

**Online Appendix for “Substitutes for Success: Public versus Private Competition
in Medicare Advantage”**

Appendix A: Model of effects of public and private competition

This appendix provides a more formal treatment of the discussion in the section titled “Some Dynamics of Competition in Medicare Markets.” To make these issues more concrete, we present a simple toy model of a public-private health insurance market. We consider three settings. First, we consider a setting where there is a monopolist MA insurer and where the outside option is uninsurance. Second, we consider the introduction of a public option, where the outside option is no longer uninsurance but is instead TM. Finally, we consider the introduction of a second MA plan, so that in this final setting the focal MA plan is now competing with both TM and another MA plan. Throughout, we highlight the factors that influence quality in the focal MA plan to show how competition influences MA plan quality, and, therefore, the “success” of the MA program and beneficiary welfare.

Let q_i be the level of quality offered by plan j .¹ We normalize the “no insurance” quality to be $q_0 = 0$, while TM quality is exogenously determined outside the model and denoted q_{TM} . The quality of MA plan i , q_i , is set to maximize MA plan profits, as discussed below, and $\mathbf{q} = \{q_{TM}, q_i, q_j\}$ is the full vector of plan quality levels. $C_{MA}(q)$ and $C_{TM}(q)$ represent the per enrollee costs for a level of quality q in MA and TM, respectively, and we assume that $C'_{MA}(q) > 0$ and $C'_{TM}(q) > 0$ and also that $C''_{MA}(q) > 0$ and $C''_{TM}(q) > 0$. Importantly, these cost functions can differ, allowing MA to potentially be more (or less) efficient than TM, where $\Delta C(q) = C_{TM}(q) - C_{MA}(q)$ represents the relative efficiency of MA. MA plans receive a fixed per-enrollee payment $P = C_{TM}(q_{TM})$ equal to the per-enrollee cost in TM.² Finally, let $D_i(\mathbf{q})$ be MA plan i 's market share given quality vector \mathbf{q} .

For simplicity, we assume that beneficiaries have homogeneous preferences for quality but heterogeneous (and idiosyncratic) preferences for the focal MA plan relative to TM and the second MA plan, *conditional on quality*. Also note that we assume constant costs and thus abstract from selection.³ We relax this assumption below and show how selection interacts with competition to impact quality. The assumption that the MA payment is equal to TM costs also abstracts from any upcoding- or legislative-driven overpayments to MA. We make these abstractions to keep the focus on the broader questions of how a public option influences private plan quality. Finally, we also abstract from the bidding process and the possibility that MA plans bid above the benchmark and charge premiums. We do this because 76% of MA enrollees in plans with drug coverage are in plans with no premium (KFF 2024). While these

¹ Quality is obviously multi-dimensional in practice. Further, consumers likely have heterogeneous preferences over different dimensions of quality. These factors are related to the “match quality” goal of MA described above. Because we assume quality is unidimensional here, we are in effect assuming away the gains due to match quality (except via the idiosyncratic plan preferences).

² Below we will consider a setting where TM is not available, making this specification of P unclear. We therefore define P to be the per enrollee cost in TM if TM were available. Alternatively, one could think of P as being exogenously determined by policymakers as the amount they're willing to spend on TM.

³ Selection is also assumed away via homogeneous preferences for quality and idiosyncratic preferences across the plans. If preferences for quality or for plans are correlated with costs, then selection would be introduced.

plans do “share” some savings with the Medicare program, assuming that they receive a fixed payment equal to the benchmark is accurate to a first approximation.

Given this setup, we can write the profit function for plan i :

$$\pi_i = (P - C_{MA}(q_i))D_i(q)$$

To find the MA plan’s profit-maximizing level of quality, q_i^* , we take the first-order condition with respect to q_i and set it to zero:

$$(P - C_{MA}(q_i^*))D_i'(q^*) = C'_{MA}(q_i^*)D_i(q^*)$$

The left-hand side of the expression represents the marginal benefit to the MA plan of raising quality: The profit margin multiplied by the demand-response to quality. The right-hand side of the expression represents the marginal cost of quality: The cost of a bit more quality multiplied by the plan’s enrollment.

