

The Effect of the Uniform Benefits Requirement on Medicare+Choice Organizations

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Abstract. This paper examines the effects on Medicare+Choice organizations (M+COs) of the uniform benefits requirement (UBR) mandated in the Balanced Budget Act of 1997. The uniform benefits policy requires M+COs to offer uniform benefits at a uniform price to all enrollees throughout an entire service area. It is found that the uniform benefits policy may cause a decline in total welfare by forcing M+COs to exit counties in which they profitably operated prior to the institution of the new requirement.

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I. Introduction

Through the introduction of the Medicare+Choice (M+C) Program, the Balanced Budget Act of 1997 (BBA) fundamentally changed the way Medicare managed care organizations provide healthcare benefits to eligible Medicare beneficiaries. The M+C Program was created to replace the existing system of Medicare managed care contracts with a broader range of options and a reformed method for determining the compensation of those organizations providing Medicare services to beneficiaries. Organizations participating in the M+C Program were called Medicare+Choice Organizations (M+COs). The new M+COs were subject to new requirements to help meet various goals of the BBA. One of these goals was to ensure Medicare managed care providers could no longer discriminate against beneficiaries based on the beneficiaries' county of residence or other demographic characteristics. To meet this goal, the BBA mandated that every individual entitled to receive Medicare benefits could enroll in any M+C plan operating in the county in which the individual resides.¹ Furthermore, the BBA instituted a uniform benefits requirement (UBR). The UBR stated that benefits and premiums (money paid to the M+CO by a beneficiary for Part B coverage, Part A coverage when required, and/or additional benefits²) must be uniform for all beneficiaries within a M+C plan's defined service area.³

¹ An exception was made for individuals with End Stage Renal Disease (ESRD), who were not permitted to enroll in the new M+C Program.

² Medicare Part A is the part of Medicare that provides hospital insurance. Eligible beneficiaries receive Part A coverage without paying a premium if they or a spouse have 40 or more quarters of Medicare covered employment. Medicare Part B is the part of Medicare that provides medical insurance. Eligible beneficiaries pay a monthly premium for Part B coverage.

³ A service area is a county or group of geographically adjacent counties. M+COs contracting with the Health Care Financing Administration (HCFA) to offer Medicare coverage must define the counties in which they propose to operate. Upon HCFA's approval, these counties constitute the M+CO's service area.

This paper considers the welfare implications of the uniform benefits requirement and assesses whether the UBR is likely to cause M+COs to withdraw from counties in which they would otherwise operate. I find that if M+COs face approximately the same cost structure across counties and payment rates to all counties within a service area are low, imposing the UBR generally increases welfare by raising the benefits offered in lower-payment counties. However, if payment rates within a service area are disparate, M+COs have an incentive to exit a county in order to earn greater profits in another county. Whenever the UBR causes a M+CO to exit a county, welfare unambiguously decreases, as beneficiaries are left either without any managed care option, or with only the lowest possible benefits.

From 1997 to 1999, Medicare managed care providers began withdrawing from counties at an increasing rate. Data indicates a slight increase in the average number of Medicare managed care plans per county from 1993 to 1995, and a larger increase from 1995 to 1997. However, these increases were followed by a significant decrease after the BBA. From 1997 to 1999, the probability of a county losing a Medicare managed care plan was 194 percent higher than the probability of gaining a plan. This is opposite of the trend from 1993 to 1997 when the probability of gaining a plan was on average 54 percent higher than the probability of losing a plan.⁴ Since the BBA was intended to increase Medicare beneficiaries' managed care choices, this exit was particularly alarming. Determining the cause of provider exit is therefore an important step toward reforming regulations within the BBA so that its initial goals might be realized.

The potentially adverse effects of the UBR result from the structure of HCFA's compensation policy by which payment rates in different counties within a service area may

⁴ Hauge (2001)

differ. Prior to the BBA, Medicare providers were permitted to vary benefits packages by county, using non-Medicare funds to finance the cost of providing benefits greater than the minimum required by Medicare. This allowed providers to compete in counties with the highest payment rates and still operate in lower payment counties offering lower benefits packages. The BBA's institution of the uniform benefits policy effectively ended this flexible benefits policy. The UBR required premiums and benefits to be uniform under a M+C plan throughout that plan's defined service area. This meant that any M+CO that was offering higher benefits in one county than in another county in the same service area must alter the benefits it offered in one county or in the other, or both.⁵ Since M+COs face different cost structures across counties, profitability differs across counties if the same benefits are offered. Under the UBR, lower payment counties may become unprofitable for M+COs that must offer high benefits in higher payment counties to effectively compete for enrollees.

A formal analysis of the effect(s) of the UBR on Medicare managed care provider participation proceeds as follows. The model is described in detail in Section II; the main analysis is developed and results are reported in Section III; and Section IV is the conclusion in which the findings and underlying intuition are summarized.

II. The Model

The model is a homogenous good duopoly competition model in which M+COs simultaneously and independently choose the quantity of benefits they will offer to enrollees.

After Medicare beneficiaries learn the benefits offered, they enroll in their preferred M+CO.

⁵ The Balanced Budget Act also altered the formula by which M+COs are paid for their Medicare enrollees. Payment rates to M+COs are quite disparate within service areas, and in many cases no longer accurately reflect costs. The new payment scheme was designed to eliminate disparate payment rates in adjacent counties. Payment rate changes are to be complete in 2003.

For simplicity, suppose there are two counties, a low payment county (L), and a high payment county (H).⁶ The payment level is the amount that Medicare pays to the M+CO for each Medicare beneficiary it enrolls. Let R^k denote this payment in county k , $k \in \{L, H\}$.⁷ There are two M+COs, a low cost M+CO ($M+CO_1$) and a high cost M+CO ($M+CO_2$).⁸ M+COs compete for enrollees through their choice of benefits offered.⁹ Let β_i^k denote the level of benefits M+CO $_i$ offers in county k , $i = 1, 2$, $k \in \{L, H\}$. Basic benefits (β_0) are the minimum allowable benefits a M+CO must offer in order to serve Medicare enrollees. The total number of potential enrollees M+COs compete for in each county k is given by $n^k = (q_i^k + q_j^k)$, $k \in \{L, H\}$. All potential enrollees choose to enroll, since there is no cost associated with eligibility for Medicare benefits. Let $q_i^k (\beta_i^k, \beta_j^k)$ denote the number of enrollees served by M+CO i in county k , $i, j = 1, 2$, $i \neq j$, $k \in \{L, H\}$. An enrollee can enroll with only one M+CO. Demand is defined as $q_i^k (\beta_i^k, \beta_j^k)$, where $q_i^k = 0$ if $\beta_i^k < \beta_j^k$, and $q_i^k = n^k$ if $\beta_i^k \geq \beta_j^k$ $i=1, j=2$ and $k \in \{L, H\}$. All consumers choose the low cost M+CO when indifferent¹⁰. Suppose the low cost M+CO has a cost advantage in all counties: $C_1^k(\beta) < C_2^k(\beta) \forall \beta \geq \beta_0$, $k \in \{L, H\}$. Then $C(\beta_i^k) = [c_0 + c_1 q_i^k(\beta_i^k)]$ where $c_1 q_i^k > 0 =$ M+CO i 's marginal cost of serving q_i^k enrollees benefits β_i^k . c_0 is the fixed per-enrollee cost of operating in a county. For simplicity, costs are assumed to increase at a constant rate as the level

⁶ The percentage of counties with one or two plans was 25.83 in 1997, and 26.31 in 1999. The majority of counties had zero plans (65.11 percent in 1997, 65.56 percent in 1999). Very few counties had more than two plans in either year (Hauge, 2001).

⁷ R^k is exogenously determined. In practice, the county per-enrollee payment rate is based on the historical cost to provide covered Medicare services within the county.

⁸ Equilibria generally do not exist in settings where firms have equal costs. See Appendix C.

⁹ Medicare patients enrolled in M+COs typically make either no payments or standard co-payments. The majority (two-thirds) of Medicare managed care providers did not charge any premium in 1997; therefore, this paper assumes M+COs do not compete based on premiums.

¹⁰ Defining demand such that each firm serves half ($n^H/2$) of county H when benefits provided are equal does not alter the main findings of the paper. Proof is available upon request.

of benefits provided increases. Further suppose a M+CO's operating cost is the same in the high payment and the low payment counties: $C_i^L(b) = C_i^H(b) = c_i, i = 1, 2$.¹¹ The high cost M+CO cannot profitably provide any level of benefits in the low payment county: $[R^L - C_2(b)]n^L < 0$.¹² Lastly, let $U_i(b^k)$ represent enrollee satisfaction or utility given benefits b^k offered by M+CO $i, i = 1, 2$ in county $k, k \in \{L, H\}$. Enrollees have positive but decreasing marginal utility of consumption. $U_i'(b^k) > 0, U_i''(b^k) < 0$. Utility in counties L and H is assumed to be equal for the same level of benefits offered: $U^L(b^k) = U^H(b^k) = U_i(b^k), i = 1, 2, k \in \{L, H\}$, and utility when basic benefits are offered is at least as great as M+CO₁'s cost of providing basic benefits in both counties, so that $U(b_0^k) \geq C_1(b_0^k), k \in \{L, H\}$.¹³ Throughout the analysis, welfare refers to total social welfare, which is the sum of enrollees' total utility and M+COs' profits: $W = \sum_{i=1,2} \sum_{k=L,H} [U_i(b_i^k) - R^k] q_i^k + [R^k - c_i(b_i^k)] q_i^k$. The welfare maximizing level of benefits (b^*) is that level of benefits at which the enrollees' marginal utility of benefits equals the M+COs' marginal cost of providing those benefits: (b^*) solves $U_i'(b_i^k) = C_i'(b_i^k), i = 1, 2, k \in \{L, H\}$.¹⁴

III. Analysis and Results

The main result of the analysis is reported in Proposition 1 below. The Proposition relies on Lemmas 1 through 3. These lemmas define conditions under which M+CO₁ will operate in each

¹¹ This assumption simplifies the analysis but does not affect the results. See proof in Appendix B.

¹² This assumption simplifies the analysis. Qualitative results are unaffected by the assumption. See proof in Appendix B.

¹³ It is assumed that utility when basic benefits are offered is at least as great as M+CO₁'s cost of providing basic benefits in both counties for simplicity only. Generalizing this assumption to $U(b_0^k) \geq C_1(b_0^k) \forall i=1,2, k \in \{L, H\}$ does not affect the results of the analysis.

