The economics of regulatory mandates on the HMO market

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Abstract

Recently proposed HMO regulations have involved mandates of two forms: (1) minimum quality standards, and (2) mandated increases in access to specialty care. I show that piecemeal regulation, which uses only one of either mandate (1) or (2), may decrease welfare for all HMO consumers. Under full regulation using both (1) and (2), if the minimum standard is set too low, say, due to political bargaining, a floor-to-ceiling effect occurs. This involves HMOs setting quality at the minimum standard, even when their quality would be above the standard in an unregulated market. Finally, I show how premiums may either increase or decrease under a mandate. Published by Elsevier Science B.V.

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1. Introduction

Many consumers in the US have expressed much anger and dissatisfaction with their health maintenance organizations (HMOs), believing that cost-cutting has lead HMOs to deliver unacceptably low levels of health care quality. In response to this upswell of consumer dissatisfaction, 41 states have passed minimum maternity length-of-stay laws; 13 states have enacted similar mandates for mastectomy and 17 for reconstructive breast surgery; and 10 states have passed mental health parity laws, which require a minimum level of coverage for mental health illnesses.

In addition, many state have mandated access to specialty care. For example, as of October 1999, 33 states had enacted laws allowing women direct access to women’s health care.
specialists; 20 states mandated standing referrals to specialists for chronic conditions; 18 states required plans to provide referrals to out-of-network providers; 37 states had passed laws increasing access to emergency care services; and 14 states required plans to allow patients access to prescription drugs that are not on the HMOs formulary.\(^1\)

Despite the increasing scope of state legislation, many state laws governing health plans do not apply to ERISA employee health plans that are self-funded, which today cover about 51 million privately insured Americans.\(^2\) As a result, the 106th Congress passed two Patients’ Bill of Rights (BOR) bills (S. 1344, and H.R. 358: the Norwood–Dingell Bill) in 1999 to attempt to override ERISA’s pre-emptions and provide more protection for patients privately insured under ERISA plans. The House BOR is more controversial in that it allows patients to sue HMOs when they deny or delay needed medical coverage.

These federal and state bills, however, have faced much criticism as piecemeal, disease-of-the-month regulation and micro-management of the HMO industry. A main criticism is that these new mandates will raise insurance premiums. The 1998 Democratic BOR (which laid much of the foundation of the 1999 BOR) (HR 3606, S 1890, 105th Congress) would impose 359 new federal mandates and create 3825 new federal jobs. According to the Congressional Budget Office, it would increase average premiums by 4% a year. A second criticism of these federal and state mandates is that they will actually distort quality in the HMO market. In particular, there is a fear that mandates will create a floor-to-ceiling effect. That is, while the mandate is intended to set a floor on HMO quality, it actually may allow HMOs to collude at the minimum standard by refusing to offer patients quality above the mandated floor. It then becomes the provider’s burden to prove that a patient warrants special treatment above the mandated level of care. In essence, today’s mandated quality floor actually becomes tomorrow’s quality ceiling on the HMO market.

Despite these concerns, there has not been a conceptual framework in which the effects of government mandates could be analyzed. Since the HMO market faces potential adverse selection and risk selection problems, the traditional economics literature on minimum standards does not apply to the HMO market. In this paper I develop a model to analyze minimum quality standards and minimum access mandates in the HMO market. In particular, I focus on the two main forms of HMO regulation: (1) mandated minimum quality standards,\(^3\) and (2) mandated increases in access to specialty care.\(^4\) With this model we can now address two important questions.

1. Will these quality and access regulations really increase welfare? I show that if the market faces piecemeal regulation, in which only one of either forms of regulation is implemented, then welfare for all consumers may decrease below the case of no regulation. But, when coupled together, both forms of regulation, mandated access and

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1 See Hellinger (1996) and Families USA (1999) for a review of state legislation on managed care.
2 The 1974 federal Employee Retirement Income Security Act (ERISA) pre-empted most state regulation of self-insured employer-sponsored health insurance.
3 All of the 1998 federal HMO bills involve numerous minimum quality standards. For example, several federal bills mandate minimum length-of-stay in the hospital for mastectomies and deliveries in order to curb ‘drive-through’ HMO mastectomies and newborn deliveries.
4 For example, the 1999 BOR allow patients direct access to specialists for chronic conditions, such as oncologists and cardiologists, without a referral from the patient’s primary care physician. Other examples are mandated access to ‘prudent lay person’ emergency care and mandated access to specialty drugs not on an HMOs formulary.
minimum standards, work together to solve the market failures in a perfectly competitive market if the mandates are set high enough. However, the two forms of regulation are not very robust in solving the market failures. I show that if a minimum standard is set too low, say, due to political bargaining, a floor-to-ceiling effect may occur in a competitive HMO market. This involves HMOs setting quality at the minimum standard, even when their quality would be above the standard in an unregulated market. Today’s mandated floor on quality will become tomorrow’s ceiling on quality.

2. Will these quality and access regulations increase costs? I show that these mandates will never increase premiums for every consumer in the market (there are always some consumers who experience a decrease in premiums). In fact, I illustrate cases where these regulations will (weakly) decrease premiums for all consumers. However, there are also cases where quality declines and premiums increase for some consumers due to regulation.

This article is organized as follows. Section 2 sets up the basic model, with Section 3 delineating the types of market failures occurring in an unregulated HMO market. Section 4 examines quality and access regulation under perfect HMO competition, while Section 5 studies the floor-to-ceiling effects of imperfect implementation of quality mandates. Section 6 concludes with some comments on imperfect HMO competition and risk adjusting.

2. The basic model

When the quality of a product is unobservable, Akerlog (1970) showed that asymmetric information could lead to a market failure. When the quality of a product (like insurance) is observable, but the purchaser’s risk type is unobservable to the insurer, Rothschild and Stiglitz (1976) showed that adverse selection still may cause a market failure. Can minimum quality standards solve these market failures? Indeed, Leland (1979) showed that imposing a minimum quality standard in Akerlof’s model would improve welfare. However, the effect of a minimum standard in Rothschild and Stiglitz’s model is still an open question. This will be the topic of this paper. I show that under adverse selection, minimum standards can actually decrease welfare in a perfectly competitive market.

First, the demand side of the managed care organization (MCO) market is described. Suppose that the health insurance market consists of two types of consumers: (1) the high risk (H) who become ill with probability \( a_H \); and (2) the low risks (L), who become ill with probability \( a_L < a_H \). Let the number of low risks in the market be \( n_L \), and the number of high risks in the market be \( n_H \). Let \( \lambda = n_H / (n_H + n_L) \) be the proportion of high risks in the market. Each consumer’s risk type is unobservable to the MCO, causing an adverse selection problem. \(^5\) The MCO’s only means of avoiding high risks is by offering low speciality care access or by offering too low a level of general quality \( q \) in order to discourage the high risks from enrolling.