Now, re-arrange the expression as follows:

$$(P - C_{MA}(q_i^*)) \frac{D_i'(q^*)}{D_i(q^*)} = C'_{MA}(q_i^*)$$

This is a general expression showing that the key factors that influence the MA plan’s choice of quality are (1) the profit margin ($P - C_{MA}(q_i^*)$), (2) the proportional return to quality in terms of enrollees ($\frac{D_i'(q^*)}{D_i(q^*)}$), and (3) the marginal cost of quality. A more efficient MA plan (lower $C_{MA}(q_i^*)$) drives up the profit margin and thus the marginal benefit of enrolling more consumers, pushing the plan to boost quality to attract those (more profitable) consumers. A higher level of “quality sensitivity” among consumers that reveals itself via larger demand-response to quality (larger $D_i'(q)$) likewise increases the returns to more quality because any given quality increase produces a larger increase in enrollment. Finally, a lower marginal cost of quality means that the plan can increase enrollment via the demand-response to quality more cheaply.

Let’s now use this model to compare our three scenarios: (1) a monopolist MA plan with the outside option of uninsurance, (2) a monopolist MA plan with the outside option of Traditional Medicare, and (3) an MA plan competing with both Traditional Medicare and a second MA plan. Importantly, the only term in this expression that will differ for MA plan i across these three scenarios is $\frac{D_i'(q^*)}{D_i(q^*)}$. Thus, to understand how the presence of TM or an additional MA plan influence the level of quality chosen by the focal MA plan, we simply need to determine how the presence of those competitors influence this term.

In all cases, more competitors likely implies that the denominator is smaller. TM is a much better outside option than uninsurance, so more beneficiaries are likely to choose it, leading the focal MA plan’s enrollment to be smaller. Additionally, more competitors likely implies that the numerator is larger. Generally, we think that more competitors increases the own-quality elasticity.⁴ A stronger outside option (TM vs. uninsurance) means that there is a larger pool of

⁴ This may not hold if quality is not easily observable by beneficiaries. Recent work by Abaluck et al. (2021) indicates that beneficiary demand does not follow plan effect on mortality. Vatter (2025) shows that public

potential “marginal” beneficiaries to steal from. An additional MA competitor further increases the size of that pool of potential marginal beneficiaries. Thus, both the presence of TM and the addition of another MA plan are likely to increase the size of the numerator and decrease the size of the denominator, leading $\frac{D'_i(q^*)}{D_i(q^*)}$ to increase. This implies that the presence of TM will lead to a larger marginal benefit of quality and a higher q_i^* . Further, the addition of an additional MA plan will have a similar effect, leading to an even higher q_i^* .

We can also consider how a stronger TM might influence q_i^* . This can easily be seen from the discussion above. The comparison of q_i^* where the outside option is uninsurance versus TM is identical to the comparison of q_i^* where the outside option is a better vs. a worse TM. A better TM leads to a smaller $D_i(q^*)$ and likely also a larger $D'_i(q^*)$ and thus a higher marginal benefit to quality and a larger q_i^* .

Further, we can show how the strength of TM can also influence the effect of an additional MA plan on q_i^* . If TM is very strong, then an additional MA plan may have only a limited effect on $D'_i(q^*)$ and especially $D_i(q^*)$ because almost all beneficiaries are choosing TM, with or without the additional plan. If TM is very weak, then an additional MA plan may have a much larger effect on $D'_i(q^*)$ and especially $D_i(q^*)$ because nobody is choosing TM with or without the additional plan. This is a critical point: A strong TM leads to higher quality from a monopolist MA plan but also limits the benefits of competition within MA. A weak TM leads to lower quality from a monopolist MA plan and increases the returns to competition within MA. Thus, the level of quality in TM and effective competition policy in MA can in some ways be thought of as substitutes: We can achieve similar benefits for Medicare beneficiaries using either lever, so in settings where it is difficult to get entry and competition, strengthening TM may be an attractive option. Whereas in settings where TM is and always will be weak, competition policy may be more necessary.⁵