¹⁴ See proof in Appendix B for details.

county, and conditions under which $M+CO_2$ will operate in county H. They also indicate the level of benefits each $M+CO$ offers. The lemmas are presented here to identify the central logic that underlies Proposition 1.

Lemma 1. The high cost $M+CO$ will not operate (i.e., $q_2^k = 0 \forall k \in \{L, H\}$) in either county if the uniform benefits requirement is not imposed.¹⁵

Suppose the payment rate in county H is such that $M+CO_2$ could profitably operate in county H if there were no competition. Any county in which $M+CO_2$ can profitably operate must also be profitable for $M+CO_1$. Without the uniform benefits requirement, $M+CO_1$ can always profitably offer a higher level of benefits in county H than $M+CO_2$ can profitably offer. By raising benefits above the level $M+CO_2$ can profitably offer, $M+CO_1$ is able to enroll all beneficiaries in (i.e., capture) the county. Therefore, $M+CO_1$ has an incentive to raise benefits high enough to capture county H, and $M+CO_2$ will not operate if the UBR is not imposed.

Lemma 2. Suppose the high cost $M+CO$ can profitably operate in county H. Then the low cost $M+CO$ will not offer uniform benefits in counties L and H if the uniform benefits requirement is not imposed.

By assumption, $M+CO_2$ cannot profitably operate only in county L. Therefore, $M+CO_1$ can offer minimum benefits (β_0) in county L and capture that county. In county H, $M+CO_1$ must offer a level of benefits $M+CO_2$ cannot profitably offer in order to capture county H. Define β^m

¹⁵ Proofs of all formal results are in Appendix A.

to be the maximum level of benefits M+CO₂ can profitably offer; φ^m will be the level of benefits at which payment equals cost, i.e., $R^H = C_2(\varphi^m)$.¹⁶ Hence, $\varphi_1^L = \varphi_0$ and $\varphi_1^H = \varphi^m$ which implies that without the UBR, if $\varphi^m > \varphi_0$, M+CO₁ offers different benefits across counties ($\varphi_1^L < \varphi_1^H$).

When uniform benefits are required, M+CO₁ must alter the benefits it offers in one or both counties. For M+CO₁ to maintain its monopoly in both counties, it must offer at least the competitive level of benefits in the high payment county to capture the county from M+CO₂. When uniform benefits are required, M+CO₁ must also offer this level of benefits in the low payment county. M+CO₁ will provide benefits φ^m to all enrollees in both counties if the profit from doing so is greater than the maximum profit it can earn by serving county H only or county L only, i.e., if the following conditions are met:

$$[R^H - C_1(\varphi^m)]n^H + [R^L - C_1(\varphi^m)]n^L \geq [R^H - C_1(\varphi^m)]n^H, \text{ or}$$

$$[R^L - C_1(\varphi^m)]n^L \geq 0, \tag{C1}$$

$$\text{and } [R^H - C_1(\varphi^m)]n^H + [R^L - C_1(\varphi^m)]n^L \geq [R^L - C_1(\varphi_0)]n^L \tag{C2}$$

(C1) states that it is more profitable for M+CO₁ to operate in both counties than only in county H; (C2) states that it is more profitable for M+CO₁ to operate in both counties than only in county L. If (C1) and (C2) are met, M+CO₁ provides benefits φ^m to all enrollees in both counties and M+CO₂ does not operate.

Lemma 3 The low cost M+CO will serve all enrollees in both counties when the uniform benefits requirement is imposed if and only if (C1) and (C2) hold.

¹⁶ Define φ^m as the competitive level of benefits. Also, define the maximum benefits equilibrium as the equilibrium in which the UBR is imposed and M+CO₁ offers all enrollees in both counties benefits φ^m .

Suppose (C1) and (C2) hold. Then the welfare effect of M+CO₁ offering benefits β^m to all enrollees in both counties is determined by comparing welfare with and without the UBR imposed, as expressed by condition (C3).

$$U(\beta^m) - U(\beta_0) > C_1(\beta^m) - C_1(\beta_0) \quad (C3)$$

(C3) states that welfare increases if the gain in utility due to increasing benefits from β_0 to β^m in the low payment county is greater than the M+CO's cost of providing those additional benefits in the low payment county.¹⁷

Proposition 1. When the UBR is imposed, welfare increases if and only if conditions (C1) through (C3) hold.

When the UBR is imposed, welfare increases if the low cost M+CO serves all enrollees in both counties and provides additional benefits in the low payment county such that the utility enrollees receive from those additional benefits is greater than the M+CO's incremental cost to provide them.

Without the UBR, M+CO₁ provides basic benefits (β_0) in county L and the competitive level of benefits (β^m) in county H. When the UBR is imposed, if (C1) and (C2) hold, M+CO₁ earns greater profits by offering benefits β^m in both counties than it could earn operating in only one county. In this case, enrollees' benefits in county L increase from β_0 to β^m , and enrollees' benefits in county H remain unchanged at β^m when the UBR is imposed.

In the present setting, enrollee utility increases more rapidly than M+CO's cost as the level of benefits increases from β_0 to β^* , where β^* is the welfare maximizing level of benefits. Increasing benefits beyond β^* decreases the difference between the utility and cost curves, since cost increases faster than utility (i.e., the slope of the cost curve is greater than the slope of the utility curve). This difference continues to decrease until benefits offered are increased to a point ($\beta^?$) at which the difference between utility and cost equals the difference between utility and cost at β_0 . This implies (C3) holds for all $\beta^m < \beta^?$, where $\beta^?$ solves $U(\beta^m) - U(\beta_0) = C_1(\beta^m) - C_1(\beta_0)$. Therefore, if M+CO₁ maximizes its profits by serving all enrollees in counties L and H with any $\beta^m < \beta^?$, welfare improves when the UBR is imposed. If any of these conditions (C1) - (C3) do not hold, welfare will not increase with the uniform benefits policy.¹⁸

Figure 1 helps to demonstrate Proposition 1. Suppose M+CO₁ operates in both counties. In Figure 1, $U(\beta_0) - C_1(\beta_0) = 0$. The difference between utility and cost is again zero at $\beta^?$: $U(\beta^?) - C_1(\beta^?) = 0$. Increasing benefits beyond $\beta^?$ violates (C3) as cost becomes greater than utility. At $\beta^m = \beta^?$, imposing the UBR does not increase or decrease total social welfare.

Corollary 1. Suppose conditions (C1) and (C2) hold. Then when the UBR is imposed, welfare will increase if the competitive level of benefits (β^m) is no greater than the welfare maximizing level of benefits (β^*).

¹⁷ Enrollees in county H receive the same level of benefits (β^m) with or without the UBR.

¹⁸ See Lemmas 4 - 6 in Appendix A.

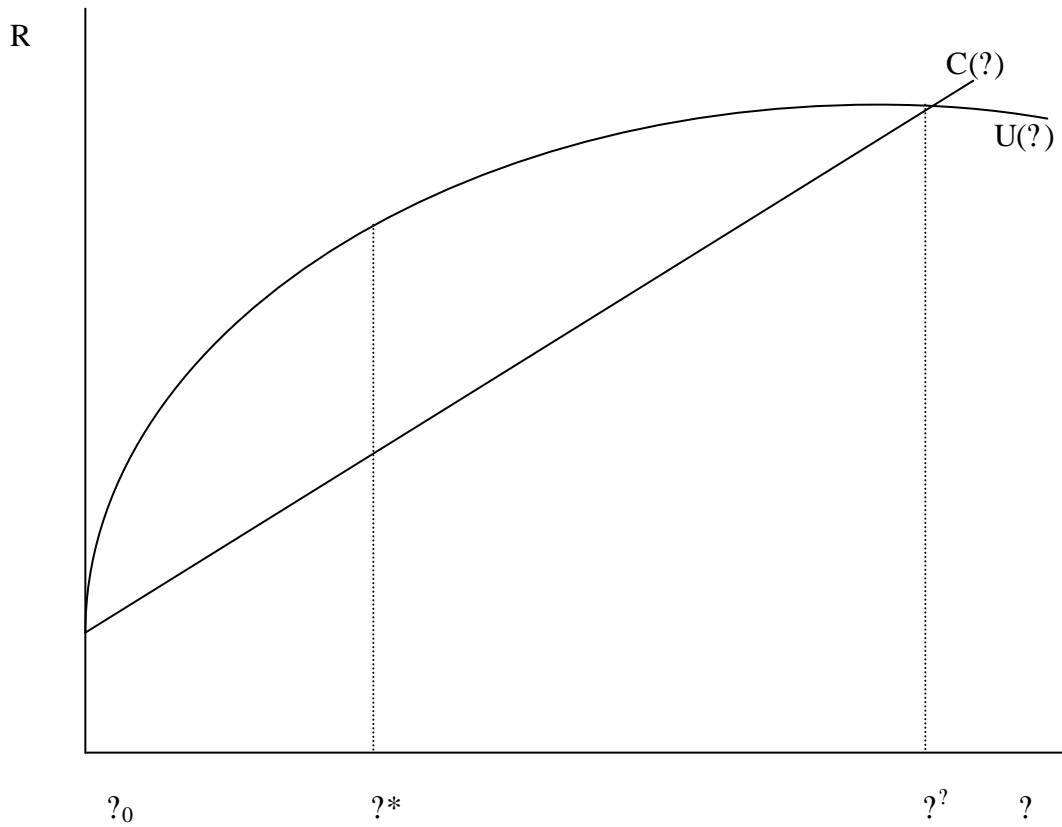


Figure 1

The socially optimal level of benefits $?\ast$ is always less than the maximum level of benefits that satisfies (C3) ($?\ast < ?^?$). Any level of benefits that satisfies (C3) (any $? < ?^?$) increases welfare. Therefore, supplying $?\ast$ always increases welfare. By definition, $?\ast$ is the welfare maximizing level of benefits. For this reason, an equilibrium in which $M+CO_1$ provides benefits $?\ast$ in both counties is optimal.

Corollary 2. Suppose the difference in $M+CO_1$'s costs as defined by $C_1(?^m) - C_2(?^m)$ is sufficiently small. Then $M+CO_1$ will offer basic benefits ($?_0$) in equilibrium.