\(^5\) Even if the risk type were observable, an adverse selection problem would still arise since the HMO Act of 1973 prohibits MCOs from discriminating against high risk patients by using pre-existing conditions clauses or risk-rated premiums.
A consumer’s utility for MCO care depends on the MCO’s premium $p$, and on the MCOs’
two types of quality: (1) general quality $q$ and (2) the MCO’s degree of access to speciality
care, $s$. The utility function for a risk type $i$ ($i = L, H$) will be

$$W_i(p, q, s) = U(y - p) + (1 - a_i)\bar{H} + a_i[H + H(q)] + V_i(s),$$

for $i = L, H$, where $y$ is income, $\bar{H}$ is the health utility when not ill, and $H$ is the health utility when ill, with $H < \bar{H}$. I assume that the risk type $i$, $i = L, H$, obtains utility $V_i(s)$ from speciality care regardless if ill or not ill.

General MCO quality $q$ is valued equally by both high and low risks ($H(q)$). Quality $q$
includes the quality of the MCO’s preventive health care, inpatient care, emergency care,
and amenities. In contrast, the MCO’s degree of access to speciality care, $s$, is valued more
by the high risks than the low risks, since the high risks have chronic conditions that require
speciality care while the low risks do not. To simplify the analysis without loss of generality,
I will assume that the degree of access to speciality care is binary: $s \in \{s_l, s_h\}$, where $s_l$ is low
access to speciality care and $s_h$ is high access to speciality care. $^6$ For example, an MCO may
have a restricted or closed network of specialists, or may allow patients to go to specialists
outside of the network through a point-of-service option. Second, MCOs may either allow
patients to see a specialist for their chronic condition only after a primary care gatekeeper
physician grants a referral, or may allow patients direct access to specialists without a
referral. Third, MCOs may have either a closed or open pharmaceutical formulary. Under a
closed formulary, patients can only be prescribed the particular brand drugs or generic drugs
that are on the MCO’s formulary list. In contrast, an open formulary allows chronically ill
patients access to any pharmaceutical brand of a drug. Thus, in general, $s_j$, $j = l, h$, may
refer to the degree of access to special drugs, special technology, or specialist physicians.

To simplify the model, I will assume that the low risks only need low access $s_l$ to specialists
and do not receive any extra benefit from high access $s_h$. That is, I assume $V_L(s_h) = V_L(s_l)$.
While the low risks are indifferent between $s_l$ and $s_h$, I also assume that the MCO prevents
any moral hazard problem in that if the MCO offers $s_h$, low risks will receive only $s_l$, since
the low risks are not chronically ill and are thus not expected to need a specialist for chronic
conditions.

However, the high risks will value high speciality care access $s_h$ more than the low risks:
$V_H(s_h) > V_L(s_h)$. $^7$ The high risks value high speciality care access more since they have
chronic conditions that would benefit from, say, direct access to a specialist without referral,
or an open network of specialists.

Next, the supply side of the MCO market is described. Each MCO will choose a quality
level $q$, at cost $C(q) = q$, and a premium $p$. If an MCO decides to offer high speciality care
access $s_h$, it will incur a cost of $k(s_h) = k$ per high risk enrollee. $^8$ The cost of low quality

$^6$ See Encinosa (1999) for a model in which $s$ is a continuous variable. Mandates behave even more anticompetitively when $s$ is continuous.

$^7$ If each risk type equally values speciality care $s_h$, then the market failures are less severe and the social optimum can be restored with a minimum standard on $q$ (Neudeck and Podczeck, 1996). But, with differential valuations of $s_h$, we will see that the impact of minimum standards is more complex.

$^8$ To simplify the model, I assume that there is no cost per low risk enrollee for offering high access speciality care since the low risks are not chronically ill and are thus not expected to need a specialist for chronic conditions. The results of the paper would still hold if there was a cost for the low risks as well.
speciality care $s_l$ is normalized to zero, $k(s_l) = 0$. Finally, I assume that the MCO market is perfectly competitive.

### 2.1. The social optimum

The social optimum involves a social planner choosing $p$, $q$, and $s$ for each MCO in order to maximize the aggregate welfare of all the low and high risks (with equal weight placed on each risk class), such that total MCO profit is zero. The social planner has two options: (1) it may be optimal to separate the risks among two MCO plans, $(p_L, q_L, s_l)$ and $(p_H, q_H, s_i)$, where either $i = l$ or $i = h$ may be optimal; or (2) it may be optimal to offer only one pooling plan $(p, q, s_i)$, where either $i = l$ or $i = h$ may be optimal. That is, the social planner maximizes the following program:

\[
\max_{p_L, p_H, q_L, q_H, s_i} n_L \left[ U(y - p_L) + (1 - a_L) q_L + a_L (H + H(q_L)) + V_L(s_l) \right] + n_H \left[ U(y - p_H) + (1 - a_H) q_H + a_H (H + H(q_H)) + V_H(s_i) \right],
\]

such that the zero profit constraint holds

\[
n_L (p_L - a_L q_L) + n_H (p_H - a_H q_H) - n_L k(s_l) - n_H k(s_i) = 0,
\]

where $k(s_h) = k$ and $k(s_l) = 0$. In program (1), recall that the low risks will always receive $s_l$ even if $s_h$ is offered at the MCO. The high risk will receive whatever is offered, $s_i$, where $i = l, h$. The solution to program (1) will involve pooling. The following proposition is proved in Appendix A.

**Proposition 1 (Social optimum).** In the social optimum, the solution to program (1) is a pooling MCO plan $(p^*, q^*, s^*_h)$, where there exists some $k^*$ such that the optimal level of speciality care access $s_l$ is high access $s_h$ for all $k \leq k^*$ and low access $s_l$ for all $k > k^*$.

Thus, if the cost $k$ of high access speciality care per high risk enrollee is above some threshold $k^*$, then it is socially optimal for all MCOs not to offer high access speciality care. However, if $k < k^*$, then it is socially optimal for all MCOs to offer high access speciality care and to pool the high risks with the low risks under one community rated premium. The intuition for the pooling is as follows. The low and high risks are charged the same premium because the welfare of each risk type is valued equally by the social planner. Quality $q$ is delivered to all patients up to the point where the extra utility that quality affords a patient per dollar of expenditure is equal to the patient’s marginal utility of income. Thus, since both risk types value $q$ equally and have the same marginal utility of income, they are afforded the same quality level $q^*$. Next, since the MCO can prevent the low risks from consuming $s_h$ when it is offered, the social planner can provide high access to speciality care $s_h$ in all MCOs. Thus, the social optimum involves pooling at $(p^*, q^*, s_h)$.

