figure 1, since utility is strictly increasing in each of its arguments, the constraint must bind at the optimum, and $y^* = bs(q^*)$. Noting this, the provider's

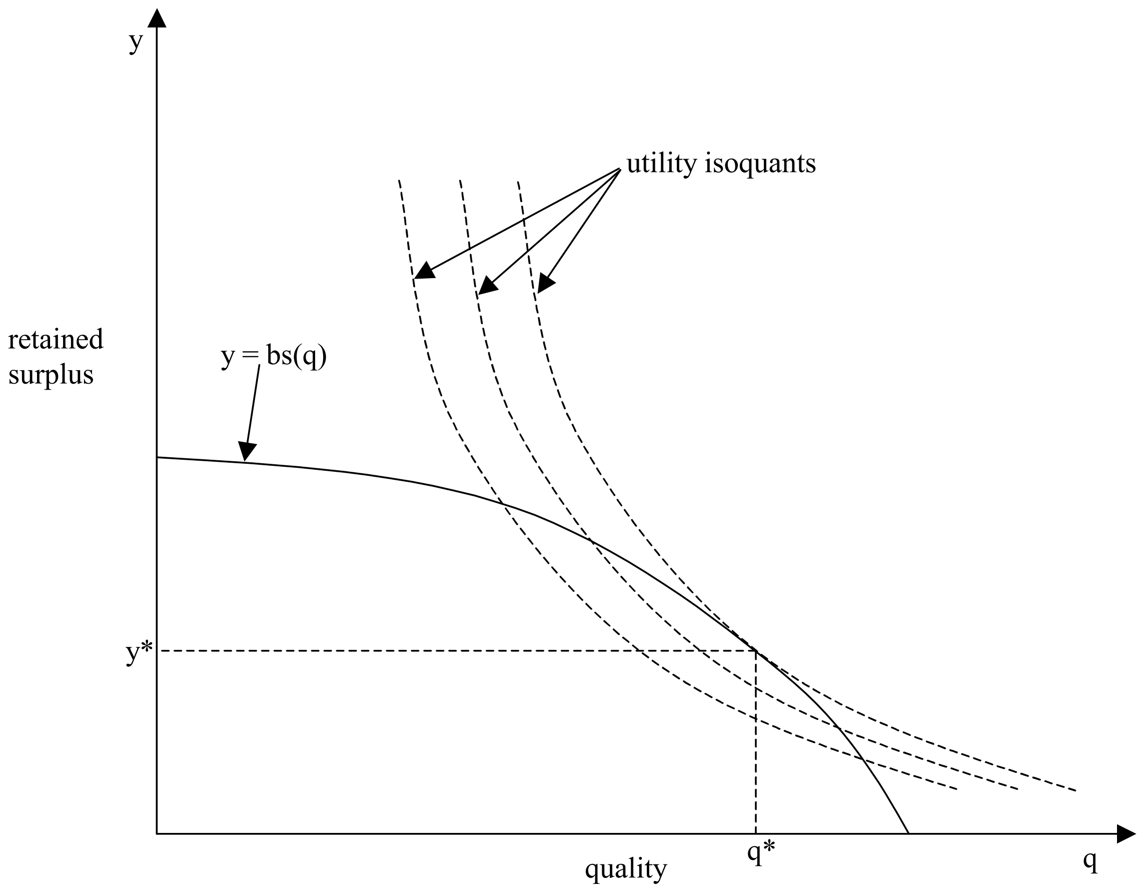

Figure 1: The Provider's Problem.

maximization problem is equivalent to choosing q to maximize:

$$q + u\left(bs\left(q\right)\right). \tag{2}$$

Differentiating (2), the provider's optimal quality choice satisfies the first-order condition:

$$bs'\left(q^*\right)u'\left(bs\left(q^*\right)\right) = -1. \tag{3}$$

Note that since $b > 0$ and $u' > 0$, it must be that $s'\left(q^*\right) < 0$. That is, the optimizing decision-maker provides more quality than he would if he only cared about surplus.

The provider's optimality condition, (3), can be rewritten as:

$$u'\left(bs\left(q^*\right)\right) = -\frac{1}{bs'\left(q^*\right)}. \tag{4}$$

The left-hand side of (4) represents the marginal utility of increasing retained surplus. The right-hand side represents the magnitude of the loss in utility from the decrease in quality that accompanies the increase in retained surplus. To see this, let $h\left(y\right)$ be the quality provided when retained surplus is y, i.e., $h\left(bs\left(q\right)\right) = q$. Since utility v is linear in quality q, $h\left(y\right)$ is measured in units of utility. Differentiating, $\frac{dh}{dy}bs'\left(q\right) = 1$, or $\frac{dh}{dy} = \frac{1}{bs'(q)}$ when $q = h\left(y\right)$. Thus, the provider chooses a level of quality to equate the marginal utility of additional surplus with the marginal disutility of the quality reduction it entails.

