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Joseph P. Newhouse
Mary Price
J. Michael McWilliams
John Hsu
Thomas G. McGuire

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ABSTRACT

There are two types of selection models in the health economics literature. One focuses on choice between a fixed set of contracts. Consumers with greater demand for medical care services prefer contracts with more generous reimbursement, resulting in a suboptimal proportion of consumers in such contracts in equilibrium. In extreme cases more generous contracts may disappear (the "death spiral"). In the other model insurers tailor the contracts they offer consumers to attract profitable consumers. An equilibrium may or may not exist in such models, but if it exists it is not first best.

The Medicare Advantage program offers an opportunity to study these models empirically, although unlike the models in the economics literature there is a regulator with various tools to address selection. One such tool is risk adjustment, or making budget neutral transfers among insurers using observable characteristics of enrollees that predict spending. Medicare drastically changed its risk adjustment program starting in 2004 and made a number of other changes to reduce selection as well. Previous work has argued that the changes worsened selection. We show, using a much larger data set, that this was not the case, but that some inherent selection may remain.

Joseph P. Newhouse
Division of Health Policy Research
and Education
Harvard University
180 Longwood Avenue
Boston, MA 02115-5899
and NBER
newhouse@hcp.med.harvard.edu

Mary Price
Division of Research
Kaiser Permanente
442 Brimhall Street
St. Paul, MN 55105
price.bdc@gmail.com

J. Michael McWilliams
Harvard University
180 Longwood Avenue
Boston, MA 02115
mcwilliams@hcp.med.harvard.edu

John Hsu
Partners Healthcare
JHSU7@PARTNERS.ORG

Thomas G. McGuire
Department of Health Care Policy
Harvard Medical School
180 Longwood Avenue
Boston, MA 02115
and NBER
mcguire@hcp.med.harvard.edu

The health economics literature contains two types of selection models. One holds insurance contracts fixed and makes the weak assumption that the demand for contracts with more generous reimbursement is positively correlated with anticipated health care use. If premiums are the same for every person with given observable characteristics who chooses a given contract, as is generally the case, and if consumers have a choice of contracts, the resulting adverse selection implies an equilibrium with too few people choosing more generous contracts (Feldman and Dowd 1982; Cutler and Reber 1998; Einav, et al. 2010; Einav and Finkelstein 2011). In the extreme, a death spiral can ensue, and more generous plans can disappear altogether (Shore and Bertko 1999; Yegian, et al. 2000; Weinberg and Kramer 2011).

A second model focuses on the incentives of insurers to attract better than average risks by tailoring insurance options to attract them (Rothschild and Stiglitz 1976; Newhouse 1996; Hendren 2012). Inefficiency takes the form of insurance contracts with the wrong mix of premiums and benefits and/or of resources devoted to particular benefit areas (Frank, et al. 2000). As is well known, in this type of model an equilibrium may or may not exist depending on assumptions about the distribution of risks and insurers' behavior (Wilson 1977; Dubey and Geanakoplos 2002; Breyer, et al. 2012).

A prominent empirical example of selection in the health economics literature has been Part C of Medicare, or Medicare Advantage (MA). Until 2006 insurers participating in the MA program agreed to accept a fixed sum per enrollee to provide benefits at least as comprehensive as the "public option" of Traditional Medicare (TM).[1] This take-it-or-leave-it fixed sum was a function of spending by the average TM beneficiary in the MA plan's county, although the nature of the function changed over time. Starting in 2006 and continuing to the present, each insurer submits a bid rather than simply agreeing to a take-it-or-leave-it price set by Medicare. But a modified version of the pre-2006 administered price system lives on; instead of the insurer's receiving a fixed price; the beneficiary receives an analog to a voucher that equals the average fixed amount that would have been paid to the insurer if the pre-2006 program had continued. If the insurer's bid is less than the amount of the "voucher," and almost all bids are, the beneficiary receives 50-70% of the difference between the bid and the voucher as additional services or lower out-of-pocket payments. The government keeps the other 30-50%. In the few cases in which the bid exceeds the voucher, the beneficiary pays the entire increment. Importantly, TM is not part of this bidding system. For more detail see (Newhouse and McGuire 2014).