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9 The social optimum might not involve pooling if the low and high risks have differing marginal utilities of income, or if the social planner maximizes a non-linear function of low and high risk welfare. See Encinosa and Selden (2000).
This pooling results in the burden of health care costs being equally distributed across both high and low risks in the MCO market. It is never optimal for some MCOs to offer low access specialty care, since this would discourage high risks from enrolling, eroding all cross subsidies between low and high risks. For costs \( k < k^* \), it is optimal for all the low and high risks to be enrolled in the MCO market, at a quality level of \( q^* \) and premium level of \( p^* \), with all MCOs offering high specialty care access. Hence, the social optimum entails the low risks subsidizing the high risks in each MCO.

3. Unregulated HMO competition

The fundamental question in this section is: can the market implement the social optimum without regulation? In particular, when the cost of high access specialty care is below the optimal threshold \( k < k^* \), will the market offer MCO plans with high access specialty care? The answer is no. In the social optimum, a social planner chose \( p, q, \) and \( s \) for each MCO so that the MCOs could not attempt to creamskim off the low risks and avoid the high risks. However, without a social planner, the market will be distorted due to MCOs attempting to creamskim the low risks. There are two mutually exclusive types of such distortions that can occur in the unregulated market: market failure and market segmentation.

Before defining these two distortions, first define \( \tilde{W}_H \) to be the high risk’s reservation utility (for example, the utility of an outside fee-for-service (FFS) option). That is, the high risks will opt out of an MCOs health plan if the utility \( W_H(p, q, s) \) is not greater than \( \tilde{W}_H \). Next, define \( \tilde{k} \) to be the maximum cost of high access specialty care \( s_h \) at which a zero profit MCO could just barely provide a total utility of \( W_H(p, q, s_h) = \tilde{W}_H \) when enrolling only high risks and offering \( s_h \) (see Fig. 1). That is, if \( k > \tilde{k} \), then the cost of \( s_h \) is so high that the high risks’ utility would be below \( \tilde{W}_H \) unless there was a cross-subsidy from the low risks. If \( k \leq \tilde{k} \), then the MCO could offer \( s_h \) at a utility level above \( \tilde{W}_H \) without any cross-subsidy from the low risks. As shown next, we will have a market failure when \( \tilde{k} < k < k^* \) and market segmentation when \( k \leq \tilde{k} \).

3.1. Market failure \((\tilde{k} < k < k^*)\)

No MCO offers high specialty care access. The market failure can be observed in Fig. 1.

To understand Fig. 1, it is helpful to discuss each property of the figure step-by-step.

- **Social optimum.** The social optimum is the \((q^*, p^*)\) point on the efficient premium curve\(^{10}\) at which the profit would be zero if both high and low risks were pooled and provided with high specialty care access. This zero profit line is denoted by the dashed segment \( n_L \pi_L + n_H(\pi_H - k) = 0 \). Note that \( \pi_L \) and \( \pi_H \) are the profits earned on each low risk and each high risk, respectively, if low access to specialty care \( s_l \) is offered. Since high specialty care is offered at the social optimum, the actual profit on a high risk at the social optimum is \( \pi_H - k \), where \( k \) is the cost of high specialty care access. For

\(^{10}\) The efficient premium curve \((H'(q) = U'(y - p))\) in Figs. 1–8 is the premium \( p \) at which the marginal utility of net income \((U'(y - p))\) is equal to the ratio of the patient’s marginal benefit \((H'(q))\) of quality \( q \) over the MCOs marginal cost of \( q \) \((C'(q) = 1)\).
the low risks, the profit is still $\pi_L$ since the low risks do not use the high speciality care access even when it is offered.

- **The high access MCOs.** Next, if an MCO offered high access speciality care and attracted only high risks, it would do so at the $(q, p)$ point at $x$ on the efficient premium curve where profit is zero on the high risks, $\pi_H - k = 0$ (i.e. the solid segment $\pi_H = k$).

- **The low access MCOs.** Given the high access MCO at $x$, the low risks will be attracted to the higher quality, low access MCO at $y$, where the efficient premium curve earns a zero profit on the low risks, $\pi_L = 0$. Note that while $y$ does have a higher quality level than $x$, the high risks at $x$ do not prefer $y$ since high speciality care access is offered at $x$ but not at $y$.\(^{11}\)

- **The market failure.** While the high risks prefer $x$ to $y$ in Fig. 1, note that they prefer their reservation utility $WH$ instead of $x$ when $k > \hat{k}$. Recall that $\hat{k}$ was defined such that profit is zero ($\pi_H - \hat{k} = 0$) at the reservation utility $WH$. Thus, when the cost of high access $k$ exceeds $\hat{k}$, it takes a higher premium to fund speciality care at a zero profit (i.e. at $x$ on the zero profit line $\pi_H = x$ versus the lower line $\pi_H = \hat{k}$). Hence, at $x$ the high risks have utility $W_H(x) < WH$ when $k > \hat{k}$. As a result, the high risks would leave the market to obtain $WH$ if they were offered high access at $x$. Thus, whenever $k > \hat{k}$, there is no zero profit high speciality care access that can be offered to the high risks that they would accept.

- **The equilibrium.** As a result, the high risks are not offered high access when $k > \hat{k}$.

\(^{11}\) It is assumed that the high risks’ utility of high access speciality care $V_H(s_h)$ is large enough that they prefer $x$ with high access over $y$ with low access (in Fig. 1).
3.2. Market segmentation ($k \leq \hat{k}$) 13

Some, but not all, MCOs offer high access. This case is illustrated in Fig. 2.

- The high access MCOs. As in Fig. 1, if an MCO offered high access speciality care and attracted only high risks, it would do so at point $x$ in Fig. 2 on the efficient premium curve at which profit is zero on the high risks, $\pi_H - k = 0$. But, now that $k \leq \hat{k}$, the zero profit line ($\pi_H = \hat{k}$) at the reservation utility $W_H$ is above the zero profit line ($\pi_H = k$) at $x$. Thus, $W_H(x) \geq W_H$, so that the high risks will prefer high access at $x$ instead of their reservation utility.

- The low access MCOs. Given the high access MCO at $x$, the low risks will be attracted to the higher quality, low access MCO at $y$, where the efficient premium curve earns a zero

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12 As in Rothschild and Stiglitz (1976), no pure strategy Nash equilibrium exists if $\lambda$ is low, since then an unstable pooling plan can skim off both risk types from $A$ and $B$.

13 More precisely, this should be $k < \min(\hat{k}, k^*)$. However, to simplify the notation I will assume $\hat{k} < k^*$. 

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profit on the low risks, \( \pi_L = 0 \). The high risks at \( x \) do not prefer \( y \) since high speciality care access is offered at \( x \) but not at \( y \). Thus, when \( k \leq \hat{k} \), we have the case of market segmentation: some, but not all, MCOs offer high access speciality care.