Conditions (3) and (4) highlight the countervailing roles played by quality in the provider's objective function. Increasing quality increases the provider's utility, but eventually decreases the provider's retained surplus. At the optimum, the provider balances the marginal contributions of these two effects on utility.

Our main objective is to determine how a change in surplus retention rate affects the provider's quality choice. When the provider's rate of surplus retention increases, there are two effects, analogous to the wealth and substitution effects of standard consumer theory (explained more fully below). First, if quality is held constant, *retained* surplus increases, which effectively makes the decision maker "wealthier," and tends to increase the provider's quality choice. Second, at the margin, the provider must sacrifice more surplus to increase quality, which leads the provider to choose a lower level of quality. This is analogous to consumer theory's substitution effect. In this model, the wealth and substitution effects oppose each other. Proposition 1 describes the overall effect of an increase in surplus retention on quality, which depends on the decision-maker's level of relative risk aversion. Since $bs(q)$ is the provider's retained surplus, the decision-maker's Arrow-Pratt coefficient of relative risk aversion is given by $\rho = -bs(q)\frac{u''(bs(q))}{u'(bs(q))}$.

Proposition 1 *If $\rho > 1$, then an increase in surplus retention leads to an increase in quality. If $\rho = 1$, then quality is unaffected by an increase in surplus retention. If $\rho < 1$, then an increase in surplus retention leads to a decrease in quality.*

Proof. *Denoting the dependence of q^* on b by $q(b)$, substituting $q(b)$ into (3), and totally differentiating with respect to b yields the following expression for $\frac{dq}{db}$, the response of q^* to a change in surplus retention:*

$$\frac{dq}{db} = \frac{-\left(s'(q(b)) + s'(q(b))\, bs(q(b))\frac{u''(bs(q(b)))}{u'(bs(q(b)))}\right)}{\left(bs''(q(b)) + (bs'(q(b)))^2\frac{u''(bs(q(b)))}{u'(bs(q(b)))}\right)}. \tag{5}$$

Substituting ρ into (5) yields:

$$\frac{dq}{db} = \frac{s'(q(b))(\rho - 1)}{bs''(q(b))\, u'(bs(q(b))) - u''(bs(q(b)))(bs'(q(b)))^2}. \tag{6}$$

By concavity, the denominator of the expression on the right hand side of (6) is negative. Since $s'(q(b)) < 0$, the sign of $\frac{dq}{db}$ is the same as that of $\rho - 1$. ■

Figure 2 illustrates how an increase in the surplus retention rate affects the provider's quality choice. For the moment, we set aside the role of risk aversion. The dashed lines labeled v_0, v_1, and v_2 represent the provider's utility isoquants.[3] Initially, the provider retains fraction b_0 of his surplus and chooses point A, where the utility isoquant is tangent to the constraint $y = b_0 s(q)$, as in Figure 1 above. Following an increase in the surplus retention rate from b_0 to b_1, the provider chooses point C, where his utility isoquant is tangent to the new constraint, $y = b_1 s(q)$.

Figure 2 decomposes the provider's quality adjustment into two parts, the substitution effect and the wealth effect. First, to identify the substitution effect, we isolate the impact of the change in b on the slope of the constraint. The curve labeled $s^*(q)$ is derived by shifting $y = b_1 s(q)$ downward until it goes through point A. Since the provider can still choose point A, changing the constraint from $y = b_0 s(q)$ to $y = s^*(q)$ represents a "compensated" change in b which holds the provider's "purchasing" power constant, allowing us to isolate the substitution and wealth effects.[4] Following the compensated change in b, the provider maximizes utility subject to the constraint that $y = s^*(q)$. The solution to the provider's problem is labeled B. Since $s^*(q)$ is steeper than $b_0 s(q)$ through point A, the provider reacts to the increase in b, which is analogous to an increase in the relative price of quality,

[3] Since utility is quasilinear in quality, each utility isoquant is a "horizontal translation" of any other. Therefore, holding retained surplus constant, the slopes of the utility isoquant do not change as quality increases.

[4] Mathematically, $s^*(q)$ is the new constraint shifted downward by the change in retained surplus when quality is held constant at the level of point A. That is, let $A = (q_A, y_A)$. Then, $s^*(q) = b_1 s(q) - s(q_A)(b_1 - b_0)$.

by substituting toward surplus and away from quality. Thus quality is necessarily lower at point B than at point A – the substitution effect (on quality) is always negative.