As mentioned above, a key abstraction in the simple model presented here is the absence of selection. Many have pointed out that selection can have important effects on the incentives of private insurers to provide higher quality products (Rothschild and Stiglitz 1976; Glazer and McGuire 2000; Layton et al. 2017). Specifically for the MA setting, Zahn (2025) shows that

quality disclosure may be important in Medicare Advantage, and, more interestingly, the form of disclosure can have important effects on firm behavior.

⁵ One note here is that if TM is extremely strong, there may be limited or no entry from MA plans, especially in the presence of fixed costs. But note that this is not necessarily a bad outcome, as beneficiaries are already benefiting from high levels of quality in TM. One might argue that limited entry from MA means limited potential for efficiency improvements, but if MA plans are relatively efficient, they will still be able to enter and acquire substantial market share even with a strong TM, meaning that if MA plans are not entering, they must not be particularly efficient. Similarly, one might argue that limited entry from MA means limited potential for increased welfare due to better “match quality.” Again, if there are welfare gains to be had from match quality, the MA plans will enter and attract market share to their differentiated products. So, if they do not enter, the potential gains from match quality likely weren’t particularly high. That said, limited entry of MA plans could be due to their inability to fully pass through savings to beneficiaries, due to the restriction that they can only pass through savings in the form of supplemental benefits and not as cash.

selection drives both market entry and plan design. We thus briefly show how selection may impact our key conclusion regarding substitutability of the strength of TM and competition within MA. It is straightforward to incorporate selection into the model by considering the cost of quality ($C(q_i)$) separately from medical costs and allowing medical costs to vary across enrollees so that the plan's average cost depends on who enrolls $AC_i(q_i, q_{-i})$. With this set-up we get a new profit maximization condition:

$$(P - C_{MA}(q_i^*) - AC_i) \frac{D'_i(q^*)}{D_i(q^*)} = C'_{MA}(q_i^*) + AC'_i$$

Now, when the MA plan raises its quality, its costs can potentially increase for two reasons. First, costs go up because quality is higher and higher quality costs more. Second, costs can go up because the average cost of the plan's enrollees may rise.

How does this change the effects of adding TM as a competitor and adding an additional MA plan as a competitor? Well, the marginal *benefit* of additional quality is pretty much unchanged from before. But the marginal *cost* of quality now incorporates the selection costs. If the focal MA plan faces adverse selection on quality,⁶ they will face a higher marginal cost of quality and choose a lower level of quality than they would choose in the absence of selection. So, in order to understand how selection might change the effects of competition on the quality of the focal MA plan, the key question is how the presence of TM (or a stronger TM) or a second MA plan affects the cost of the marginal enrollee.

Consider for example the introduction of a strong, very high-quality TM. When a strong TM is the outside option those choosing TM could easily be sicker than the average MA enrollee. In this case, AC'_i could be positive, and the marginal cost of additional quality will be higher (adverse selection on quality). This will counteract the higher marginal benefit stemming from a larger $\frac{D'_i(q^*)}{D_i(q^*)}$ term (compared to the outside option of uninsurance). In this case, the presence of TM will not lead the focal MA plan to choose a quality level as high as it would in the absence of selection. Note, however, that if TM is very weak and has fairly low quality, the result could flip. In that case, the beneficiaries in TM may be the healthiest (least quality-sensitive) people in the market and AC'_i is likely to be negative (advantageous selection on quality). In this case, the marginal cost of additional quality is actually lower than in the absence of selection, and the focal MA plan will choose an *even higher* level of quality than it would in the absence of TM.