Recall that under a market failure, the market stratifies into good and bad MCOs. In contrast, under market segmentation \( (k \leq \hat{k}) \), there is no market stratification into good and bad MCOs: the MCOs that have lower quality \( q \) offer high access speciality care, while the MCOs that have high quality \( q \) do not offer high access speciality care. This market segmentation has been observed to some extent between two types of MCOs: HMOs (health maintenance organizations) and POSs (point of service). One can think of HMOs as MCOs that do not offer high access speciality care and POSs as MCOs that do offer higher access to speciality care. Recent evidence from 1998 and 1999 indicates that POSs have lower general quality rankings than HMOs, even though they offer more flexibility in seeing specialists.\(^{14}\)

For example, in the 1998 US News National Ranking of 271 MCOs in 45 states (using 28 HEDIS measures from the NCQA annual survey), only four POSs were ranked in the top 40 MCOs in terms of overall general quality.\(^{15}\) Of the 74 MCOs that reported both POS and HMO scores, the average overall quality score for POSs was 57 (out of 100, with 100 being best), 8% lower than the average score for an HMO, 62. In terms of preventive care, the average score for all HMOs was 64 (out of 100), while the average score for all POSs was more than 10% lower at 57. Moreover, in terms of the worst MCOs, 13% of the POSs had a score of less than 33 (out of 100), while only 6% of HMOs had a score of less than 33. In California’s 1995 PBGH Health Plan Value Check Survey, 80% of HMO customers were satisfied with their plan’s overall quality, while only 56% of POS customers were satisfied. In New Jersey’s 1999 HMO Performance Report (which covered practically all POSs and HMOs in New Jersey), 38% of HMOs on average had a score for overall quality that was above average among all MCOs, while POSs had no above average scores; in fact, 43% of the POSs had below average scores among all MCOs.

4. Market regulation

Recall that in the social optimum, all MCOs offer high access \( s_h \) and pool risks when \( k \leq k^* \). However, in the unregulated market, no MCOs pool risks and not all MCOs offer \( s_h \). To resolve this market failure and market segmentation occurring in the perfectly competitive MCO market, three forms of market regulation will be considered:

1. **Specialty care regulation (SC).** This regulation requires all MCOs to offer high access to speciality care. Examples from the 1999 Patients’ Bill of Rights would be direct access to specialists without referrals, open pharmaceutical formularies, and expanded networks with point-of-service options.

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\(^{14}\) Many HMOs offer a POS option on top of the HMO option. However, quality may differ under the POS option since it is a larger and looser network of providers, with only a subset being in the HMO. For example, an HMO option may be composed of urban university medical school doctors, while the POS option may be used primarily in the outlying rural and suburban areas to see the local doctors. Clearly, quality may differ.

\(^{15}\) Most of the HEDIS measures are objective measures (such as immunization rates). Thus, the scores should reflect an actual quality difference and not simply reflect more disgruntled (or sicker) patients being in the POSs.
2. **Minimum quality regulation** (MQ). This is the case of the MCO being prohibited from offering a quality level $q$ below some mandated minimum quality standard. Access to speciality care is not regulated.

3. **Bundled regulation** (SC, MQ). This is minimum quality regulation combined with guaranteed high access speciality care, so that a minimum quality is mandated and patients have direct access to specialists without a referral, for example.

I now compare how these three types of regulations affect a perfectly competitive MCO market. First, I examine the case of piecemeal speciality care regulation.

### 4.1. Specialty care regulation

#### 4.1.1. Under market segmentation ($k \leq \hat{k}$)

SC regulation decreases welfare and costs for low risks. Does SC regulation solve the market segmentation problem of the unregulated market? No, SC regulation makes the market segmentation problem worse. This can be seen in Fig. 3.

- **The low access MCOs.** Recall that in the unregulated case, the equilibrium under market segmentation entails the high risks joining the plans that offer $s_h$ at $x$ and the low risks joining the $s_l$ plans at $y$. The high risk are not attracted to $y$ in the unregulated market since $y$ does not offer $s_h$ while $x$ does offer $s_h$. Now, SC regulation requires all plans, including $y$, to offer $s_h$. This would then attract the high risks to $y$, causing a negative profit at $y$. As a result, SC introduces a *race to the bottom* for the MCOs that were previously not offering high access speciality care. Now that the MCOs are required to offer high access speciality care, they must lower quality $q$ from $y$ to $z$ so that the high risks in the MCOs with the quality of plan $x$ are not attracted to their plans as well.

![Fig. 3. Market segmentation ($k < \hat{k}$), piecemeal SC regulation.](image-url)
- **Welfare declines.** The high risks stay with the high access, zero-profit MCOs that offer quality $x$. Therefore, since the low risks experience a drop in quality from $y$ to $z$ (in which quality decreases quicker than the premium), SC regulation decreases overall welfare in the MCO market. Note that the MCO market remains segmented. 16 Also, since SC regulation only affects premiums by lowering premiums for the low risks, SC regulation may actually lower the costs for some employers offering an MCO option.

Fig. 3 indicates a deterioration in general quality $q$ when specialty care regulation SC is imposed. This has been observed to some extent at the state level. For example, in the middle of 1997, New Jersey passed a patients’ Bill of Rights that increased access to specialists. Comparing the 1997–1999 New Jersey HMO Performance Reports, there was a noticeable reduction in the general quality of New Jersey HMOs between 1997 and 1999. For example, in the enrollee survey category of ‘how well the primary care doctors communicate’ (listened carefully, explained things, and spent enough time), the percentage of enrollees who responded ‘always’ (that the doctor always communicated well and spent enough time) decreased from 78.3% in 1998 to 59.9% in 1999 on average for the HMOs in New Jersey. This is a 24% decline in satisfaction. (In 1997, this category was sub-divided into two categories that had ‘always’ for each category at 76 and 69%, so it is hard to compare 1997 with 1998–1999.)

Scores for more objective HEDIS measures also decreased for New Jersey HMOs from 1997 to 1998. Prenatal care decreased from 81% (of first trimester pregnancies) in 1997 to 77.6% in 1998. Eye exams for adults with diabetes decreased from 34% (of diabetics) in 1997 to 32.8% in 1998. Care after hospitalization for mental illness decreased from 74% (of such hospitalizations) to 72.3%. However, some wellness care increased slightly. For example, child immunizations (by age 2) increased from 57% in 1997 to 65.5% in 1998. Mammograms increased from 61 to 62.5% on average.