As competition increases, the incentive to provide greater benefits to capture county H decreases. By offering higher benefits, profits are diminished since the per-enrollee cost increases while per-enrollee payments remain the same. The profit $M+CO_1$ is able to earn solely by capitalizing on its cost advantage in county H decreases as the difference in cost decreases.

The equilibrium in which $M+CO_1$ offers basic benefits requires that the difference between the payment rate in county H and $M+CO_1$'s costs to supply basic benefits is sufficiently small. An increase in the payment rate means $M+CO_1$ are able to (and therefore must) increase benefits in order to capture the county. Increasing payment in county H simply increases the incentive to exit the less profitable county L. If $M+CO_1$'s cost advantage is sufficiently small and the difference in payment rates to counties H and L becomes sufficiently large, an equilibrium in which $M+CO_1$ offers benefits β^m in both counties does not exist.

Corollary 3. Suppose the difference in payment rates is greater than the difference in costs as defined by $C_1(\beta^m) - C_2(\beta^m)$. Then imposing the UBR will decrease welfare.

For the maximum benefits equilibrium to be present, the difference in payment rates in counties L and H must be less than or equal to the difference in $M+CO_1$'s costs of providing β^m benefits.¹⁹

Corollaries 1, 2 and 3 indicate that imposing the UBR increases welfare in the maximum benefits equilibrium characterized by $M+CO_1$ offering benefits sufficiently close to basic benefits, where the difference in $M+CO_1$'s costs is sufficiently small and the difference in payment rates is also sufficiently small. Figure 2 helps to illustrate this conclusion.

¹⁹ See proof in Appendix A.

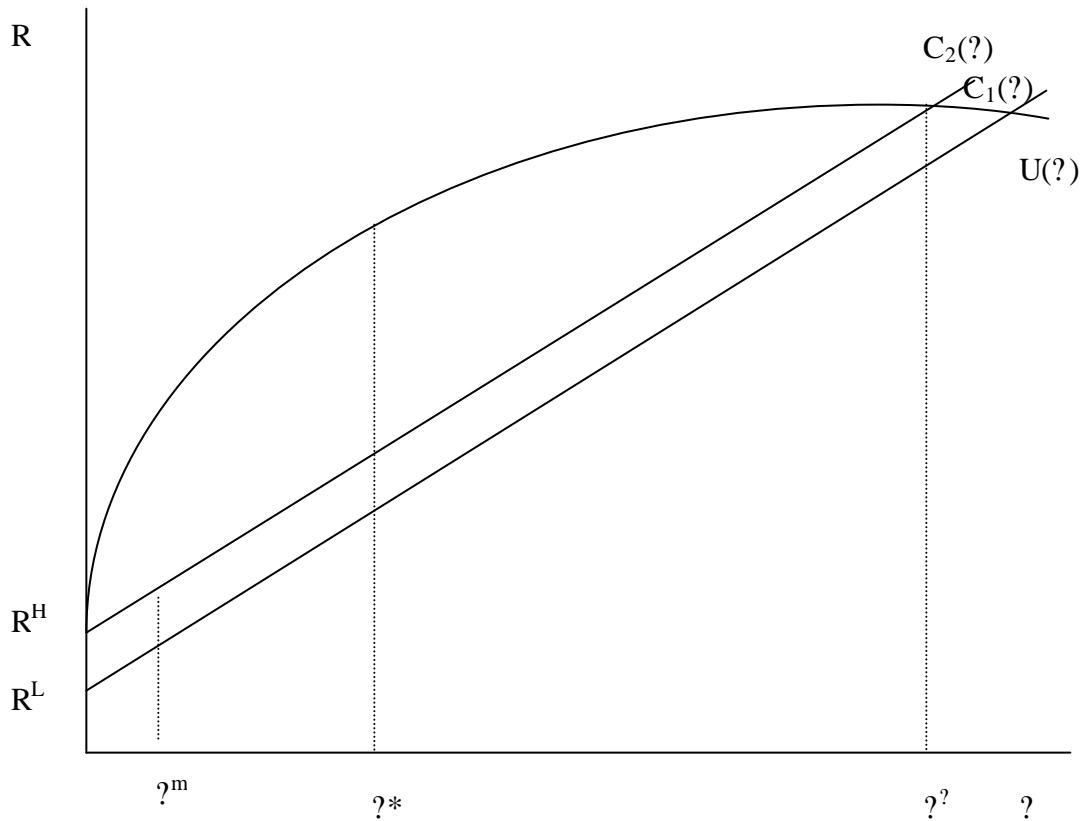


Figure 2

For equilibrium to exist under the UBR, the difference between payment rates and costs must be sufficiently small, and the difference in M+COs' costs must also be sufficiently small.

IV. Conclusion

This research shows that a uniform benefits requirement may cause M+COs to exit counties in which they would otherwise operate. Whenever an M+CO exits a county due to the imposition of the UBR, welfare decreases. Conversely, the uniform benefits policy may increase welfare if the low cost M+COs continue to operate in those counties in which they operated prior to the imposition of the UBR. In this case, benefits in the lower payment counties are raised to the level of benefits in the higher payment counties.

M+COs are more likely to remain in both counties under the uniform benefits requirement under three conditions. First, M+COs are more likely to remain in both counties

when payment rates in the high payment counties make more generous benefits packages unprofitable. If payment rates do not allow the M+CO to profitably offer any additional benefits over the Medicare required minimum benefits, M+COs are not forced to compete by offering higher benefits. Low payment rates provide little incentive to offer more generous benefits packages. If low benefits must be offered in the high payment county, those same benefits are more likely to be affordable in the low payment county, therefore the M+CO will remain in both counties. Providing the minimum benefits required by Medicare law reduces competition and ensures all enrollees receive the same benefits without discrimination.

Second, M+COs are more likely to remain in both counties under the uniform benefits requirement when payment rates in low payment counties accurately reflect M+COs costs to provide benefits. Sufficient payment in the low payment counties ensures the M+CO can profitably offer minimum benefits in the low payment counties

Third, M+COs are more likely to remain in both counties under the uniform benefits requirement when M+COs have similar cost structures. When no M+CO has a significant cost advantage, each provides the highest profitable level of benefits. The incentive to exit a county and operate only in another county is small, since there is no cost advantage on which it can capitalize. No M+CO can earn extraordinary profits in any one county. If a M+CO has a large cost advantage over all other M+COs in the county, it may be able to profitably increase benefits in the low payment county and serve all enrollees in both counties.²⁰

The UBR may have been more effective if both the benefits and the payment rates had gradually been adjusted at complementary rates. The county disruption may have been avoided. By requiring policy changes in benefits prior to amending payment rates, the government may

²⁰ Beginning January 2000, the method of determining payment rates was reformed to include a partial adjustment based on beneficiary characteristics.

have caused M+COs to temporarily exit the low payment counties leaving beneficiaries without providers and decreasing welfare. As payment rates become more similar within service areas, M+COs' incentives to exit counties should disappear.

This research suggests the UBR may have caused M+COs to exit counties in which they otherwise would have operated. This conclusion is supported by some empirical evidence,²¹ however theoretical research using additional M+COs and different forms of competition would greatly enhance the results. Preliminary research indicates that adding additional M+COs would not alter the decisions of the lowest cost firm, but that welfare implications would be significantly changed. Additionally, considering competition given asymmetric information alters the decisions of M+COs within the model. Formal analysis of these and other changes to the model would lend greater understanding about the effects of the uniform benefits requirement on M+COs and on social welfare.

²¹ Hauge, 2001.

Appendices

Appendix A This appendix contains formal proofs of Lemmas 1 through 6, Proposition 1, and Corollaries 1 through 3 found within the paper.

Proof of Lemma 1: The high cost M+CO will not operate (i.e., $q_2^k = 0 \quad \forall k \in \{L, H\}$) in either county if the uniform benefits requirement is not imposed.

- 1) Suppose the uniform benefits requirement is not imposed.

By assumption, $C_1^k(\beta) < C_2^k(\beta) \quad \forall \beta \geq \beta_0, k \in \{L, H\}$, and

$$[R^L - C_2(\beta)] < 0 \quad \forall \beta \geq \beta_0.$$

- 2) Suppose $[R^k - C_1(\beta_0)] > 0, k \in \{L, H\}$. By assumption, $C_1(\beta_0) < C_2(\beta) \quad \forall \beta > \beta_0$.

$$\text{Therefore, } [R^k - C_1(\beta_0)]n^k > [R^k - C_1(\beta_{m0})]n^k, k \in \{L, H\}$$

$$\text{and } \beta_1^k(\beta_0) > \beta_1^k(\beta_{m0}), k \in \{L, H\} \tag{A1.1}$$

- 3) Since $[R^L - C_2(\beta_0)] < 0$, M+CO₂ will not enter county L. By offering the minimum possible benefits (β_0) in county L, M+CO₁ can serve all enrollees (n^L) in county L.

(A1.1) reveals that M+CO₁ maximizes profit by offering β_0 in county L.

- 4) From (A1.1), M+CO₁'s profits are greatest when offering basic benefits to all enrollees in a county. Therefore, M+CO₁ will maximize profit by offering the minimum benefits, subject to ensuring it captures the county.

By assumption, $q_2^L = 0$ since $[R^L - C_2(\beta)] < 0 \quad \forall \beta \geq \beta_0$.

By assumption, demand $q_1^H = 0$ if $\beta_1^H < \beta_2^H$

$$n^H \text{ if } \beta_1^H \geq \beta_2^H$$

- 5) Suppose there exists some β^m such that $[R^H - C_2(\beta^m)] = 0$.

It follows that $[R^H - C_1(\beta^m)] > 0$.

Therefore, $M+CO_1$ offers all enrollees in county H benefits $\beta_1^m = \beta_2^m$, and serves all enrollees in county H: $q_1^H = n^H$. (A1.2)

6) Suppose $M+CO_1$ offers benefits $\beta_1^m + \beta > \beta_1^m$.

Since $C_1(\beta_1^m) < C_1(\beta_1^m + \beta)$, profits are lower when $M+CO_1$ offers $\beta_1^m + \beta$ than if $M+CO_1$ offers β_1^m , (i.e. $[R^H - C_1(\beta_1^m)]n^H > [R^H - C_1(\beta_1^m + \beta)]n^H$).

Therefore, $\beta_1^H(\beta_1^m) > \beta_1^H(\beta_1^m + \beta)$.