Thus, selection could have important effects on the effects of competition on quality of the focal MA plan. The key question is how the presence of additional competitors affects the pool of the focal MA plan's marginal enrollees. In some cases, the addition of selection may just mean that q_i^* doesn't increase by quite as much due to the addition of another MA plan as it would in the absence of selection. But in other cases, selection could completely flip the conclusion and lead to q_i^* ultimately being lower with additional MA competitors than without them. Here, the key insight for policymakers is that without appropriate risk adjustment that ensures that marginal consumers, whether sick or healthy, are profitable, both competition policy and enhancing the

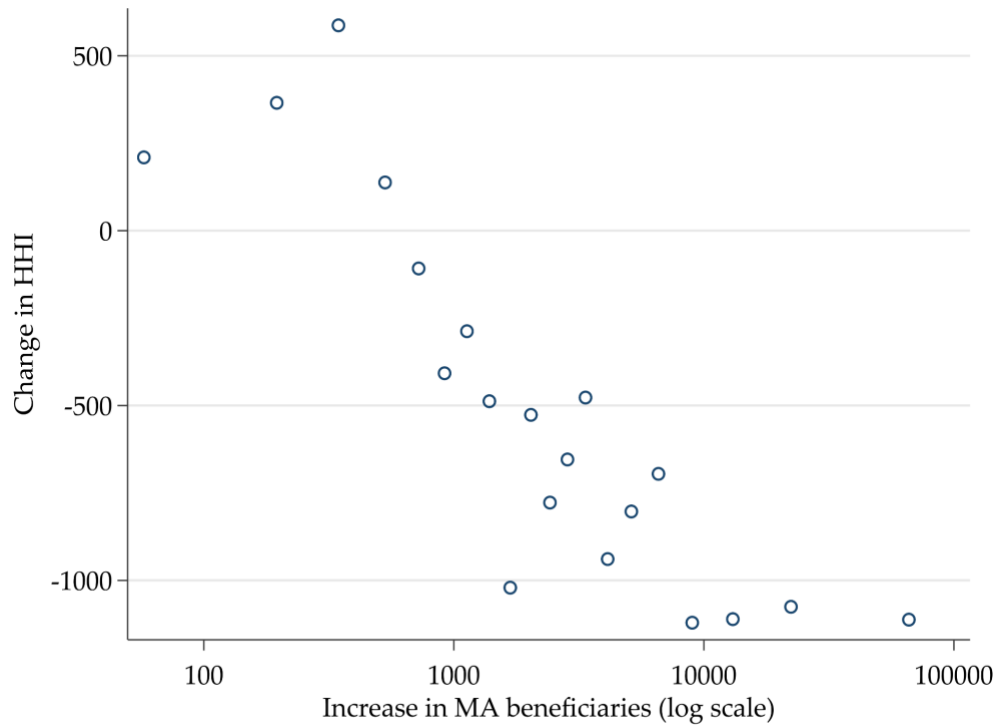
⁶ Recall that premiums are held fixed here, so this is akin to adverse selection on premium.

strength of TM could backfire by actually limiting the focal MA plan's incentive to invest in quality instead of strengthening it.

In summary, abstracting from selection, the addition of competition from TM unambiguously increases MA quality, and a stronger TM leads to even higher MA quality. Competition from an additional MA plan also increases quality in the focal plan. Importantly, if TM is weak, competition within MA is more important. Thus, policymakers should think about the strength of TM and effective competition policy within MA as substitutes. With selection, however, all bets are off, as competition from both TM and other MA plans can actually lead to worse quality in the focal plan. It is thus critical to use strong risk adjustment to ensure that marginal enrollees, whether sick or healthy, are always profitable.