We next turn to the wealth effect.[5] Increasing b also makes the provider "wealthier." Taking the substitution effect as fixed, this shifts the constraint from $s^*(q)$ to $b_1 s(q)$. The provider responds to this increase in purchasing power by increasing quality.[6]

Whether a provider increases or decreases quality when her surplus retention rate rises depends on which effect–substitution or wealth–is stronger. As Proposition 1 states, this is determined by the provider's relative risk aversion. To get a feel for the intuition, consider a risk neutral provider. In this case, the provider's utility isoquants are linear. Therefore, since $s^*(q)$ is a vertical translation of $b_1 s(q)$, point C must lie directly above point B, i.e., there is no wealth effect. However, the substitution effect persists, and therefore an increase in b leads the provider to decrease quality. When the provider is risk averse but only slightly so (i.e., $\rho < 1$), the wealth effect is positive, but the substitution effect continues to dominate, and increasing b decreases quality.

At the other extreme, when the provider is very risk averse, a small increase in surplus significantly reduces the marginal utility of surplus. It is as if the provider's utility isoquant through point A bends at nearly a right angle. In this case, the substitution effect is very small, whereas the wealth effect remains large. Thus, when the provider is very risk

[5] The analogy to the wealth effect of neoclassical consumer theory is not exact: the budget set here is nonlinear and the increase in b induces an upward shift in the constraint (rather than a radial expansion). Nevertheless, our wealth effect is the natural extension of the neoclassical concept to our more general environment, and so we maintain the name.

[6] The Appendix provides an argument for why the wealth effect must be positive.

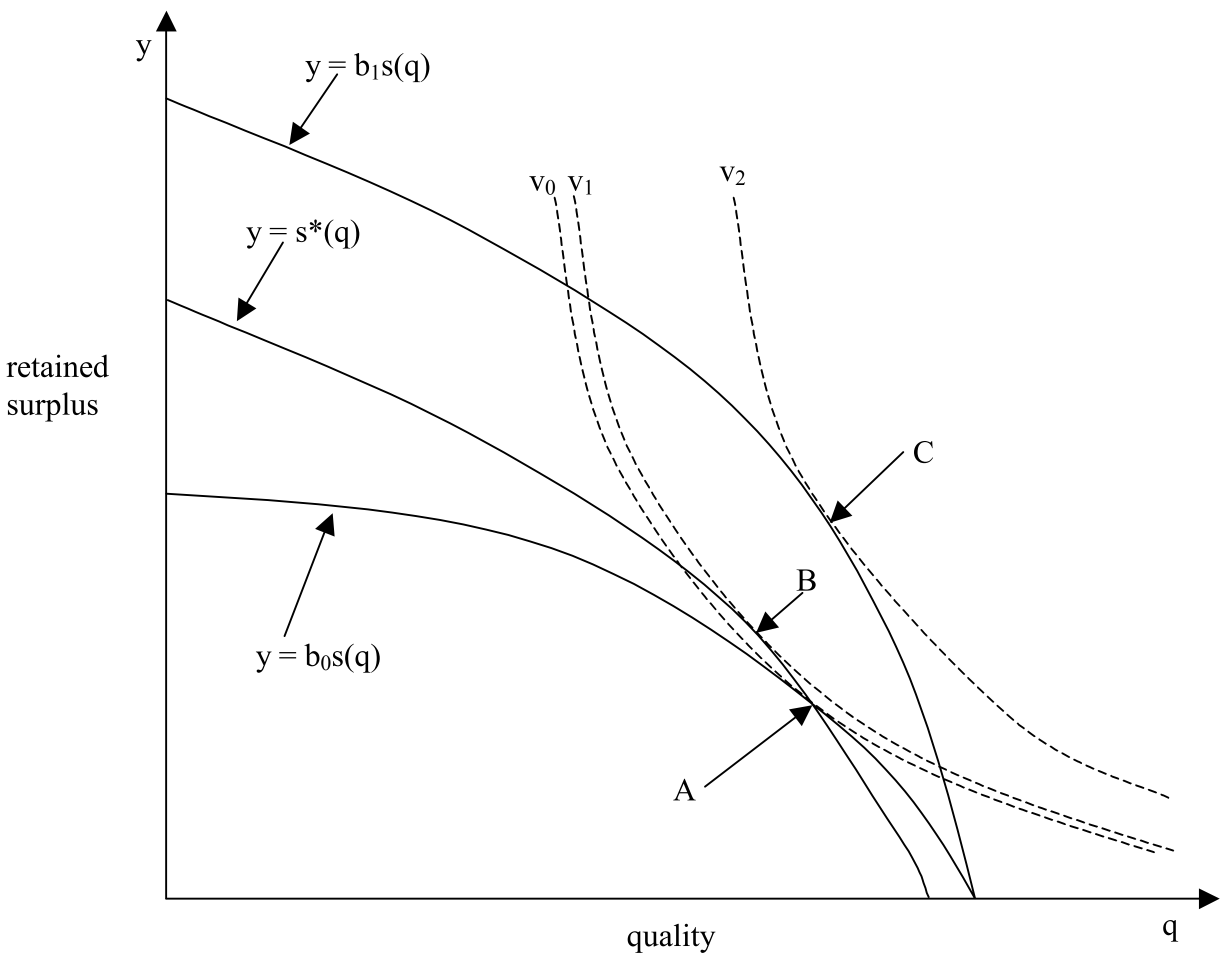

Figure 2: The Substitution and Wealth Effects.

averse, the wealth effect dominates and the increase in b leads to an increase in quality. By extension, the wealth effect continues to dominate whenever the provider is sufficiently risk averse (i.e., $\rho > 1$).