$M+CO_1$ has no incentive to offer benefits greater than $\beta_1^m = \beta_2^m$ where β_2^m solves $R^H = C_2(\beta^m)$. $M+CO_1$ serves all enrollees in county H benefits β_1^m and $M+CO_2$ will not operate. If $M+CO_1$ offers $\beta_1^m < \beta_2^m$, it does not serve any enrollees, and $q_1^H = 0$.

Therefore, $[R^H - C_1(\beta_1^m)]n^H > [R^H - C_1(\beta_1^m - \beta)](0)$

and it follows that $\beta_1^H(\beta_1^m) > 0$.

$M+CO_1$ has no incentive to offer fewer benefits than β_1^m . By symmetry, if there exists some β such that $[R^L - C_2(\beta)] > 0$, $M+CO_1$ would offer in county L that level of benefits such that $R^L = C_2(\beta)$. Therefore, the result can be generalized such that $M+CO_1$ is able to capture both counties L and H.

7) Since $[R^L - C_1(\beta_0)]n^L \geq 0$ and $[R^H - C_1(\beta^m)]n^H \geq 0$,

$[R^L - C_1(\beta_0)]n^L + [R^H - C_1(\beta^m)]n^H \geq [R^L - C_1(\beta_0)](0) + [R^H - C_1(\beta^m)]n^H$ and

$[R^L - C_1(\beta_0)]n^L + [R^H - C_1(\beta^m)]n^H \geq [R^L - C_1(\beta_0)]n^L + [R^H - C_1(\beta^m)](0)$

Therefore, $\beta_1^{H+L} > \beta_1^H$ and $\beta_1^{H+L} > \beta_1^L$.

$M+CO_1$ earns greater profit operating in both counties than in only one county; therefore, $M+CO_1$ serves all enrollees in both counties and $M+CO_2$ does not operate.

Proof of Lemma 2: Suppose the high cost M+CO can profitably operate in county H. Then the low cost M+CO will not offer uniform benefits in counties L and H if the uniform benefits requirement is not imposed.

By Lemma 1, M+CO₁ maximizes its profit in county L by offering minimum benefits (β_0) to all enrollees in county L, and M+CO₁ maximizes its profit in county H by offering benefits β_1^H to all enrollees in county H.

Suppose $R^H = C_2(\beta)$ for $\beta > \beta_0$.

Then M+CO₁ offers β_0 in county L and $\beta > \beta_0$ in county H, and $\beta_1^L < \beta_1^H$.

Proof of Lemma 3: The low cost M+CO will serve all enrollees in both counties when the uniform benefits requirement is imposed if and only if (C1) and (C2) hold.

- 1) In the proof of Lemma 1, (A1.2) reveals that M+CO₁ maximizes profits in county H by offering β^m where β^m solves $[R^H - C_2(\beta^m)] = 0$. This is the maximum level of benefits M+CO₂ can profitably offer in county H. By Lemma 1, M+CO₁ maximizes profits in county L by offering β_0 .

$$\text{So, } \beta_1^H = [R^H - C_1(\beta_1^m)]n^H \quad (\text{A3.1})$$

$$\text{and } \beta_1^L = [R^L - C_1(\beta_0)]n^L \quad (\text{A3.2})$$

- 2) Suppose the UBR is imposed. M+CO₁ can exit one, both, or neither county. If M+CO₁ offers β^m in county H, it must also offer β^m in county L.

$$\beta_1^{L+H} = [R^H - C_1(\beta_1^m)]n^H + [R^L - C_1(\beta^m)]n^L. \quad (\text{A3.3})$$

If (A3.3) > (A3.1), $\beta_1^{L+H} > \beta_1^H$.

It is more profitable for M+CO₁ to offer all enrollees in both counties benefits τ^m than to offer benefits τ^m in county H only:

$$[R^H - C_1(\tau_1^m)]n^H + [R^L - C_1(\tau^m)]n^L \geq [R^H - C_1(\tau_1^m)]n^H \quad (C1)$$

If (A3.3) > (A3.2), $\tau_1^{L+H} > \tau_1^L$.

It is more profitable for M+CO₁ to offer all enrollees in both counties benefits τ^m than to offer benefits τ_0 in county L only:

$$[R^H - C_1(\tau_1^m)]n^H + [R^L - C_1(\tau^m)]n^L \geq [R^L - C_1(\tau_0)]n^L \quad (C2)$$

Therefore, M+CO₁ will serve all enrollees in both counties when UBR is imposed if (C1) and (C2) hold.

If (A3.3) < (A3.1), M+CO₁ will exit county H.

If (A3.3) < (A3.2), M+CO₁ will exit county L.

Proof of Proposition 1: When the UBR is imposed, welfare increases if and only if conditions (C1) – (C3) hold.

Conditions (C1) and (C2) ensure M+CO₁ offers all enrollees in both counties L and H benefits τ^m . Welfare when the UBR is imposed is the sum of enrollees' total utility, and M+CO₁'s profit in counties L and H.

$$W^U = [U(\tau^m) - R^H]n^H + [U(\tau^m) - R^L]n^L + [R^H - C_1(\tau^m)]n^H + [R^L - C_1(\tau^m)]n^L.$$

$$W^U = U(\tau^m)n^H + U(\tau^m)n^L - C_1(\tau^m)n^H - C_1(\tau^m)n^L. \quad (A.1)$$

By assumption, $[R^L - C_2(\tau_0)]n^L < 0$. M+CO₁ will offer only the minimum benefits in county L if the UBR is not imposed. Welfare without the UBR imposed is the sum of enrollees' total utility, and M+CO₁'s profit in counties L and H.

$$W^N = [U(\tau^m) - R^H]n^H + [U(\tau_0) - R^L]n^L + [R^H - C_1(\tau^m)]n^H + [R^L - C_1(\tau_0)]n^L.$$

$$W^N = U(?^m)n^H + U(?_0)n^L - C_1(?^m)n^H - C_1(?_0)n^L. \quad (A.2)$$

From (A.1) and (A.2), $W^U > W^N$ as

$$U(?^m)n^H + U(?^m)n^L - C_1(?^m)n^H - C_1(?^m)n^L > U(?^m)n^H + U(?_0)n^L - C_1(?^m)n^H - C_1(?_0)n^L.$$

It follows that $U(?^m)n^L - C_1(?^m)n^L > U(?_0)n^L - C_1(?_0)n^L$,

$$\text{and therefore } U(?^m) - C_1(?^m) > U(?_0) - C_1(?_0). \quad (A.3)$$

(A.3) reveals that $W^U > W^N$ if and only if

$$U(?^m) - C_1(?^m) > U(?_0) - C_1(?_0), \text{ or}$$

$$U(?^m) - U(?_0) > C_1(?^m) - C_1(?_0). \quad (C3)$$

Lemma 4: Suppose conditions (C1) and (C2) hold, but (C3) does not hold. Then imposing the uniform benefits requirement does not increase welfare.

Conditions (C1) and (C2) ensure $M+CO_1$ operates in both counties; it is more profitable for $M+CO_1$ to operate in counties L and H offering benefits $?^m$ than to operate only in county L or only in county H. If (C3) does not hold, the cost of increasing benefits from $?_0$ to $?^m$ is greater than the utility enrollees receive from those additional benefits (i.e., $U(?^m) - U(?_0) < C_1(?^m) - C_1(?_0)$). Therefore, although $M+CO_1$ serves both counties H and L and provides enrollees in county L greater benefits than without the UBR, total welfare is lower with the UBR than without the UBR.

From (A.1) and (A.2), we know that $W^U > W^N$ as

$$U(?^m) - C_1(?^m) > U(?_0) - C_1(?_0). \quad (A.3)$$

(A.3) reveals that $W^U > W^N$ if and only if

$$U(?^m) - U(?_0) > C_1(?^m) - C_1(?_0). \quad (C3)$$

Therefore if (C3) does not hold, the UBR does not increase welfare.

Lemma 5: Suppose condition (C2) holds and (C1) does not hold. Then welfare decreases when the UBR is imposed.

By (C1) it is more profitable for M+CO₁ to operate in both counties than only in county H; by (C2) it is more profitable for M+CO₁ to operate in both counties than only in county L.

$$[R^H - C_1(?^m)]n^H + [R^L - C_1(?^m)]n^L \geq [R^H - C_1(?^m)]n^H \quad ?$$

$$[R^L - C_1(?^m)]n^L \geq 0, \text{ and} \quad (C1)$$

$$[R^H - C_1(?^m)]n^H + [R^L - C_1(?^m)]n^L \geq [R^L - C_1(?_0)]n^L \quad (C2)$$

If (C2) holds and (C1) does not hold,

$$[R^H - C_1(?^m)]n^H \geq [R^H - C_1(?^m)]n^H + [R^L - C_1(?^m)]n^L \geq [R^L - C_1(?_0)]n^L.$$

The low cost M+CO will serve the high payment county and neither M+CO will serve the low payment county.

If M+CO₁ exits county L and operates only in county H, welfare is unambiguously lower than without the UBR. The low payment county is not served by either M+CO, since by assumption M+CO₂ cannot profitably operate in county L, and M+CO₁ exits county L to earn greater profits operating in county H only. Enrollees' benefits in county H remain unchanged at ?^m when the UBR is imposed.

Welfare is the sum of enrollees' total utility and M+CO₁'s profit in county H.

$$W^U = [U(?^m) - R^H]n^H + [R^H - C_1(?^m)]n^H.$$

$$W^U = U(?^m)n^H - C_1(?^m)n^H. \quad (A.4)$$

Without the UBR, M+CO₁ provides county L benefits π_0 and provides county H benefits π^m . Welfare is the sum of enrollees' total utility and M+CO₁'s profits in counties L and H.

$$W^N = [U(\pi^m) - R^H]n^H + [U(\pi_0) - R^L]n^L + [R^H - C_1(\pi^m)]n^H + [R^L - C_1(\pi_0)]n^L.$$

$$W^N = U(\pi^m)n^H + U(\pi_0)n^L - C_1(\pi^m)n^H - C_1(\pi_0)n^L. \quad (\text{A.5})$$

From (A.4) and (A.5), $W^U \geq W^N$ as

$$U(\pi^m)n^H - C_1(\pi^m)n^H \geq U(\pi^m)n^H + U(\pi_0)n^L - C_1(\pi^m)n^H - C_1(\pi_0)n^L.$$

$$\text{It follows that } 0 \geq U(\pi_0) - C_1(\pi_0). \quad (\text{A.6})$$

By assumption, $U(\pi_0) \geq C_1(\pi_0)$. (A.6) reveals that if $U(\pi_0) - C_1(\pi_0) > 0$, imposing the UBR decreases welfare. If $U(\pi_0) = C_1(\pi_0)$, imposing the UBR has no effect on total social welfare.