Overall, it seems that patients became about 24% more disgruntled with their primary care doctors from 1998 to 1999 after the New Jersey patients’ Bill of Rights. Wellness care increased slightly. But, primary care for chronic conditions (eye exams for diabetics and mental health care) decreased slightly from 1997 to 1998. Thus, general quality did seem to deteriorate slightly for HMOs in spite of the New Jersey Patients’ Bill of Rights. 17

4.1.2. **Under a market failure ($\hat{k} < k < k^*$)**

SC regulation decreases welfare for both risks. Does SC regulation solve the market failure problem of the unregulated market? No. Unfortunately, SC regulation exacerbates the market failure. This can be seen in Fig. 4.

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16 If $\lambda$ is low, SC regulation may cause no pure strategy equilibrium to exist, since an unstable pooling plan may skim off both risk types from $x$ and $z$.
17 I do not have any data on premiums. Most consultants now agree that the MCO sector has fallen into the underwriting cycle (3 years of profits, 3 years of losses). As a result, premium increases move in a cycle with a long lag time. Thus, it is hard to get evidence of premium changes directly due to a patients’ Bill of Rights. It is true that the conventional wisdom is that regulation will increase costs, causing more people to lose insurance. My point is that this is not obvious; it is conceivable that firms will compensate by decreasing the unregulated dimensions of quality to keep costs down so that people do not have to become uninsured. This is certainly an open empirical question.
Fig. 4. Market failure ($\hat{k} < k < k^*$), piecemeal SC regulation.

- **The high access MCOs.** Recall that in an unregulated market with a market failure, no plan offers $s_h$, and the high risks enroll in the plans at $A$ while the low risks join the plans at $B$. When the MCOs are now forced to provide high access speciality care under SC regulation, the plans at $A$ must move up to $x$ to break even on the high risks due to the extra cost $k$ of offering $s_h$. However, since the reservation utility indifference curve $W_H$ is below $x$ when $\hat{k} < k < k^*$, the high risks will opt out of the MCO market (at $A'$) instead of selecting $x$. Thus, no MCOs are now able to enroll the high risks, since all high risks opt out (and return to fee-for-service care (FFS)). Welfare declines for the high risks.

- **The low access MCOs.** Since the high risks leave the market to obtain $W_H$ at $A'$, the MCOs serving the low risks at $B$ (and now offer high access speciality care) decrease quality down to $B'$ on the $W_H$ indifference curve in Fig. 4 in order to attract the low risks while deterring the high risks from enrolling. The profit line is still $\pi_L = 0$ since the low risks do not use the high access to speciality care.

Overall, the welfare of both risk types decreases under SC regulation. While the premium drops for the low risks, the high risks must now pay a very high FFS premium. Thus, the employer’s costs will most likely rise under SC regulation in the market failure ($\hat{k} < k < k^*$) case.

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18 If no pure strategy equilibrium existed for all $\lambda$ below some $\hat{\lambda}$ in the unregulated market, the SC regulation will perturb the non-existence problem, causing no pure strategy equilibrium to exists for all $\lambda < \hat{\lambda}$, where $\hat{\lambda} > \lambda$. 
Fig. 5. Market segmentation \((k < \hat{k})\), piecemeal MQ regulation.

4.2. Minimum quality regulation

4.2.1. Under market segmentation \((k \leq \hat{k})\)

MQ regulation causes welfare to decline and costs to increase for the high risks. Does MQ regulation solve the market segmentation problem of the unregulated market? No. This can be seen in Fig. 5.

- **The high access MCOs.** First, note that minimum quality (MQ) regulation mandates a quality standard \(M\) that prohibits any MCO from offering any quality level \(q\) below \(M\). Recall that the unregulated equilibrium with market segmentation entails plans at \(x\) and \(y\).

  If the mandate is \(M = q^*\), then the high access speciality care MCOs in Fig. 5 that attract only the high risks now must increase quality \(q\) from \(x\) to \(x'\) at the minimum standard \(M\). This, however, decreases the welfare of the high risks since the MCOs attracting only the high risks must also increase premiums more than commensurately with the quality increase in order to maintain a non-negative profit at \(x'\). The welfare of the low risks does not change; they still obtain quality \(y\) from the MCOs that do not offer high access speciality care. Thus, under MQ regulation, the MCO market remains segmented, and overall welfare decreases. Moreover, MQ regulation increases the costs of employers offering an MCO option with high access speciality care.

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19 This is in contrast to Neudeck and Podczeck (1996), who show that minimum insurance benefit standards may solve market segmentation. Their result does not hold here since there are two quality dimensions here, \(q\) and \(s\). Ronnen (1991) finds that minimum standards increase welfare under imperfect competition when consumers are homogeneous in risk. Here, I find that minimum standards decrease welfare in a perfectly competitive market with heterogeneous consumers.
4.2.2. Under a market failure ($\hat{k} < k < k^*$)

MQ regulation increases total welfare by inducing pooling, but without high access. Does MQ regulation solve the market failure problem of the unregulated market? No. However, unlike the market segmentation case, MQ regulation does increase total welfare. This can be seen in Fig. 6.

- **Pooling.** Recall that an unregulated equilibrium with a market failure entails low access $s_l$ plans at $A$ and $B$. When the minimum standard is $M = q^*$, the MCOs can no longer offer high access specialty care at $x'$ as in the market segmentation case since the high risks now prefer FFS ($W_H$) to $x'$ in Fig. 6. As a result of MQ regulation, no MCO offers high access specialty care and all MCOs pool both high and low risks at quality $q^*$ at point $C$ in Fig. 6 (at the zero profit pooling line when $s_l$ is not offered). Due to the minimum standard, any other MCO trying to skim off the low risks from the pooling $C$ must do so by increasing quality beyond $q^*$ or lowering the premium, but this would attract all the high risks as well and earn negative profits. Thus, the pooling $C$ cannot be creamskimmed.

Since $C$ pools the risks compared to the unregulated case of MCOs separating the risks types at $A$ and $B$, quality and total welfare actually increase under MQ regulation. Since cross subsidies are implemented at the optimal quality $q^*$ under MQ regulation, the market is close to the social optimum. However, the MCOs still do not offer high access specialty care. Thus, MQ regulation does not solve all of the market failure.

4.3. Bundled regulation

Under bundled regulation (SC, MQ), the MCOs are no longer allowed to restrict access to specialty care, and face a minimum quality standard $M$. If the minimum standard $M$ is set
equal to the socially optimal quality $q^*$, then bundled regulation will implement the social optimum for all $k < k^*$ (i.e. for both the market failure and market segmentation cases). For example, in the market failure case ($\hat{k} < k < k^*$), recall that piecemeal MQ regulation with the standard $M = q^*$ implemented pooling and cross subsidies at the point $C$ in Fig. 6, but without high access speciality care. With SC regulation bundled with MQ regulation, the MCOs must now offer high access speciality care, and so now simply move from $C$ on the pooling zero profit line to the social optimum on the pooling zero profit line for high access speciality care in Fig. 6 (i.e. the zero profit line shifts up due to the additional cost $k$). The social optimum is thus implemented under bundled regulation, completely solving the market failure.