2.1 Breakeven Concerns and Target Income Behavior

Frequently, decision makers, whether in for-profit or nonprofit organizations, are faced with the need to achieve a certain critical level of surplus. If the decision maker is unable to achieve this goal, he will be assessed a large penalty. For example, a firm that cannot break even over the long run will go out of business; a nonprofit reaping red ink may lose contributions and enter a death spiral; a decision-maker who incurs large losses may risk dismissal. When such a decision maker faces some residual risk (perhaps exogenous to the decision at hand), the possibility that surplus will be low enough to trigger the penalty will have the effect of increasing the decision maker's effective risk aversion. *** working on a reference here *** In light of this, Proposition 1 suggests that providers facing tough financial times will respond to an increase in their surplus retention rate by increasing quality, while those experiencing good times will respond to the increase by decreasing quality.

In a different context, McGuire and Pauly (1991) present findings similar to ours. In a model that focuses on physicians' responses to fee changes, they show that when a provider is very risk averse and income effects are strong, the provider will tend to display "target income" behavior. The importance of this motive depends on the provider's level of relative risk aversion. In a footnote, they observe "the condition for the supply curve to be backward bending involves the coefficient of relative risk aversion... The supply curve is negatively sloped if and only if the coefficient of relative risk aversion exceeds one" (p.393).

In the extreme, if the decision-maker faces a very large penalty if he fails to achieve some target income, he will behave as if he actually faces a breakeven constraint. The predictions of our model are consistent with the behavior that arises in this limiting case. To illustrate, consider a simplified version of our model. We let $s(q) = r - c(q)$, where r is a fixed reimbursement, $c'(q) > 0$, and $c''(q) > 0$. The provider is risk neutral with utility function:

$$v = q + b(r - c(q)),$$

and faces breakeven constraint $b(r - c(q)) \geq f$, where $f > 0$ represents the target income, the surplus required to break even.[7]

If r is large and f is small, the breakeven constraint does not bind, and the optimal quality choice satisfies:

$$bc'(q^*) = 1.$$

Totally differentiating with respect to b yields:

$$\frac{dq}{db} = \frac{-c'(q^*)}{bc''(q^*)} < 0,$$

which agrees with Proposition 1. For a risk-neutral provider in relatively good times (i.e., when the breakeven constraint does not bind), an increase in b leads to a decrease in q.

Now consider the case where the breakeven constraint does bind. In this case, q^* satisfies:

$$b(r - c(q^*)) = f,$$

and

$$\frac{dq}{db} = \frac{(r - c(q^*))}{bc'(q^*)} > 0.$$

[7] The results continue to hold if the provider is risk averse.

Hence, when times are difficult enough that the breakeven constraint binds, the provider responds to an increase in b by increasing q. This stands to reason, since the constraint only binds when the provider would like to increase quality but cannot do so and still break even. An increase in b relaxes the constraint and allows the provider to choose higher quality.

2.2 Productive Efficiency vs. Surplus Retention

An increase in the provider's surplus retention rate can be thought of as a type of efficiency gain (e.g., a reduction in "organizational slack," discussed below). However, not all efficiency gains lead to the type of behavior described in Proposition 1. For example, a firm's behavior following an increase in productive efficiency, i.e., a downward shift in the cost curve, does not meet the conditions of Proposition 1. To illustrate, consider the case where $s(q) = r(q) - kc(q)$, where $k > 0$ is a parameter whose decrease represents a gain in productive efficiency, and $c(q)$ is the strictly positive, strictly increasing, and strictly convex cost of producing quality. The provider's utility function is:

$$v = q + u\left(b\left(r\left(q\right) - kc\left(q\right)\right)\right).$$

Proposition 2 *An increase in productive efficiency (i.e., a decrease in k) always leads the provider to increase quality.*

Proof. *Differentiating with respect to q yields the optimality condition:*

$$bu'\left(b\left(r\left(q^*\right) - kc\left(q^*\right)\right)\right)\left(r'\left(q^*\right) - kc'\left(q^*\right)\right) = -1$$

Recognizing the dependence of q^* on k and totally differentiating with respect to k, yields:

$$\frac{\partial q(k)}{\partial k} = \frac{bu'(w^*)\,c'(q(k)) + b^2 (r'(q(k)) - kc'(q(k)))\,u''(w^*)\,c(q(k))}{bu'(w^*)\,(r''(q(k)) - kc''(q(k))) + b^2 (r'(q(k)) - kc'(q(k)))^2 u''(w^*)} = \frac{(+)+(+)}{(-)+(-)} < 0, \tag{7}$$

where $w^* = b(r(q^*) - kc(q^*))$. The Proposition follows from 7, noting that an increase in productive efficiency corresponds to a decrease in k. ■