Lemma 6: Suppose condition (C1) holds and (C2) does not hold. Then welfare decreases when the UBR is imposed.

By (C1) it is more profitable for M+CO₁ to operate in both counties than only in county H; by (C2) it is more profitable for M+CO₁ to operate in both counties than only in county L.

$$[R^H - C_1(\pi^m)]n^H + [R^L - C_1(\pi^m)]n^L \geq [R^H - C_1(\pi^m)]n^H \geq$$

$$[R^L - C_1(\pi^m)]n^L \geq 0, \text{ and} \quad (\text{C1})$$

$$[R^H - C_1(\pi^m)]n^H + [R^L - C_1(\pi^m)]n^L \geq [R^L - C_1(\pi_0)]n^L \quad (\text{C2})$$

If (C1) holds and (C2) does not hold,

$$[R^L - C_1(\pi_0)]n^L \geq [R^H - C_1(\pi^m)]n^H + [R^L - C_1(\pi^m)]n^L \geq [R^H - C_1(\pi^m)]n^H.$$

The low cost M+CO will serve the low payment county and the high cost M+CO will serve the high payment county.

If M+CO₁ exits county H and operates only in county L, welfare is unambiguously lower than without the UBR. Enrollees in both counties L and H receive the same level of benefits as they would receive without the UBR imposed, however the high cost M+CO provides benefits in county H, rather than the low cost M+CO providing benefits. This means the less efficient M+CO operates where the more efficient would otherwise operate if the UBR is not imposed. This increase in total cost to provide benefits results in a decrease in total welfare.

Welfare with the UBR imposed is the sum of enrollees' total utility, M+CO₁'s profit in county L and M+CO₂'s profit in county H.

$$W^U = [U(?^m) - R^H]n^H + [U(?_0) - R^L]n^L + [R^H - C_2(?^m)]n^H + [R^L - C_1(?_0)]n^L.$$

$$W^U = U(?^m)n^H + U(?_0)n^L - C_2(?^m)n^H - C_1(?_0)n^L. \quad (A.7)$$

Welfare without the UBR imposed is the sum of enrollees' total utility and M+CO₁'s profit in counties L and H.

$$W^N = [U(?^m) - R^H]n^H + [U(?_0) - R^L]n^L + [R^H - C_1(?^m)]n^H + [R^L - C_1(?_0)]n^L.$$

$$W^N = U(?^m)n^H + U(?_0)n^L - C_1(?^m)n^H - C_1(?_0)n^L. \quad (A.8)$$

$$\text{From (A.7) and (A.8), } W^U > W^N \text{ as } -C_2(?^m) > -C_1(?^m) \quad (A.9)$$

(A.9) reveals that since M+CO₂'s cost to provide any given level of benefits is higher than M+CO₁'s cost to provide that level of benefits, welfare is greater without the UBR imposed.

Proof of Corollary 1: Suppose conditions (C1) and (C2) hold. Then when the UBR is imposed, welfare will increase if the competitive level of benefits (q^m) is no greater than the welfare maximizing level of benefits (q^*).

1) Suppose (C1) and (C2) hold.

By Proposition 1, imposing the UBR increases welfare if the competitive level of benefits satisfies (C3). Define $q^?$ to be the level of benefits at which $U(q^?) - U(q_0) = C_1(q^?) - C_1(q_0)$, $q_0 \leq q^?$. $q^?$ is the level of benefits at which (C3) becomes an equality and welfare neither increases nor decreases with the UBR.

2) By assumption, utility $U(q)$ is an increasing, concave function and cost $C(q)$ is an increasing linear function. By definition, q^* maximizes $U(q) - C_1(q)$, since q^* solves $U_q(q) - C_q(q) = 0$.

Therefore, $U(q^*) - C(q^*) > U(q^{m*}) - C(q^{m*})$.

If $U(q^?) - U(q_0) = C_1(q^?) - C_1(q_0)$, then, $U(q^?) - C_1(q^?) = U(q_0) - C_1(q_0)$.

It follows that $U(q_0) - C_1(q_0) < U(q^*) - C(q^*)$ and $U(q^?) - C(q^?) < U(q^*) - C(q^*)$.

3) By definition, $U(q_0) - C_1(q_0) = U(q^?) - C(q^?)$, but $q_0 \leq q^?$.

Therefore, $q^? > q^*$, due to the properties of the utility and cost functions.

4) Since any competitive level of benefits $q^m < q^?$ results in an increase in welfare when the UBR is imposed, and $q^* < q^?$, q^* results in an increase in welfare when the UBR is imposed.

Proof of Corollary 2: Suppose the difference in M+COs' costs as defined by $C_1(\theta^m) - C_2(\theta_0)$ is sufficiently small. Then M+CO₁ will offer basic benefits (θ_0) in the maximum benefits equilibrium.

By (C2), M+CO₁ can profitably offer benefits θ^m in county L: $R^L - C_1(\theta^m) > 0$.

By assumption, $R^L - C_2(\theta_0) < 0$.

Therefore, $R^L - C_1(\theta^m) > 0 > R^L - C_2(\theta_0)$.

It follows that $R^L - C_1(\theta^m) > R^L - C_2(\theta_0)$,

and $-C_1(\theta^m) > -C_2(\theta_0)$.

Assume $C_1(\theta) = \theta + c\theta$

$C_2(\theta) = \theta + c\theta$

Let $\theta = \theta_0 + \epsilon$ where $\epsilon > 0$ is small, so that the difference in M+COs' costs at any particular θ is small. Then:

$-(\theta + c\theta^m) > -(\theta_0 + \epsilon + c\theta_0)$. Simplifying, this becomes

$-c\theta^m > -c\theta_0 - \epsilon$

$-\theta^m > -\theta_0 - \epsilon/c$

$\theta^m < \theta_0 + \epsilon/c$

If $\theta^m < \theta_0 + \epsilon/c$, and $R^H - C_2(\theta^m) = 0$, then $R^H - C_2(\theta_0 + \epsilon/c) < 0$. M+CO₂ cannot profitably provide benefits greater than basic benefits θ_0 . M+CO₁ provides $\theta^m = \theta_0 + \epsilon/c$.

When the difference in M+COs' costs is sufficiently small, the difference in payment rates must also be small for equilibrium to exist. This results in benefits offered sufficiently close to θ_0 .

Proof of Corollary 3: Suppose the difference in payment rates is greater than the difference in costs as defined by $C_1(\beta^m) - C_2(\beta^m)$. Then imposing the UBR will decrease welfare.

The difference in payment rates in counties L and H must be less than or equal to the difference in M+COs' costs as defined by $C_1(\beta^m) - C_2(\beta^m)$. When conditions (C1) and (C2) hold, M+CO₁ offers benefits β^m to all enrollees in both counties.

Given the assumption $C_2(\beta) = [\beta_2 + c\beta]$.

Then $R^H = \beta_2 + c\beta^m$ in the maximum benefits equilibrium. (A.10)

Solving (A.10) for β^m provides $\beta^m = (R^H - \beta_2)/c$.

By (C1), $R^L \geq C_1(\beta^m)$.

It follows that $R^L \geq \beta_1 + c\beta^m$ since $C_1(\beta) = \beta_1 + c\beta$ and

$R^L \geq \beta_1 + c(R^H - \beta_2)/c$.

Simplifying, $R^L \geq \beta_1 + R^H - \beta_2$ and

$R^L - R^H \geq \beta_1 - \beta_2$.

Therefore, $\beta_2 - \beta_1 \geq R^H - R^L$ in the maximum benefits equilibrium. (A.11)

Equation (A.11) implies that the maximum benefits equilibrium will exist only when the difference in M+COs' costs is at least as great as the difference in payments to counties H and L. Therefore, as the difference in M+COs' costs decreases, the difference in payments to counties H and L must decrease for the equilibrium to exist. By Lemma 5 and Lemma 6, if the maximum benefits equilibrium does not exist, welfare decreases when the UBR is imposed.

Appendix B. This appendix addresses the effect of relaxing various assumptions held throughout the model, and provides details regarding the welfare maximizing level of benefits.

Assertion: The assumption $C_i^L(?) = C_i^H(?)$, $i = 1,2$ simplifies the model. Qualitative results remain the same as if it is assumed that $C_i^L(?) < C_i^H(?)$, $i = 1,2$.

If an equilibrium in which M+CO₁ serves both counties H and L exists when the cost to provide a particular level of benefits is the same across counties, an equilibrium in which M+CO₁ serves both counties H and L also exists when the cost to provide a particular level of benefits differs across counties.

Suppose $C_i^L(?) = C_i^H(?)$, $i = 1,2$. Conditions for equilibrium in which M+CO₁ operates in both counties are that the profit M+CO₁ earns in the low payment county when it serves all enrollees (n^L) benefits β^m must be non-negative, and the profit M+CO₁ earns by offering all enrollees in both counties benefits β^m must be greater than the profit M+CO₁ earns by offering basic benefits to all enrollees in the low payment county only.

$$[R^L - C_1(\beta^m)]n^L \geq 0, \text{ and} \tag{C1}$$

$$[R^H - C_1(\beta^m)]n^H + [R^L - C_1(\beta^m)]n^L \geq [R^L - C_1(\beta_0)]n^L \tag{C2}$$

By (C1) it is more profitable for M+CO₁ to operate in both counties than only in county H; by (C2) it is more profitable for M+CO₁ to operate in both counties than only in county L. If (C1) and (C2) are met, M+CO₁ serves all enrollees in both counties benefits β^m .

- 1) Suppose there exists some $\hat{C}_1(?) < C_1(?)$, where $\hat{C}_1(?)$ is the cost of providing benefits to consumers in the low payment county.

Since $\hat{C}_1(?) < C_1(?)$, then $[R^L - C_1(\beta^m)]n^L < [R^L - \hat{C}_1(?)]n^L$.