4.4. The overall effects of piecemeal regulation

In summary, Table 1 ranks the three forms of regulations under perfect competition according to the total welfare they generate. The ‘NR’ term will refer to the no regulation case, and the ‘SO’ term will refer to the social optimum. Both piecemeal MQ and bundled (SC, MQ) regulation use the optimal quality floor $M = q^*$. $W(\cdot)$ is the aggregate welfare in the market under the given regulation. In addition, Table 2 summarizes the effects of all three regulatory regimes on MCO behavior.

In particular, four facts from Tables 1 and 2 warrant special emphasis.

- Piecemeal SC regulation is the worst form of regulation since it forces a race to the bottom to the lowest quality level, $B'$ in Fig. 4 and $z$ in Fig. 3, and the market remains segmented. Even worse, in the market failure case ($\hat{k} < k < k^*$), SC regulation decreases the welfare of both risks. Moreover, it forces the high risks to disenroll from MCOs and return to FFS, decreasing welfare and increasing costs for the very people the regulation was targeted to help.

- Piecemeal regulation is always worse than no regulation, unless it induces pooling. The only time piecemeal regulation induces pooling is when MQ regulation is imposed under a market failure. However, under the less severe case of market segmentation, MQ does not induce pooling and decreases total welfare compared to no regulation.

- Piecemeal regulation is not robust. The effects of piecemeal regulation depend critically on the cost $k$ of high access to speciality care. For example, MQ decreases welfare when $k \leq \hat{k}$, but increases welfare when $k > \hat{k}$.

- Regulation will never increase premiums for all consumers. In all six cases of Table 2, premiums (weakly) increase for one risk class and (weakly) decrease for the other risk class. In only one of the six cases in Table 2 is it clear that aggregate premiums will increase (MQ when $k \leq \hat{k}$). In one other case (SC regulation when $k \leq \hat{k}$), aggregate premiums will decrease due to the regulation. In the remaining four cases of Table 2, it is ambiguous whether aggregate premiums will increase. Thus, the commonly heard argument that regulation will increase premiums for all consumers is not necessarily true.

### Table 1
Welfare rankings of MCO regulations

<table>
<thead>
<tr>
<th>$\hat{k} &lt; k &lt; k^*$</th>
<th>$W(\text{SO}) &lt; W(\text{NR}) &lt; W(\text{MQ}) &lt; W(\text{SC}, \text{MQ}) = W(\text{SO})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k \leq \hat{k}$</td>
<td>$W(\text{SC}) &lt; W(\text{MQ}) &lt; W(\text{NR}) &lt; W(\text{SC}, \text{MQ}) = W(\text{SO})$</td>
</tr>
<tr>
<td>Regulation</td>
<td>Access cost</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SC</td>
<td>( \hat{k} &lt; k &lt; k^* )</td>
</tr>
<tr>
<td>SC</td>
<td>( k \leq \hat{k} )</td>
</tr>
<tr>
<td>MQ(^b)</td>
<td>( \hat{k} &lt; k &lt; k^* )</td>
</tr>
<tr>
<td>MQ</td>
<td>( k \leq \hat{k} )</td>
</tr>
<tr>
<td>(SC, MQ)</td>
<td>( \hat{k} &lt; k &lt; k^* )</td>
</tr>
<tr>
<td>(SC, MQ)</td>
<td>( k \leq \hat{k} )</td>
</tr>
</tbody>
</table>

\(^a\) All comparisons are made in reference to the unregulated market.
\(^b\) Also, MQ = \( q^* \).
Premiums will increase for all consumers only if the minimum standard is set above the socially optimal \( q^* \) under bundled regulation. However, this would decrease total welfare compared to a standard set exactly at \( q^* \). It is true that some industries lobby for very high standards to impede entry. I doubt if this is occurring in the MCO market since the standards do not seem overtly high to deter entry. In fact, some laws encourage entry. For example, a common “patients’ Bill of of Rights” law allows patients to continuing seeing a doctor that has left the MCO for several months to a year. This would indeed make it easier for a doctor to switch to an entrant MCO. Overall, MCOs have not, in general, been lobbying for a health care “patients’ Bill of Rights” for any reason, not even to deter entry.

5. Imperfect market regulation

We saw in the last section that the social optimum could be implemented only with bundled (SC, MQ) regulation that used a minimum quality standard set precisely at the socially optimal quality level \( q^* \). This solved all the market failure and market segmentation problems of the unregulated market and restored pooling. However, in this section I show that this nice result of bundled regulation is not very robust. In particular, if the minimum quality standard is set below the socially optimal quality \( q^* \), bundled regulation may create new distortions in the market, possibly making it worse than no regulation. Note that a minimum standard set at \( q^* \) is relatively high in that the ‘minimum’ standard is really set at the exact socially optimal quality standard \( q^* \). Thus, there is really no gap or leeway allowed between the minimum standard and \( q^* \). This may be difficult to implement politically. More realistically, the political process may result in a bargained compromise in which the minimum standard is set below \( q^* \).

My view of bargaining comes from Summers’ (1989) article on mandated benefits. His idea is that Republicans in Congress rank their preferred regulatory alternatives in the order of no regulation, minimum standards, and public provision. Democrats prefer the reverse order: public provision, minimum standards, and no regulation. As a result of bargaining between Republicans and Democrats, they implement the middle ground: minimum standards. In my model, I extend this notion by assuming they pick a somewhat ‘middle’ minimum standard between, say, zero and \( q^* \) (with the Democrats preferring \( q^* \) and the Republicans preferring 0). This bargaining model does not conflict with perfect market competition, since the market decisions are made after the Republicans and Democrats in Congress bargain over a minimum standard. Since the market is perfectly competitive, the market cannot hold the Congress hostage with a threat of retaliation. Thus, under perfect market competition, the bargaining is independent of the market.