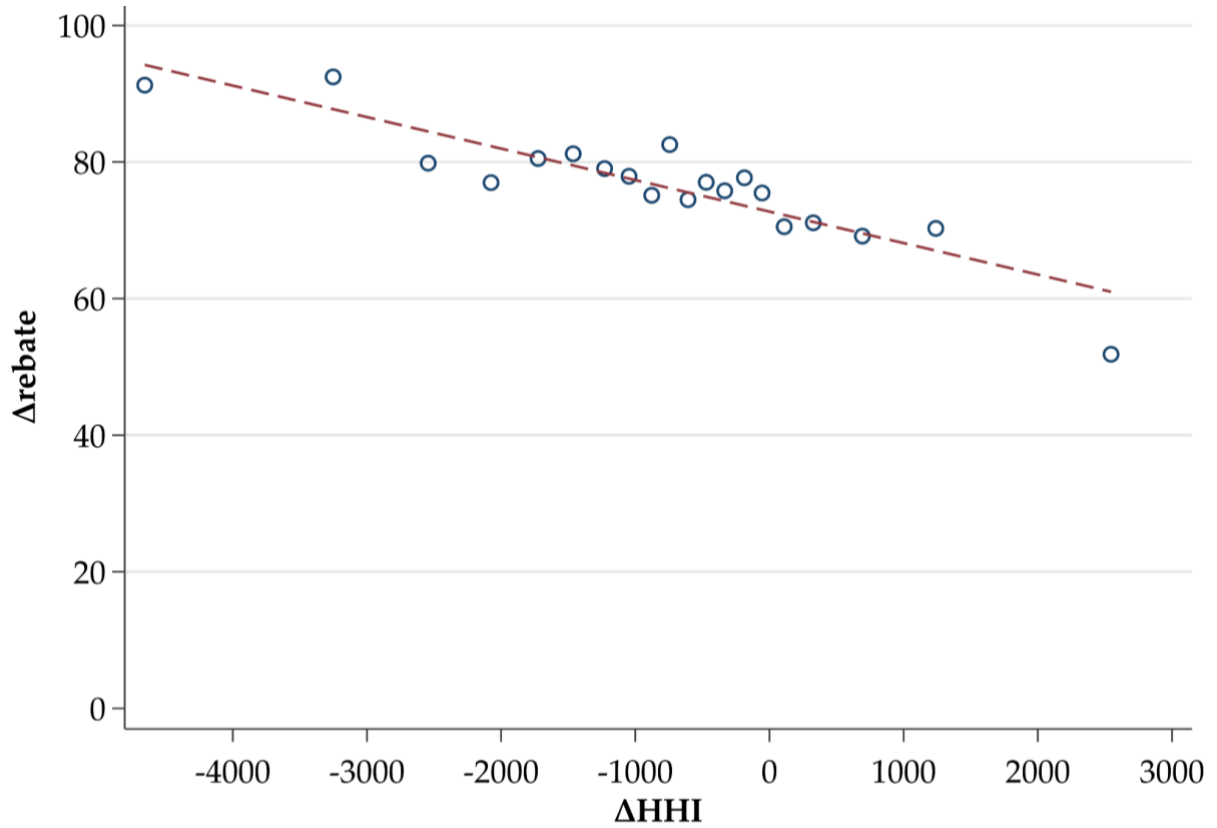
Appendix B: Additional Figures

Figure 12: Binscatter of Change in HHI vs. growth in new Medicare Advantage enrollees, 2007-2022



Notes: This figure shows a binscatter of change in HHI versus change in Medicare Advantage beneficiaries from 2007-2022. The x-axis is in log scale, reflecting the skewed distribution of the change in Medicare Advantage beneficiaries. We exclude 40 counties whose Medicare Advantage enrollment declined (out of over 3148) for readability. Scatterplot constructed using data from the MBSF.

Figure 14: Plot of change in rebates against change in HHI, 2016-2022



Notes: This figure shows a binscatter of change in average plan level rebate against change in HHI at the county-level, between 2016-2022. We exclude plans with less than 11 enrollees.