If $[R^L - C_1(\theta^m)]n^L \geq 0$, then $[R^L - C_1^*(\theta)]n^L \geq 0$.

This implies that if $[R^L - C_1(\theta^m)]n^L \geq 0$ satisfies (C1), then $[R^L - C_1^*(\theta)]n^L \geq 0$ satisfies (C1).

- 2) Suppose $C_1(\theta^m) > C_1(\theta_0)$ when $(\theta^m) > (\theta_0)$. Then $C_1^*(\theta^m) > C_1^*(\theta_0)$. Therefore, if $[R^H - C_1(\theta^m)]n^H + [R^L - C_1(\theta^m)]n^L - [R^L - C_1(\theta_0)]n^L \geq 0$, then

$$[R^H - C_1(\theta^m)]n^H + [R^L - C_1^*(\theta^m)]n^L - [R^L - C_1^*(\theta_0)]n^L \geq 0.$$

This implies that if $[R^H - C_1(\theta^m)]n^H + [R^L - C_1(\theta^m)]n^L - [R^L - C_1(\theta_0)]n^L \geq 0$ satisfies (C2), then $[R^H - C_1(\theta^m)]n^H + [R^L - C_1^*(\theta^m)]n^L - [R^L - C_1^*(\theta_0)]n^L \geq 0$ satisfies (C2).

If an equilibrium exists in which M+CO₁ operates in both counties H and L under UBR when $C_1^L(\theta) = C_1^H(\theta)$, an equilibrium will also exist in which M+CO₁ operates in both counties H and L under UBR if $C_1^L(\theta) < C_1^H(\theta)$.

Consider $C_1^*(\theta) < C_1(\theta) \geq ?$.

Let $C_1^*(\theta) = C_1(\theta) - ?$

If $R^L - C_1(\theta) \geq 0$, then $R^L - [C_1^*(\theta) + ?] \geq 0$.

Therefore, $R^L \geq C_1^*(\theta) + ?$.

The existence of a cost curve $C_1^L(\theta) < C_1^H(\theta)$ provides the same results regarding equilibria as giving a lump sum payment to M+CO₁ for serving county L: $R^L + ?$. It encourages M+CO₁ to remain in county L.

Since by assumption M+CO₂ cannot profitably operate in county L, M+CO₂'s only cost curve represents costs in county H. M+CO₁ offers benefits based on M+CO₂'s maximum

profitable level of benefits, regardless of whether M+CO₁ faces separate cost curves for county L and H (i.e., if $C_i^L(?) < C_i^H(?)$) or if costs are the same ($C_i^L(?) = C_i^H(?)$).²²

Condition (C3) is not affected, since the comparison of welfare with and without the UBR depends only on enrollees' utility and M+COs' costs of providing benefits in county L: $U(?^m)n^L - U(?_0)n^L > C_1(?^m)n^L - C_1(?_0)n^L$.

Assertion: The assumption $[R^L - C_2(?)]n^L < 0$? ? ? ?₀ provides the same qualitative results as are found if it is assumed that there exists some ? such that $[R^L - C_2(?)]n^L > 0$.

This proof proceeds by considering three distinct cases, labeled A, B, and C.

Case A) In the situation in which (C1) and (C2) hold, the assumption $[R^L - C_2(?)]n^L < 0$ for all ? does not affect the results.

1) Suppose $[R^L - C_2(?)]n^L < 0$ for all ?.

Further suppose (C1) and (C2) hold. This assumption will be maintained throughout Case A. M+CO₁ earns greater profit offering ?^m in counties H and L than it can earn operating in only county H or only county L.

$$R^H n^H - C_1(?^m)n^H + R^L n^L - C_1(?^m)n^L \ ? \ R^H n^H - C_1(?^m)n^H \quad (B.1)$$

$$R^H n^H - C_1(?^m)n^H + R^L n^L - C_1(?^m)n^L \ ? \ R^L n^L - C_1(?_0)n^L \quad (B.2)$$

M+CO₁ operates in both counties H and L; M+CO₂ does not operate. By Lemma 4, total social welfare increases iff (C3) holds.²³

2) Suppose there exists some ? for which $R^L - C_2(?) \ ? \ 0$.

²² If firm 2 can profitably operate in county L ($R^L - C_2(?_0)]n^L \ ? \ 0$), the parameters in conditions (C1) - (C3) change, however the determination of welfare based on those parameters remains the same as when firm 2 cannot profitably operate in county L ($R^L - C_2(?_0)]n^L < 0$). See proof in Appendix B.

²³ See proof of Lemma 4 in Appendix A.

To capture county L, M+CO₁ must offer the level of benefits that satisfies $R^L - C_2(?) = 0$. Let β^{mL} solve $R^L - C_2(\beta^{mL}) = 0$. Since $R^H > R^L$ and $C_1^H(\beta) = C_1^L(\beta)$, the level of benefits M+COs can profitably offer is greater in county H than in county L: $\beta^m > \beta^{mL}$.

Therefore, to capture both counties, M+CO₁ must offer β^m . Condition (C1) = (B.1) is unchanged; condition (C2) = (B.2) becomes

$$R^H n^H - C_1(\beta^m) n^H + R^L n^L - C_1(\beta^m) n^L \geq R^L n^L - C_1(\beta^{mL}) n^L \quad (\text{B.3})$$

If (B.1) and (B.3) hold, M+CO₁ offers benefits β^m to all enrollees in both counties and M+CO₂ is unable to operate. By Lemma 4, total social welfare increases iff (C3) holds.

Case B) In the situation in which (C2) holds and (C1) does not, the assumption $[R^L - C_2(\beta)] n^L < 0$ does not affect the results.

1) Suppose $[R^L - C_2(\beta)] n^L < 0$.

Further suppose (C2) holds and (C1) does not hold. This assumption will be maintained throughout Case B. M+CO₁ earns greater profit offering β^m in county H alone than it can earn offering β^m in counties H and L; however, offering β^m in counties H and L is more profitable than offering basic benefits in county L only.

$$R^H n^H - C_1(\beta^m) n^H \geq R^H n^H - C_1(\beta^m) n^H + R^L n^L - C_1(\beta^m) n^L \geq R^L n^L - C_1(\beta_0) n^L \quad (\text{B.4})$$

$$R^H n^H - C_1(\beta^m) n^H \geq R^L n^L - C_1(\beta_0) n^L \quad (\text{B.5})$$

M+CO₁ operates only in county H; M+CO₂ does not enter either county. By Lemma 5, total social welfare decreases.²⁴

2) Suppose there exists some β for which $R^L - C_2(\beta) \geq 0$.

²⁴ See proof of Lemma 5 in Appendix A.

Since (B.5) holds, M+CO₁ operates only in county H. However, since by assumption it is profitable to do so, M+CO₂ operates in county L and provides benefits φ_0 . Total social welfare decreases.

If there exists a φ for which $R^L - C_2(\varphi) = 0$, that φ becomes the benchmark by which M+CO₁ makes its participation decision. Substituting φ for φ_0 in equation (B.5) M+CO₁ will operate only in county H if $R^H n^H - C_1(\varphi^m) n^H \geq R^L n^L - C_1(\varphi) n^L$.

Let φ^{mL} solve $R^L - C_2(\varphi) = 0$. Welfare under the UBR is the sum of enrollees' total utility in counties L and H, M+CO₁'s profit in county H, and M+CO₂'s profit in county L.

$$W^U = [U(\varphi^m) - R^H]n^H + [U(\varphi_0) - R^L]n^L + [R^H - C_1(\varphi^m)]n^H + [R^L - C_2(\varphi^{mL})]n^L.$$

$$W^U = U(\varphi^m)n^H + U(\varphi_0)n^L - C_1(\varphi^m)n^H - C_2(\varphi^{mL})n^L. \quad (B.6)$$

Welfare without the UBR imposed is the sum of enrollees' total utility in counties L and H, and M+CO₁'s profit in counties L and H.

$$W^N = [U(\varphi^m) - R^H]n^H + [U(\varphi^{mL}) - R^L]n^L + [R^H - C_1(\varphi^m)]n^H + [R^L - C_1(\varphi^{mL})]n^L.$$

$$W^N = U(\varphi^m)n^H + U(\varphi^{mL})n^L - C_1(\varphi^m)n^H - C_1(\varphi^{mL})n^L. \quad (B.7)$$

From (B.6) and (B.7), $W^U \geq W^N$ as

$$U(\varphi^m)n^H + U(\varphi^{mL})n^L - C_1(\varphi^m)n^H - C_2(\varphi^{mL})n^L \geq U(\varphi^m)n^H + U(\varphi^{mL})n^L - C_1(\varphi^m)n^H - C_1(\varphi^{mL})n^L$$

$$\text{which means } -C_2(\varphi^{mL}) \geq -C_1(\varphi^{mL}) \quad (B.8)$$

(B.8) reveals that since $C_2(\varphi) > C_1(\varphi)$ for all φ , welfare decreases when the UBR is imposed. The less efficient M+CO provides benefits to county L, and the level of benefits in both counties L and H is the same as is provided without the UBR. Without the UBR, M+CO₁ serves county H benefits φ^m , and serves county L benefits φ^{mL} , where

θ^{mL} solves $[R^L = C_2(\theta)]$. Because by assumption consumers choose the low cost M+CO when indifferent, M+CO₁ offers that level of benefits at which $[R^L = C_2(\theta)]$.

Case C) In the situation in which (C1) holds and (C2) does not, the assumption $[R^L - C_2(\theta)]n^L < 0$ does not affect the results.

1) Suppose $[R^L - C_2(\theta)]n^L < 0$.

Further suppose (C1) holds and (C2) does not hold. This assumption will be maintained throughout Case C. M+CO₁ earns greater profit offering θ_0 in county L alone than it can earn offering θ^m in counties H and L; however, offering θ^m in counties H and L is more profitable than offering θ^m in county H only.

$$R^L n^L - C_1(\theta_0)n^L > R^H n^H - C_1(\theta^m)n^H + R^L n^L - C_1(\theta^m)n^L > R^H n^H - C_1(\theta^m)n^H \quad (B.9)$$

$$R^L n^L - C_1(\theta_0)n^L > R^H n^H - C_1(\theta^m)n^H \quad (B.10)$$

M+CO₁ operates only in county L; M+CO₂ operates in county H. By Lemma 6, total social welfare decreases.²⁵

2) Suppose there exists some θ for which $R^L - C_2(\theta) = 0$.