In Proposition 2, an increase in productive efficiency leads to an increase in quality because the wealth and substitution effects go in the same direction. A decrease in k increases retained surplus, which induces the provider to increase quality in order to restore optimality. Thus the wealth effect is positive. A decrease in k also decreases the marginal cost of quality, making quality "less expensive" relative to surplus and inducing the provider once again to increase quality to restore optimality. Thus the substitution effect is positive as well, and, unequivocally, the provider responds to a downward shift in its (marginal) cost curve by increasing quality.[8]

It is also straightforward to confirm that the provider responds to an increase in per-patient revenue r by increasing quality (Ma 1994). That is, if $v = q + u(tr - c(q))$, then $\frac{dq^*}{dt} > 0$. Hence, the possibility that increasing surplus retention increases quality highlighted in Proposition 1 arises from the fact that an increase in surplus retention increases the provider's cost, effectively increasing supply-side cost sharing.

[8] This is because a decrease in k decreases both total cost and marginal cost. If the productive efficiency change entailed larger total cost but lower marginal cost over the relevant range, then the wealth and substitution effects would once again oppose each other.

3 Discussion

Decision-makers subject to a breakeven constraint become very risk averse as the constraint comes closer to binding. Hence, we should expect providers facing tough economic times to behave in a very risk averse manner, while those enjoying good times should be less risk averse. Hence, Proposition 1 implies that in good times, surplus retention and quality move in opposite directions, while in bad times they move together.

It has long been observed that health care providers, like many entities that operate in a sector with many subsidized participants – most significantly nonprofits and government providers – enjoy (or suffer) from *organizational slack* (Cyert and March 1956 and 1963), particularly in good times or less competitive contexts.[9] That is, they provide a service at higher cost than the most efficient providers do. Alexander and Bloom (1987) reflect the conventional view in stating that "slack resources are greater among hospitals that by law cannot distribute their excess revenue as profits to external actors such as stockholders" (p.62; see also Duizendstraal and Nentjes 1994).

One explanation is that organizations that give or sell inputs to the provider may "tax" the provider on any surplus. We label such organizations "purveyors." Purveyors include suppliers price discriminating so as to maximize their profits, federal and local governments offering subsidies, and employees in a normal bargaining relationship, who can extract some of their employers' surplus. Purveyors will provide less or charge more when the organization

[9] "The allocation of organizational resources to the satisfaction of subunits in excess of the minimum required for maintenance of the system gives rise to a form of organizational slack" (Cyert and March 1956, p.46).

is flush with funds.

Private suppliers of resources will naturally seek to price discriminate among their clients. Deep pockets lead to higher prices for everything from cleaning services to medical supplies. Health care provider organizations relying on public funds are not immune to purveyor absorption of surplus. A government subsidizer may well cut the level of subsidy if a provider is running a surplus (and offer support through a soft budget constraint [Kornai 1986] in hard times).[10]

Moreover, a provider's employees can usurp part of any surplus. Some evidence comes from the literature on unionization and collective bargaining. Unionized firms often have lower profits than comparable firms (with similar growth or capital-labor ratios), consistent with a bargaining model in which unionization claims more of any given surplus for workers (Clark 1984). Empirical analysis by Alexander and Bloom (1987) suggests that the practice of collective bargaining in hospitals is more likely in "good times" (or "improving times"); among government and nonprofit hospitals; and when regulatory intensity is high, with associated pressures for institutional isomorphism.[11] Pauly and Redisch (1973) characterize nonprofit hospitals as physicians' cooperatives, with commensurate ability to control resource

[10] For example, Duggan (2000) finds that local governments decreased their subsidies to public hospitals almost exactly dollar-for-dollar with the increased California state revenues those hospitals received from the Disproportionate Share (DSH) program payments for indigent patient care.

[11] In a seminal article on the sociology of organizations, DiMaggio and Powell (1983) argue that several processes, including professionalization and bureaucratization, lead rational actors in any given field to "make their organizations increasingly similar as they try to change them" (p.147), resulting in institutional isomorphism.

flow and retain surplus (or create organizational slack).

By contrast, when times are tight, employees may have to sacrifice. During the Depression, for example, hospital employees accepted large reductions in wages: "Nursing salaries were cut across the board—largely without complaint.... Young doctors, like nurses, were loath to leave the shelter of the hospital. Even though half of interns received no monthly allowances from hospitals or any other form of pay in 1933, they did get food and lodging, and house staff positions were eagerly sought" (Stevens 1989, p.144).