In this section, it is shown that this bargaining for a minimum standard may lead to a quality-decreasing distortion compared to the unregulated market. If the minimum standard is set only moderately low, then the minimum standard may induce all MCOs to lower quality down to the standard even when their quality was above the standard in the unregulated market. This is the floor-to-ceiling effect. The mandated floor essentially becomes a self-imposed ceiling on quality. In this section I will analyze this effect only for the market segmentation case (\( k \leq \hat{k} \)).
5.1. Full floor-to-ceiling effect

Recall from Fig. 3 that in an unregulated market with market segmentation \( k \leq \hat{k} \), the introduction of speciality access regulation (SC) would force some MCOs into a race to the bottom from \( y \) to \( z \). But, recall also that a minimum standard \( M = q^* \) bundled with SC regulation would prevent the race to the bottom and force MCOs to pool risks at the socially optimal quality level \( q^* \) at zero profit. Now suppose that the SC regulation is bundled with the lower minimum standard mandate \( M < q^* \) as illustrated in Fig. 7. First, note that \( M \) in Fig. 7 prevents a full race to the bottom to \( z \) by stopping the MCOs at \( z_0 \). However, if the MCOs stayed at \( z_0 \), they would attract all the high risks away from the MCOs at \( x \), since the SC regulation requires them to offer high access speciality care even at \( z_0 \). Attracting all the high risks would result in a negative profit at \( z_0 \) since \( z_0 \) is below the pooling high access speciality care zero profit line. To avoid this, the MCOs move from \( z_0 \) in Fig. 7 up \( M \) to the high risks’ indifference curve at \( z_1 \). The high risks will not be attracted away from \( x \) to \( z_1 \). However, note that the low risks at \( z_1 \) and the high risks at \( x \) can be skimmed off by the pooling plan at \( E \) in Fig. 7.

If each MCO can only offer one plan, and not two (or, more precisely, cannot offer one plan to the low risks and one plan to the high risks),\(^{20}\) then \( E \) in Fig. 7 is a Nash equilibrium. The mandate \( M \) prevents any plan from lowering quality below \( M \) to skim...
the low risks off $E$ without attracting the high risks. Thus, the minimum standard $M$ in Fig. 7 induces all MCOs to cross subsidize the high risks at the mandated quality floor $M$. In this case, the minimum standard $M$ creates a floor-to-ceiling effect in that it forces MCOs at the unregulated plan $x$ to drop quality down from $x$ to $M$. In addition, it forces all MCOs at the unregulated plan $y$ to drop quality down to $M$ as well. Thus, the bundled regulation mandate $M$ in Fig. 7 forces all MCOs in the market to decrease quality below their unregulated levels. That is, the mandated floor $M < x$ creates a quality ceiling at $M$ even though all MCOs offered quality above $M$ in the unregulated market.

5.2. Partial floor-to-ceiling effect

If each MCO can indeed offer two plans (one to each risk type), then plan $E$ is no longer a Nash equilibrium in Fig. 7. When MCOs can offer two plans, they can offer one plan at $F$ and a second plan at $G$, as in Fig. 8. While a negative profit is made at $G$, a positive profit is earned at $F$ so that the aggregate profit of the MCO is zero.\footnote{The boldface segment from $z$ to the social optimum in Fig. 8 is the locus of second-best efficient allocations for the low risks (Crocker and Snow, 1985). That is, each low risk plan on the segment from $z$ to the social optimum has a corresponding high risk plan on the efficient premium curve ($H' = U'$) that (1) makes the high risk indifferent between the low and high risk plans, and (2) that guarantees a zero aggregate profit, even though a negative profit is earned on the high risks.} Note that $F$ skims off the low risks from $E$ and that $G$ skims off the high risks from $E$ in Fig. 8. Moreover, $F$ does not attract the high risks away from $G$. Also, the mandated minimum standard $M$ does not allow any plan to lower quality below $M$ to skim off only the low risks from $F$. Thus, $F$ and
provide a doubleton, separating Nash equilibrium in Fig. 8. In this case, when \( M < x \), a partial floor-to-ceiling occurs. While the mandate \( M \) in Fig. 8 causes quality to increase for the high risks from \( x \) to \( G \), the quality for the low risks decreases from the unregulated quality level \( y \) down to the minimum standard at \( F \). Thus, the minimum standard quality floor becomes a ceiling on quality for the low risks. Thus, we have a floor-to-ceiling effect only for the low risks when MCOs can offer more than one plan on the market.

Moreover, the minimum standard causes the MCOs to reverse their quality rankings. That is, paradoxically, the higher quality plans in the unregulated market now drop their quality down to the minimum standard floor. As a result the low quality plans in the unregulated market have now become the high quality plans under the partial floor-to-ceiling effect (see Fig. 8).

In some cases, the doubleton \( F \) and \( G \) in Fig. 8 might not be a Nash equilibrium. For example, in Fig. 8, the pooling plan \( D \) may instead be higher up on the zero profit pooling line such that \( D \) is then preferred to \( F \) and \( G \) by both risk types. However, \( D \) is not an equilibrium since the low risks can be skimmed off. In a previous version, I show that a doubleton Nash equilibrium will exists for large \( \lambda \) (i.e. for high ratios of high risks in the market). Moreover, note that the deviation \( D \) is not an equilibrium since the low risks can be skimmed off. The Grossman refinement of the Nash equilibrium rules out unstable deviations such as \( D \) (Neudeck and Podczeck, 1996). Thus, if we use the Grossman–Nash equilibrium concept, as do (Neudeck and Podczeck, 1996) in a recent insurance market model, then a doubleton Grossman–Nash equilibrium will always exists for all \( \lambda \), so that a partial floor-to-ceiling effect will always occur if MCOs can offer more than one plan. 22

While the floor-to-ceiling effect decreases quality when compared to the unregulated case, cross subsidies between the low and high risks do occur (either through pooling in \( E \) or cross subsidies from \( F \) to \( G \)). Thus, it is possible that total welfare may increase under the floor-to-ceiling effect. The benefits of cross subsidizing risks may outweigh the decrease in quality.

In summary, if some political bargaining process results in a compromised quality floor mandate \( M \) set moderately low \((z < M < x)\) in Fig. 8), the floor will, paradoxically, become a ceiling on HMO quality in a perfectly competitive market. However, the floor still does restore cross subsidies, and, if only one plan can be offered per MCO, the floor does mitigate market segmentation. Welfare increases for the high risks and decreases for the low risks, so the floor-to-ceiling effect on total welfare is ambiguous. If the mandate is set exceedingly low \((M < z)\), then the mandate will allow a race to the bottom to the low quality level \( z \) in Fig. 7, with the market still being segmented so that there are no cross subsidies from the low risks to the high risks, decreasing welfare.

Finally, what happens when the MQ standard is set above \( q^* \) under full regulation? Total welfare decreases when the MQ standard is increased above \( q^* \), even though pooling of both risk classes is maintained. Since \( q \) increases, the premium increases. But, now that \( q \) is above \( q^* \) (where \( q^* \) is the point at which total welfare is maximized), total welfare begins to decline (the increase in premium begins to outweigh the benefits of higher quality).

\[22\text{Encinosa (1999) shows that the full floor-to-ceiling effect will always occur in a duopoly market even if the MCO can offer more than one plan.}\]

6. Conclusion

Without regulation, MCO competition for the healthy low risks results in either one of two possible problems under risk selection: (1) a market failure in which no MCO offers high access to speciality care, accompanied by a race to the bottom in quality; or (2) market segmentation, where some MCOs offer high access to speciality care, but at low quality, while others offer high quality with low access to speciality care. In both cases, the low risks are never pooled with the chronically ill high risks in any MCO. As a result, there are no insurance cross subsidies between the low and high risks, decreasing welfare and lowering quality for the high risks.