M+CO₁ is no longer able to capture county L offering θ_0 . Instead, M+CO₁ must offer the level of benefits that satisfies $R^L - C_2(\theta) = 0$. Let θ^{mL} solve this equation. By substituting θ^{mL} for θ_0 in equation (B.10), M+CO₁ will operate only in county L if $R^L n^L - C_1(\theta^{mL})n^L > R^H n^H - C_1(\theta^m)n^H$.

Welfare under the UBR is the sum of enrollees' total utility in counties L and H, M+CO₁'s profit in county L, and M+CO₂'s profit in county H.

²⁵ See proof of Lemma 6 in Appendix A.

$$W^U = [U(?) - R^H]n^H + [U(?^{mL}) - R^L]n^L + [R^H - C_2(?^m)]n^H + [R^L - C_1(?^{mL})]n^L.$$

$$W^U = U(?^m)n^H + U(?^{mL})n^L - C_2(?^m)n^H - C_1(?^{mL})n^L. \quad (B.11)$$

Welfare without the UBR imposed is the sum of enrollees' total utility in counties L and H, and M+CO₁'s profit in counties L and H.

$$W^N = [U(?) - R^H]n^H + [U(?^{mL}) - R^L]n^L + [R^H - C_1(?^m)]n^H + [R^L - C_1(?^{mL})]n^L.$$

$$W^N = U(?^m)n^H + U(?^{mL})n^L - C_1(?^m)n^H - C_1(?^{mL})n^L. \quad (B.12)$$

From (B.11) and (B.12), $W^U > W^N$ as

$$U(?^m)n^H + U(?^{mL})n^L - C_2(?^m)n^H - C_1(?^{mL})n^L > U(?^m)n^H + U(?^{mL})n^L - C_1(?^m)n^H - C_1(?^{mL})n^L$$

$$\text{which means } -C_2(?^m) > -C_1(?^m) \quad (B.13)$$

(B.13) reveals that since $C_2(?^m) > C_1(?^m)$, welfare is greater without the UBR. The less efficient M+CO provides benefits to county H, and the level of benefits to counties L and H is the same with UBR as is provided without the UBR.

Therefore, the assumption $[R^L - C_2(?)]n^L < 0$ does not affect the main conclusions of this paper.

Definition: The welfare maximizing level of benefits is that level at which marginal utility equals marginal cost.²⁶

- 1) Welfare is the sum of enrollees' total utility in counties H and L, and M+CO₁'s profits from operating in counties H and L.²⁷

$$W = [U(?) - R^H]n^H + [U(?) - R^L]n^L + [R^H - C_1(?)]n^H + [R^L - C_1(?)]n^L.$$

Differentiating with respect to benefits offered (?),

²⁶ By assumption, the utility and cost functions are continuous and possess a continuous derivative, therefore the first order condition is taken as a necessary condition for identifying the optimum.

$$\frac{\partial W}{\partial b} = U_b(b)n^H + U_b(b)n^L - C_b(b)n^H - C_b(b)n^L \stackrel{?}{=} 0.$$

$$\text{Therefore } U_b(b)[n^H + n^L] = C_b(b)[n^H + n^L]$$

$$\text{and } U_b(b) = C_b(b) \quad (\text{B.12})$$

When the UBR is imposed, the welfare maximizing level of benefits satisfies marginal utility equals marginal cost (B.12).

- 2) If the UBR is not imposed, benefits offered in county L may differ from benefits offered in county H. Welfare is the sum of enrollees' total utility in counties H and L, and M+CO₁'s profits from operating in counties H and L.

$$W = [U(b^H) - R^H]n^H + [U(b^L) - R^L]n^L + [R^H - C_1(b^H)]n^H + [R^L - C_1(b^L)]n^L.$$

Differentiating with respect to benefits offered in county H (b^H),

$$\frac{\partial W}{\partial b^H} = U_b(b^H)n^H - C_b(b^H)n^H \stackrel{?}{=} 0.$$

$$\text{Therefore, } U_b(b^H) = C_b(b^H) \quad (\text{B.13})$$

Similarly, differentiating with respect to benefits offered in county L (b^L),

$$\frac{\partial W}{\partial b^L} = U_b(b^L)n^L - C_b(b^L)n^L \stackrel{?}{=} 0.$$

$$\text{Therefore, } U_b(b^L) = C_b(b^L) \quad (\text{B.14})$$

Without the UBR, welfare is again maximized at the level of benefits at which marginal utility equals marginal cost. Since by assumption enrollee's utility and M+COs' costs are the same across counties, (B.13) = (B.14) \Rightarrow the welfare maximizing level of benefits for both counties satisfies (B.12).

²⁷ The social planner always prefers that firm 1 serves both counties, therefore $b_1 = b_1^{**}$.

Appendix C

This appendix contains proofs on the existence of equilibria with and without the uniform benefits requirement when M+COs have equal costs. It considers all possible county configurations in determining that unless $R^L = C_i^L(\beta_i)$ and $R^H = C_i^H(\beta_i)$, the only equilibrium occurs with two M+COs in two counties without the UBR imposed.

Assume $R^k > C_i^k(\beta_0)$ $\forall i, j = 1, 2$, and all $k \in \{L, H\}$.

Assume county L is less profitable than county H: $R^L - C_i^L(\beta_i^k) < R^H - C_i^H(\beta_i^H)$ $\forall i, j = 1, 2$.

Assume it is not the case that both $R^L = C_i^L(\beta_i)$ and $R^H = C_i^H(\beta_i)$ $\forall i, j = 1, 2$.

Assume $C_i^k(\beta) = C_j^k(\beta)$ $\forall i, j = 1, 2, k \in \{L, H\}$

Each M+CO must earn non-negative profits to operate: $\beta_i \geq 0$ $\forall i, j = 1, 2, k \in \{L, H\}$.

These assumptions will be maintained throughout Appendix C.

Lemma C1: Suppose the two M+COs have identical operating costs and the UBR is not imposed.

Then in equilibrium, the level of benefits supplied will exhaust all profit, i.e. $R^k = C_i^k(\beta_i^k)$ $\forall i, j = 1, 2, i \neq j, k \in \{L, H\}$. (C1.1)

If $\beta_i = \beta_j$, then $\beta_i = [R^k - C_i^k(\beta_i)]n^k/2$ for all $i, j = 1, 2, k \in \{L, H\}$.

If $\beta_i = \beta_j + \epsilon$, then $\beta_i = [R^k - C_i^k(\beta_i)]n^k$ for all $i, j = 1, 2, k \in \{L, H\}$.

As long as the profit from serving n^k is positive, i.e. $[R^k - C_i^k(\beta_i)]n^k > 0$, each M+CO has an incentive to offer slightly more benefits than its competitor in order to capture the county. This can be seen by noting that $[R^k - C_i^k(\beta_i)]n^k > [R^k - C_i^k(\beta_j)]n^k/2$ for all $i, j = 1, 2, k \in \{L, H\}$. The result is that each M+CO offers increasingly greater benefits until

$R^k = C_i^k(\beta_i)$, which implies $\beta_i = \beta_j$ and $\beta_i^k = \beta_j^k = 0 \quad \forall i, j = 1, 2, k \in \{L, H\}$. In this perfectly competitive county, profits of both M+COs go to zero.

Without the UBR, M+COs compete in both the high and low payment counties without necessarily offering uniform benefits across counties. Each M+CO considers each county separately. M+COs compete away all profit as they increase benefits to obtain county share. The result is that benefits are bid up to the highest profitable level, where the cost to provide the benefits equals the payment.

Lemma C2: Suppose the uniform benefits requirement is imposed. Then the situation in which both M+COs operate in both high and low payment counties is not an equilibrium.

Suppose both M+COs are operating in both counties as described above. Then suppose UBR is imposed. Since by assumption the level of benefits that solves equation (C1.1) is different for each county, the M+COs must choose a different level of benefits in at least one county that they can provide equally to both counties.

It might seem logical to provide benefits at a level somewhere in between the levels initially provided by the M+COs to the high and low payment counties. But, lowering the benefits provided in the high payment county leaves room for a competitor to offer slightly higher benefits and win the entire county. Increasing benefits in the low payment county results in a loss, since M+COs already are supplying the maximum possible profitable level of benefits. This dilemma creates an incentive for a M+CO to leave the low payment county because by doing so, it is able to offer greater benefits and can

capture the entire high payment county. Therefore, the situation in which both M+COs operate in both the high and low payment counties under the UBR is not an equilibrium.

- 1) M+COs offer the highest profitable β when in competition. If $\beta_i = \beta_j$, then $\beta_i = [R^k - C_i^k(\beta_i)]n^k/2$ for all $i, j = 1, 2, k \in \{L, H\}$. If $\beta_i = \beta_j + \epsilon$, then $\beta_i = [R^k - C_i^k(\beta_i)]n^k$ for all $i, j = 1, 2, k \in \{L, H\}$.

As long as the profit from serving n^k is positive, i.e. $[R^k - C_i^k(\beta_i)]n^k > 0$, each M+CO has an incentive to offer slightly more benefits than its competitor in order to capture the county. This can be seen by noting that

$[R^k - C_i^k(\beta_i)]n^k > [R^k - C_i^k(\beta_j)]n^k/2$ for all $i, j = 1, 2, k \in \{L, H\}$. The result is that each M+CO offers increasingly greater benefits until $R^k = C_i^k(\beta_i)$, which implies $\beta_i = \beta_j$ and $\beta_i^k = \beta_j^k = 0 \quad \forall i, j = 1, 2, k \in \{L, H\}$.

This implies that a M+CO operating in both counties will offer β such that $R^L = C^L(\beta_i)$ and $R^H = C^H(\beta_i)$.

- 2) By assumption, $C_i^k(\beta_i) = C_j^k(\beta_i) \quad \forall i, j = 1, 2, k \in \{L, H\}$.

Therefore, $[R^k - C_i^k(\beta_i)] = [R^k - C_j^k(\beta_j)] \quad \forall i, j = 1, 2, k \in \{L, H\}$.

$\beta_i = \beta_j$ and M+COs evenly divide the county such that $q_i^k(\beta_i^k, \beta_j^k) = n^k/2$.