Though we have posed this situation as one of surplus retention, it could also be posed as one where the decision-maker is an agent for many parties – those who subsidize it, sell it goods and services, and work for it. Yet, the decision-maker cannot extract the full rent from providing those principals with benefits. Moreover, it is assumed that the decision-maker has little or no concern for the principals who also claim the surplus, as long as they are fairly compensated. The one principal for which the provider-agent exhibits direct concern is the patient: we assume that higher quality of care raises provider utility for any given level of financial reward.

We do not assume any specific ownership form, although direct concern for patient benefits is most often ascribed to nonprofit organizations.[12] One important application might be to the analysis and oversight of ownership conversions. It seems natural to consider conversion to for-profit ownership as an increase in the manager's surplus retention rate, compared to more diffuse ownership and surplus claims in government and nonprofit firms. Then Proposition 1 suggests that conversions to for-profit status are most likely to raise effi-

[12] Hart and Holmstrom (2002) refer to manager "enthusiasts," in the context of for-profit firms.

ciency *and* quality in hard times (when many conversions take place), but may lower quality in flush times. This suggests that study of conversions and their impact on quality should take into account the reimbursement and competitive environment at the time of conversion, and also examine performance several years after conversion or in a different phase of the business cycle.

Proposition 1 fits well with a large literature on how competitive environments and "hard times" spur productivity improvements and organizational innovation. Caves (1980) notes that "economists' vague suspicions that competition is the enemy of sloth can be specifically documented in the effect of competition (and environmental uncertainty) on the decision-making structures and control devices of firms" (p.88). Caves and Krepps (1993) find that import competition and changes in control spurred large firms to lay off nonproduction workers, and that those lay-offs increased the value of the firm. Shareholders reacted positively to announcements of corporate downsizing involving white-collar lay-offs.

Within health care, Kessler and McClellan (2000) find hospital competition to be socially beneficial—both reducing cost and improving quality in terms of patient outcomes—under recent competitive environments. Although measuring health care productivity (and the value of new medical technologies) presents a unique challenge (see Cutler and McClellan 2001), some evidence points to organizational innovation in "hard times." Anecdotally, providers emphasize improving quality more in the early 21^{st} century, when cost pressures are high and margins low, than in the 1990s. It remains unclear to what extent this represents a response to "hard times," a response to recent prominent calls for quality improvement (e.g., the 2001 IOM report *Crossing the Quality Chasm*), or some combination.

Proposition 2 – that an increase in productive efficiency always leads the provider to increase quality – is a more conventional result. The key policy question becomes what policies can spur increases in productive efficiency? A frequently used motivation or reward for such efficiency gains is an increase in the decision-maker's claim to residual resources, providing another link to Proposition 1. Other commonly cited motivators include competition, supply-side incentives, and ownership. We discuss each briefly in turn.

Health care policymakers in many countries seek to use incentives and competition to spur efficiency improvements in the health sector. In fact, Cutler (2002) argues that promoting incentives and competition constitutes a current "third wave" of international health policy reform. A central concern that arises from increasing supply-side cost sharing is the trade-off between incentives for productive efficiency and risk selection (Newhouse 1996). Supply-side incentives, particularly when combined with competition for profitable patients, can exacerbate incentives for stinting on quality for unprofitable clients or for services disproportionately used by the poor and uninsured (Ellis 1997; Frank, Glazer and McGuire 2000). Since our model does not look at patient heterogeneity, it throws little light upon the uneven improvement in quality that may follow productive efficiency gains.

Finally, our second proposition suggests that if for-profit organizations achieve greater productive efficiency than other ownership forms, and if for-profits also share the objective function posited above, then for-profits improve social welfare. Of course evidence for higher for-profit efficiency in the health sector is mixed (Sloan 2000), and the assumption that for-profits have an innate or reputational concern for quality seems questionable.[13]

[13] Our propositions also relate to the large literature on executive compensation, stock and stock options

Our attention to surplus retention stresses the breadth of agency relationships within the health care sector. Vastly disparate classes of players have claims on a healthcare provider's surplus. In effect, there is a decision-maker with the responsibilities of a residual claimant, but not the privileges. He is forced to share any residual surplus. Yet, in an ironic "second-best" twist, this claim sharing helps ameliorate another agency problem, stinting on quality. Given this environment, the decision-maker's concern for quality, a concern that is likely to be reinforced by professional norms, can strongly bolster quality.[14] This paper identifies the conditions where greater sharing of claims leads to greater, and lesser, quality.

References

[1] Alexander, J.A., and J.R. Bloom, 1987. Collective bargaining in hospitals: An organizational and environmental analysis. *Journal of Health and Social Behavior* 28(1): 60-73.

[2] Brickley, J.A., and R.L. Van Horn, 2002. Incentives in nonprofit organizations: Evidence from hospitals. *Journal of Labor Economics* 45(1): 227-249.