An MA insurer competes with both TM and with other MA insurers through the terms of the contracts or insurance plans that they offer beneficiaries. At a high level of generality the attraction of MA relative to TM for a beneficiary without supplementary insurance (Medigap) is much less cost sharing at the point of service and often additional covered services such as vision or dental.[2] In return,

[1] The requirement that benefits be at least as comprehensive as TM meant (and means) that MA plans had to cover any service covered by TM, for example, physician visits. Further, the actuarial value of any beneficiary out-of-pocket payments in the MA plan, both premiums and cost sharing, could not (and cannot) exceed the actuarial value of the cost sharing in TM. MA participants were (and are) required to be enrolled in Part B and pay the Part B premium.

[2] A beneficiary enrolling in TM has the option of purchasing an individual Medigap plan to cover most or all of the cost sharing in TM, in effect converting the additional cost sharing in TM relative to MA to an additional premium

the beneficiary agrees to change the terms at which he or she can use certain physicians or hospitals; if a given physician or hospital is not in the MA plan's network, the beneficiary's out-of-pocket cost to use that physician or hospital would likely be considerably above what the beneficiary would pay in TM.

Each MA insurer has an incentive to design their plan to attract participants whose spending is below the MA plan's bid, net of the risk adjustment payments we describe below. Except for the risk adjustment payments, this incentive is the same as that of insurers in the well-known Rothschild-Stiglitz (1976) model, the second type of selection model referred to above. Plans must accept all beneficiaries who want to join, so to affect the distribution of costs among enrollees, plans must influence who wants to join them in the first place. Their main instruments for doing so are their choice of networks of providers and structure of drug formularies, as well as their marketing and choice of geographic area in which to operate (Frank et al. 2000; Cao and McGuire 2003).

In the Rothschild-Stiglitz model there is no regulator of the contracts that can be offered, whereas the Medicare Advantage program uses a number of instruments to mitigate selection behavior by plans, as we describe below.[3] A key issue is how effective these instruments are. Historically they were not very effective, so Medicare has introduced additional anti-selection instruments in the past decade.

Two groups of economists have studied the effect of the introduction of these new instruments and reached different conclusions. Our group has published three papers that suggest favorable selection in MA has fallen markedly, but that some remains (McWilliams, et al. 2012; Newhouse, et al. 2012; Newhouse, et al. 2013). By contrast, Brown, et al. have concluded that plans found new ways to select in response to Medicare regulations so as to increase the degree of favorable selection (Brown, et al. 2011). In the remainder of this paper we briefly review the evidence to date and present new evidence by re-estimating an approximation to Brown, et al.'s key equation on a much larger data set. The effectiveness of the new instruments is an important issue for the Medicare program, as well as other publicly regulated programs, including the ACA's health insurance exchanges.

We conclude that selection has fallen markedly among the main group of persons enrolled in the MA Coordinated Care Program (primarily HMOs but also PPO's), the elderly who are not Medicaid eligible ("non-duals"), who are not institutionalized, and whose initial basis of eligibility was old age. Nonetheless, some modest selection remains. Ascertaining whether selection changed among other groups of persons enrolled in MA is difficult because of small numbers and legislative changes in the design of the plans available to them.[4] Whereas the second model of selection that focuses on plan

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relative to MA. Around 30 percent of beneficiaries have a supplementary plan that is partly or fully subsidized by a prior employer, although this may be structured as a lump sum subsidy with Medicare Advantage plans as a choice. Poorer Medicare beneficiaries are eligible for Medicaid, which historically functioned like a supplementary plan to TM, although many states are currently enrolling Medicaid beneficiaries in MA with the ability to opt out to TM.

[3] Employers play this role in the commercial market by choice of plans to offer employees and subsidy policy.

[4] The other groups include those whose original reason for eligibility was not old age (about 16% of Medicare beneficiaries are disabled under 65 in 2009), those also eligible for Medicaid (18% of Medicare beneficiaries), and those institutionalized (about 5% of the Medicare population). These groups are not mutually exclusive; for

incentives implies that in principle better regulation might ameliorate the selection, the first model implies there may be some inherent characteristics of TM and the current structure of the Medicare program that lead to at least some residual selection between MA and TM.