It follows that $\beta_i^H = \beta_j^H \neq 0$ and $\beta_i^L = \beta_j^L = 0$.

which means $\beta_i^{H+L} = [R^H - C^H(\beta_i)]n^H/2 + [R^L - C^L(\beta_i)]n^L/2$ where $[R^L - C^L(\beta_i)]n^L/2 = 0$.

- 3) Suppose while M+CO j continues to offer β_j , M+CO i offers $\beta_i^m > \beta_j$ subject to

$R^H - C^H(\beta_i^m) \neq 0$. Then $\beta_i^H > \beta_j^H = 0$ and $\beta_i^L < \beta_j^L = 0$. Since β_i is chosen such that $R^L =$

$C^L(\beta_i)$, $\beta_i^m > \beta_j$ implies that $C^L(\beta_i^m) > C^L(\beta_i)$ which implies that

$R^L < C^L(\beta_i^m)$.

4) Comparing M+CO i's profit at the new (π_i^m) versus the initial (π_i):

$$[R^H - C^H(\pi_i^m)]n^H + [R^L - C^L(\pi_i^m)]n^L > [R^H - C^H(\pi_i)]n^H/2 + [R^L - C^L(\pi_i)]n^L/2,$$

$$\text{but } [R^L - C^L(\pi_i^m)] < 0,$$

$$\text{therefore } [R^H - C^H(\pi_i^m)]n^H > [R^H - C^H(\pi_i)]n^H + [R^L - C^L(\pi_i^m)]n^L \text{ and}$$

$$[R^H - C^H(\pi_i^m)]n^H > [R^H - C^H(\pi_i)]n^H/2$$

By increasing $\pi_i^m > \pi_j$ and exiting county L, M+CO i increases profits. There is an incentive for a M+CO to leave the low payment county and to offer greater benefits to capture the high payment county. Therefore, both M+COs operating in both counties under the UBR does not constitute an equilibrium.

Lemma C3: When M+COs have identical operating costs, county structures in which both M+COs operate in only one county, one M+CO operates in each county, or one M+CO operates in only one county and one M+CO operates in both counties cannot constitute an equilibrium. This is the case whether or not the uniform benefits requirement imposed.

This proof proceeds by considering four distinct cases, labeled A, B, C and D.

Case A) Both M+COs operating in the same county.

Suppose M+COs i and j operating in county H.

By Lemma C1, $\pi_i = \pi_j$, and $\pi_i^H = \pi_j^H = 0$.

It follows that $\pi_i^H = [R^H - C^H(\pi_i)]n^H/2$ and $\pi_j^H = [R^H - C^H(\pi_j)]n^H/2$.

By exiting county H and entering county L, M+CO i earns $\pi_i^L = [R^L - C^L(\pi_0)]n^L > [R^H - C^H(\pi_i)]n^H/2$, since M+CO i offers only basic benefits when there is no competition. $\pi_i^L = [R^L - C^L(\pi_0)]n^L$ provides M+CO i the maximum possible profit in county L. There is an

incentive for each M+CO to exit the competitive county in which profits are bid to zero and to operate only in the profitable county L.

The symmetric case applies for both M+COs operating in county L initially. Therefore, both M+COs operating in one county does not constitute an equilibrium.

Case B) One M+CO operating in each county.

Suppose M+CO i operating in county H and M+CO j operating in county L.

If $C(?) > C(?_0)$, then $[R^k - C(?)] < [R^k - C(?_0)]$, $k \in \{L, H\}$.

Therefore, $?^k(?) < ?^k(?_0)$, $k \in \{L, H\}$.

Therefore, each M+CO offers the minimum benefits necessary when not faced with competition: $?_i = ?_0$ and $?_j = ?_0$. If M+CO j enters county H and offers $?_0$, M+CO j captures 1/2 of county H.

$$?_j^{H+L} = [R^L - C^L(?_0)]n^L + [R^H - C^H(?_0)]n^H/2 > [R^L - C^L(?_0)]n^L = ?_j^L$$

? $i, j = 1, 2$, $i \neq j$.

Therefore, M+CO j has an incentive to enter county H and by symmetry, M+CO i has an incentive to enter county L, and an equilibrium does not exist.

Case C) One M+CO operating in county H and one M+CO operating in both counties H and L.

1) Suppose M+CO i in county H. $?_i^H = [R^H - C^H(?_i)]n^H/2$

2) Suppose M+CO j in counties L and H. $?_j^{H+L} = [R^H - C^H(?_j)]n^H/2 + [R^L - C^L(?_j)]n^L$.

Since $[R^H - C^H(?_i)]n^H \geq 0$ to operate, but $R^H \geq C^H(?_i)$, $R^H > C^H(?_i)$. By Lemma CI,

M+COs provide $?_i = ?_j$ in county H and divide the county evenly.

- 3) Suppose while M+CO j continues to offer τ_j , M+CO i in county H offers $\tau_i^m > \tau_i = \tau_j$.

Then by assumption, $C^H(\tau_i^m) > C^H(\tau_i)$.

This implies $[R^H - C^H(\tau_i^m)] < [R^H - C^H(\tau_i)]$.

- 4) Assume there exists some τ such that $C^H(\tau_i^m) = C^H(\tau_i) + \tau$, so that $[R^H - C^H(\tau_i^m)] > 0$.

Then $[R^H - C^H(\tau_i^m)]n^H > [R^H - C^H(\tau_i)]n^H/2$. M+CO i has an incentive to increase τ_i above τ_j . Given the same cost structure, both M+COs will compete in county H by offering higher τ .

- 5) Suppose M+CO i can offer some τ_i^m for which $[R^H - C^H(\tau_i^m)] > 0$ but $[R^L - C^L(\tau_i^m)] < 0$.

Given $[R^L - C^L(\tau_j)] < 0$ if $\tau_i^m = \tau_j$.

Then $\tau_i^H = [R^H - C^H(\tau_i^m)]n^H$ and $\tau_j^{H+L} = [R^H - C^H(\tau_j)](0) + [R^L - C^L(\tau_j)]n^L$.

Since by assumption, M+COs must earn nonnegative profits, $\tau_j^{H+L} = 0 \Rightarrow \tau_j^H = [R^H - C^H(\tau_j)]n^H/2$. M+CO j has an incentive to exit county H and offer $\tau_j = \tau_0$ such that $[R^L - C^L(\tau_0)]n^L > 0$ if $[R^L - C^L(\tau_0)]n^L > [R^H - C^H(\tau_j^m)]n^H/2$; or M+CO j has an incentive to exit county L and raise τ_j such that $[R^H - C^H(\tau_j)]n^H/2 > 0$, if $[R^L - C^L(\tau_0)]n^L < [R^H - C^H(\tau_j^m)]n^H/2$. M+CO i has an incentive to enter county L and offer $\tau_i^m = \tau_0 + \tau$ since $\tau_i^{H+L} = [R^H - C^H(\tau_i)]n^H/2 + [R^L - C^L(\tau_i)]n^L > [R^H - C^H(\tau_i)]n^H/2$.

Therefore, one M+CO operating in county H only and M+CO operating in both counties is not an equilibrium.

Case D) One M+CO operating in county L and one M+CO operating in both counties H and L.

- 1) Suppose M+CO i in county L.

2) Suppose M+CO j in counties H and L. Since M+COs must earn non-negative profits to operate, $\pi_i^L = [R^L - C^L(\pi_i)]n^L/2$ and $\pi_j^{H+L} = [R^H - C^H(\pi_j)]n^H/2 + [R^L - C^L(\pi_j)]n^L/2$. By Lemma C1, M+COs compete in county L so that $\pi_i = \pi_j$ and $R^L = C^L(\pi_i)$ for all $i, j = 1, 2$, but by assumption $R^L < C^L(\pi_i)$.

3) Let $\pi_i^m = \pi_0 - \pi$ and let $\pi_j^m = \pi_0 - \pi$ where $\pi_i = \pi_j$ solves $R^L = C^L(\pi_i)$. Then $\pi_i^L = 0$ and $\pi_i^{H+L} > 0$ since $R^H > C^H(\pi_j^m)$ when (π_j^m) is chosen such that $R^L = C^L(\pi_j) + \pi$. M+CO i has an incentive to enter county H.

$$\pi_i^L = [R^L - C^L(\pi_i^m)]n^L/2 < \pi_i^{H+L} = [R^L - C^L(\pi_i^m)]n^L/2 + [R^H - C^H(\pi_i^m)]n^H/2,$$

where $[R^H - C^H(\pi_i^m)]n^H/2 > 0$.

Therefore, one M+CO operating in county L only and one M+CO operating in both counties is not an equilibrium.

References

- Anton, James J., James H. Vander Weide, and Nikolaos Vettas. "Strategic Pricing and Entry Under Universal Service and Cross-Market Price Constraints," The Fuqua School of Business, Duke University, April 1998.
- Crew, Michael A. and Paul R. Kleindorfer. "Efficient Entry, Monopoly, and the Universal Service Obligation in Postal Service," *Journal of Regulatory Economics*, 14(2) September 1998, pages 103-125.
- Foster, Richard W. "Cost-Based Reimbursement and Prospective Payment: Reassessing the Incentives," *Journal of Health and Politics, Policy and Law*, Vol. 7, No 2, Summer 1982, pages 407-420.
- Foster, Richard W. "Cost-Shifting Under Cost Reimbursement and Prospective Payment," *Journal of Health Economics*, Vol. 4, No 3, September 1985, pages 261-271.
- Fuchs, Victor R. "Health Care for the Elderly: How Much? Who Will Pay For It?" *Health Affairs*, January/February 1999, Vol. 18, No1, pages 11-21.
- Hauge, Janice. "An Empirical Analysis of Provider Exit in the Medicare Managed Care Market", working paper, 2001.
- Kahn, Charles N. III and Hanns Kuttner. "Budget Bills and Medicare Policy: The Politics of the BBA," *Health Affairs*, January/February 1999, Vol. 18, No1, pages 37 – 47.
- MedPAC. Report to Congress: Medicare Payment Policy, March 1999.
- MedPAC. Report to Congress: Selected Medicare Issues, June 1999.
- Vladeck, Bruce, C. "The Political Economy of Medicare," *Health Affairs*, January/February 1999, Vol. 18, No1, pages 22-36.
- Wilensky, Gail R. and Joseph P. Newhouse. "Medicare: What's Right? What's Wrong? What's Next?" *Health Affairs*, January/February 1999, Vol. 18, No1, pages 92-106.