Two forms of quality regulation (guaranteed high access to speciality care and mandated minimum quality standards) are necessary to solve the market failure in the perfectly competitive MCO market. However, if the two regulations set minimum standards that are moderately low (say, due to political compromises), then a floor-to-ceiling effect may occur. This involves MCOs setting quality at the mandated minimum floor even when their quality levels were above the floor when the market was unregulated. The mandated floor essentially becomes a self-imposed ceiling on quality. Moreover, piecemeal regulation, in which only one of the two forms of regulation is implemented, generally results in a decrease of welfare, compared to the case of no regulation, in a perfectly competitive market.

In contrast to conventional wisdom, these two forms of regulation will not necessarily increase costs. In particular, piecemeal minimum quality standard regulation is the only form of regulation in which it can be predicted that aggregate premiums will increase due to regulation. All other forms of regulation, piecemeal speciality care regulation and bundled regulation, result in ambiguous predictions about the effects on premiums. In general, for bundled regulation, premiums increase for the low risks, but decrease for the high risks. The change in aggregate premiums is ambiguous. In no case does regulation ever increase premiums for every consumer.

It would be nice to empirically test the predictions of this paper after regulation has occurred. A good deal of regulation has occurred at the state level. However, those laws are very piecemeal and very diverse; no states have enacted the same set of laws. Also, these state laws are pre-empted by ERISA and so do not apply to 51 million Americans. Most large firms are exempt from these state laws. Thus, it is hard to empirically confront these predictions in my paper until a substantial federal “patients’ Bill of Rights” is passed.

Next, I discuss two major extensions of the model presented in this paper: (1) duopolistic MCO competition, and (2) wealth transfers via risk adjusted payments. In Encinosa (1999), I extend the model of Section 2 to the case of an incumbent MCO that faces only one entrant MCO. In contrast to the perfectly competitive case, the two regulatory mandates bundled together actually make the consumers worse off in a duopolistic MCO market, compared to the case of no regulation. A piecemeal mandate is more welfare enhancing than bundled mandates. Moreover, the two mandates allow the duopolistic MCOs to earn more profits than they would if they were not regulated, even when the minimum standard is set correctly at the socially optimal quality level \( q^* \). A straightforward solution to this is to place an appropriate premium cap on the duopoly market. A second best solution to the problems of a duopolistic MCO market would be to implement the piecemeal regulation of imposing minimum standards, but not regulating access to speciality care. While
such piecemeal regulation decreases welfare in a perfectly competitive market, it actually increases welfare in a duopolistic market. Indeed, while piecemeal regulation via a minimum quality standard does increase quality in both perfectly competitive and duopolistic markets, it increases premiums too much due to fierce price competition in the perfectly competitive market, decreasing welfare compared to the case of no regulation. But, in a duopolistic market, aggregate premiums rise less commensurately with quality since price competition is softened under a duopoly, so that consumer welfare actually increases due to the increase in quality.

Finally, one alternative to regulating quality via minimum standards and mandates on access to specialty care is to risk adjust premiums in the market. That is, MCOs would pay a tax per low risk enrollee, but would receive a subsidy for each high risks enrolled, in a budgetary-neutral fashion. Thus, the regulator directly imposes cross subsidies between MCOs. However, in Encinosa (2000), I show that the same types of problems emerge under risk adjusting as they did for quality regulation. While perfectly implemented risk adjustment solves the market failures of a perfectly competitive unregulated market described above in Section 3, market distortions arise if the risk adjustment is imperfectly implemented. Moreover, if the MCO market is duopolistic, perfectly implemented risk adjusting will actually decrease welfare and increase profits. Thus, implementing risk adjustments is just as problematic as implementing quality mandates.

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Appendix A

Proof of Proposition 1. Let \( \mu \) be the Lagrangian multiplier on the zero profit constraint in program (1). Then the first order conditions on \( p_L \) and \( p_H \) are \( U'(y - p_L) = \mu \) and \( U'(y - p_H) = \mu \). Thus, \( p_L = p_H \). Next, the first order condition on \( q_i \) is \( H'(q_i) = \mu C'(q_i) \) for \( i = L, H \). Thus, \( q_L = q_H \). Next, we derive the optimal \( s \). First, define

\[
\delta = \frac{n_L a_L + n_H a_H}{n_L + n_H} C(q).
\]

Then note that if \( s_L \) is selected, the zero profit constraint in program (1) yields

\[ p = \delta. \quad (A.1) \]

If \( s_H \) is selected, then the zero profit constraint yields

\[ p = \delta + \lambda k. \quad (A.2) \]
Note that \( s_h \) will be optimal if and only if the aggregate welfare in program (1) is higher under \( s_h \) than \( s_l \). That is, substituting Eqs. (A.1) and (A.2) for the premiums in the aggregate welfare of program (1), we have aggregate welfare higher under \( s_h \) than \( s_l \) if and only if

\[
\begin{align*}
&n_L[nL(y - \delta) + (1 - a_L)\bar{H} + a_L(H + H(q_L)) + V_L(s_l)] \\
&+n_H[nH(y - \delta) + (1 - a_H)\bar{H} + a_H(H + H(q_H)) \\
&+V_H(s_l)] < n_L[nL(y - \delta - \lambda k) + (1 - a_L)\bar{H} + a_L(H + H(q_L)) \\
&+V_L(s_h)] + n_H[nH(y - \delta - \lambda k) + (1 - a_H)\bar{H} \\
&+a_H(H + H(q_H)) + V_H(s_h)].
\end{align*}
\]  
(A.3)

Note that Eq. (A.3) reduces to

\[
U(y - \delta - \lambda k) > U(y - \delta) - \lambda[V_H(s_h) - V_H(s_l)].
\]  
(A.4)

This holds for all \( k < k^* \), where \( k^* \) solves Eq. (A.4) at equality. Hence, \( s_h \) is optimal when \( k < k^* \). The intuition for Eq. (A.4) is that providing high access speciality care is optimal when the incremental utility of a dollar of income is worth less than the incremental health utility to a high risk of a dollar spent on high access speciality care. Thus, for \( k < k^* \) the social optimum is a pooling plan \((p, q, s_h)\). Cross subsidies are present since the price is uniform across all risk types, but the expected costs of each type differs: \( a_Lq^* < a_Hq^* + k(s_h) \). Similarly, for \( k > k^* \) the social optimum is a pooling plan \((p, q, s_l)\).

\[ \square \]

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