[3] Caves, R.E., 1980. Industrial organization, corporate strategy and structure. *Journal of Economic Literature* 18(1): 64-92.

(e.g., Hall and Liebman 1998), and its application to CEO compensation in health care organizations (e.g., Brickley and Van Horn 2002).

[14] Better "agency" for patients can curb the less savory actions of profit-seeking provider organizations or health plan managers, such as the stinting on quality for unprofitable clients or services that we discussed above (Fuchs 1996; McGuire 2000; Newhouse 2002).

[4] Caves, R.E., and M.B. Krepps, 1993. Fat: The displacement of nonproduction workers from U.S. manufacturing industries. *Brookings Papers on Economic Activity. Microeconomics* 1993(2): 227-273.

[5] Clark, K.B., 1984. Unionization and firm performance: The impact on profits, growth, and productivity. *American Economic Review* 74(5): 893-919.

[6] Cutler, D.M., 2002. Equality, efficiency, and market fundamentals: The dynamics of international medical-care reform. *Journal of Economic Literature* 40: 881-906.

[7] Cutler, D.M., and M. McClellan, 2001. Is technological change in medicine worth it? *Health Affairs* (September/October 2001): 11-29.

[8] Cyert, R.M, and J.G. March, 1956. Organizational factors in the theory of oligopoly. *Quarterly Journal of Economics* 70(1): 44-64.

[9] Cyert, R.M, and J.G. March, 1963. *A Behavioral Theory of the Firm.* Englewood Cliffs: Prentice-Hall.

[10] DiMaggio, P.J., and W.W. Powell, 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* 48(2): 147-160.

[11] Duizendstraal, A., and A. Nentjes, 1994. Organizational slack in subsidized nonprofit institutions, *Public Choice* 81(3-4): 297-321.

[12] Duggan, M.G., 2000. Hospital ownership and public medical spending, *Quarterly Journal of Economics* 115(4): 1343-1373.

[13] Ellis, R., 1997. Creaming, skimping, and dumping: Provider competition on the intensive and extensive margins. *Journal of Health Economics* 17: 537-555.

[14] Ellis, R., and T.G. McGuire, 1990. Optimal payment systems for health services. *Journal of Health Economics* 9: 375-396.

[15] Frank, R. G., J. Glazer, and T. G. McGuire, 2000. Measuring adverse selection in managed health care. *Journal of Health Economics* 19 (2000), 829-854.

[16] Fuchs, V.R., 1996. Economics, values, and health care reform. *American Economic Review* 86: 1-24.

[17] Hall, B.J., and J.B. Liebman, 1998. Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics* 113(3): 653-691.

[18] Hart, O., and B. Holmstrom, 2002. A theory of firm scope. Mimeo, Harvard University, November 4, 2002.

[19] Institute of Medicine, Committee on the Quality of Health Care in America, 2001. *Crossing the Quality Chasm: A New Health System for the 21st Century*. National Academy Press.

[20] Kornai, János, 1986. The Softness of the Budget Constraint. *Kyklos* 39: 3–30.

[21] Ma, C.A., 1994. Health care payment systems: Cost and quality incentives. *Journal of Economics & Management Strategy* 3(1), 93-112.

[22] McGuire, T.G., 2000. Physician Agency. Chapter 9 in A.J. Culyer and J.P. Newhouse, eds., *Handbook of Health Economics*, Vol. 1A (Amsterdam: Elsevier North-Holland), 461-536.

[23] McGuire, T.G., and M.V. Pauly, 1991. Physician response to fee changes with multiple payers. *Journal of Health Economics 10: 385-410.*

[24] Newhouse, J.P., 1970. Toward a theory of nonprofit institutions. *American Economic Review* 60: 64-74.

[25] Newhouse, J.P., 1996. Reimbursing health plans and health providers: Selection versus efficiency in production. *Journal of Economic Literature* 34: 1236-1263.

[26] Newhouse, J.P., 2002. *Pricing the Priceless: A Health Care Conundrum*. Cambridge, MA: MIT Press.

[27] Pauly, M.V., 1987. Nonprofit firms in medical markets. *AEA Papers and Proceedings* 77(2): 257-262.

[28] Pauly, M.V., and M. Redisch, 1973. The non-profit hospital as a physician cooperative. *American Economic Review* 63: 87-100.

[29] Simon, H.A., 1979. Rational decision making in business organizations. *American Economic Review* 69(4): 493-513.

[30] Sloan, F.A., 2000. Not-for-profit ownership and hospital behavior. Chapter 21 in *Handbook of Health Economics*, Culyer and Newhouse (eds): 1141-1174.

[31] Stevens, Rosemary, 1989. *In Sickness and in Wealth: American Hospitals in the Twentieth Century*. New York: Basic Books.

A Appendix: The Wealth Effect is Positive

In this Appendix, we provide a brief argument for why the wealth effect of an increase in the surplus retention rate (identified in the discussion of Figure 2) must be positive. To see why the wealth effect must lead the provider to increase quality, let $B = (q_B, y_B)$ and $C = (q_C, y_C)$, and consider Figure 3. Since $s^*(q)$ is a downward translation of $b_1 s(q)$, $s^{*'}(q_B) = b_1 s'(q_B)$, and the constraints have the same slope at points B and D. On the other hand, quasilinear utility implies that utility isoquants are horizontal translations of each other. Therefore the iso-utility curve through point D (labeled v_3) has the same slope at point E as constraint $y = b_1 s(q)$ has at point D, and therefore, by convexity of the isoquants, point D cannot be an optimum. Further, we know (also by convexity) that isoquant v_3 is steeper than constraint $b_1 s(q)$ at point D, and therefore that the solution to the provider's optimization problem when the constraint is $y = b_1 s(q)$ must lie further to the right along the constraint than point D. Hence the wealth effect must increase quality.

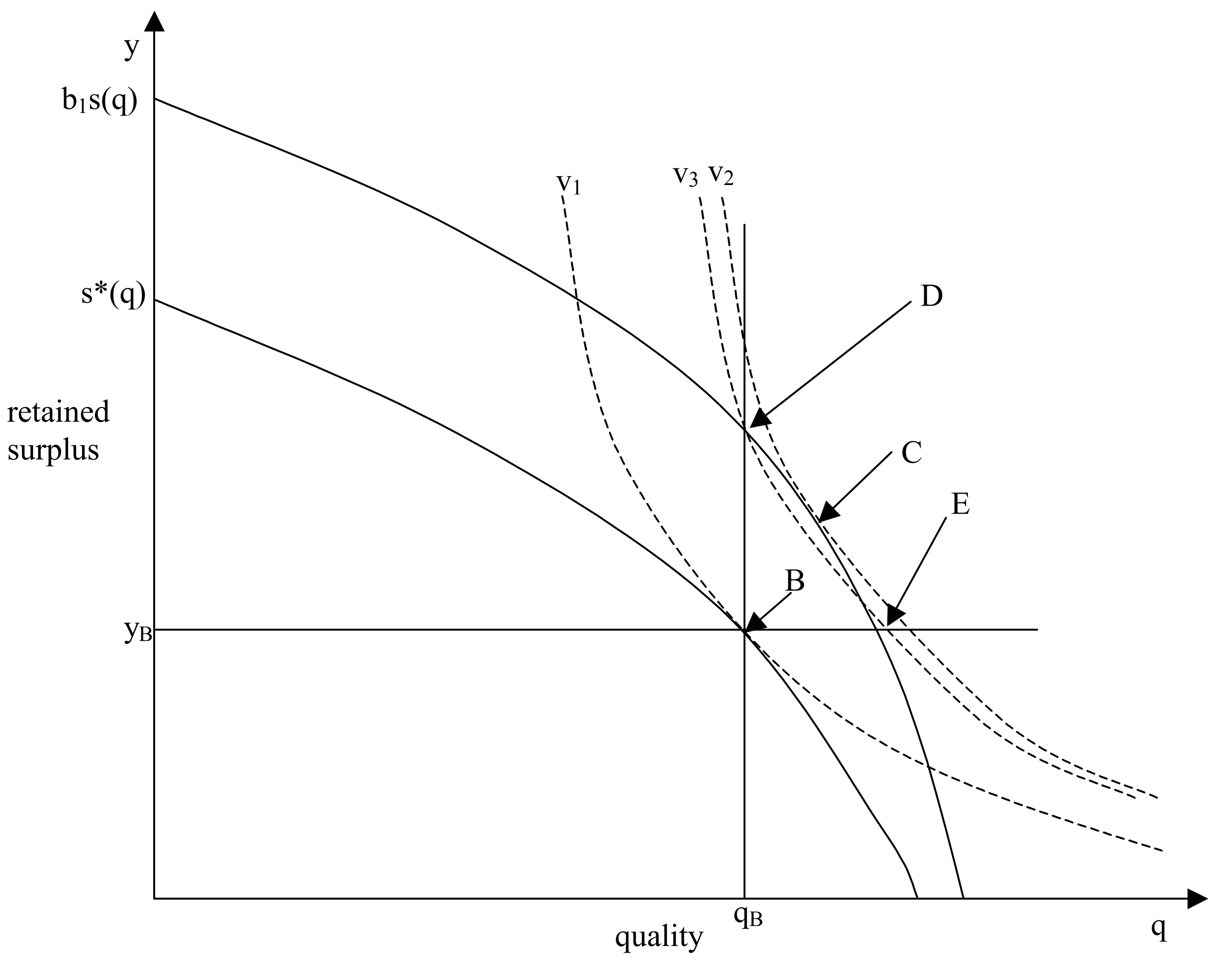

Figure 3: The Wealth Effect is Uniformly Positive.

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