Background on the Medicare Advantage Program

MA plans face two problems in competing against TM. First, the unit prices they negotiate with physicians and hospitals are typically above the take-it-or-leave-it prices paid by TM. Second, they must finance the lower cost sharing they offer. To compete therefore, MA plans must reduce the quantity of services they pay for, either through medical management of chronic diseases (e.g., attempting to increase compliance with prescribed medication and thereby lowering the likelihood of hospitalization), choosing physicians to be in their network who practice conservatively, or with the mechanism of interest to us, offering networks of providers and drug formularies and configuring cost sharing in ways that will attract good risks, as envisioned in the second model of selection described above.

The first type of selection model, however, could also be relevant. Not surprisingly those with multiple illnesses on average use more providers than those with no or a single health problem, as we show below. These persons, who also may have more complex disease or at least greater concerns about complexity associated with having multiple comorbid conditions, could prefer TM's freedom of choice of provider (almost all providers participate in TM), since the more providers the beneficiary uses, the greater the chance that one or more of them is not in an MA plan's network. Networks and formularies are inherent in MA, since MA plans must have a credible threat to exclude the provider from their network to negotiate price.[5] If selection of this type is going on, beneficiaries in MA plans will tend to be "healthier" and less costly than those in TM, but better regulation cannot address it given the current structure of the Medicare program.[6]

Medicare employs several instruments to mitigate plans' selection incentives. First, it "risk adjusts" the amounts it pays MA plans. The general idea is that Medicare makes budget neutral transfers among MA plans according to certain observed characteristics of each plan's mix of enrollees; thus, plans whose enrollees are below average in expected cost are paid less than those whose enrollees are above average in expected cost. TM, however, is not part of this transfer system. Up until 2000, the algorithm to determine a beneficiary's expected cost accounted for only demographic variables such as age, gender, Medicaid eligibility, whether the beneficiary was institutionalized, and the beneficiary's county of residence. These variables were used to predict spending by TM beneficiaries and thus

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example, 44% of the dual eligible group was under 65. Percentages are from the Medicare Payment Advisory Commission 2013 Data Book (Medicare Payment Advisory Commission 2013). As we describe below, in the time period we examine, these groups were underrepresented in Medicare Advantage.

[5] Starting in 2012 the MA program has paid bonuses to plans based on the observed quality of care. Plans thus have an incentive to exclude from their network or charge high copayments to see providers whose measured quality is low.

[6] In principle, such selection could be addressed with sufficiently good risk adjustment in a voucher like scheme that included TM, for example, the premium support proposal of Senator Wyden and Representative Ryan (Antos 2012). Nonetheless, there would not be efficient sorting of beneficiaries between TM and MA for reasons we describe in the conclusion.

yielded relative supply prices for individuals in MA plans with given characteristics. For example, a plan that hypothetically enrolled only 65-69 year old males in a given county would have been paid less than a plan that hypothetically enrolled only 70-74 years old males in the same county. Second, Medicare regulates network and formulary adequacy; a plan's network, for example, must include a sufficient number of oncologists. Third, Medicare regulates a plan's choice of geographic area in which to operate; generally a plan must either operate in an entire county or not enter the market in that county; it requires special approval to choose particular zip codes within a county in which to operate. Fourth, as mentioned above, Medicare constrains the amount of cost sharing; the actuarial value of a plan, or the percentage of an average beneficiary's cost that the contract covers, must equal or exceed that of TM. Thus, a plan's ability to attract good risks by offering even higher cost sharing and lower premiums than TM, a standard kind of selection tool in unregulated insurance markets, is limited. In practice this actuarial value constraint is rarely binding, because, as noted above, MA plans typically offer much lower cost sharing than TM. Finally, Medicare has an overarching authority to refuse to contract with a plan that it deems as engaged in selection.

The health economics literature, however, has convincingly demonstrated that in the 1990's these various anti-selection tools did not prevent favorable selection into MA plans. The Congressional Budget Office estimated that in the mid 1990's Medicare on average paid 8% more for the beneficiaries in MA than if those same beneficiaries had enrolled in TM - despite Medicare's paying a take-it-or-leave-it price that at that time was 95% of the average TM spending in a county for a beneficiary with average risk (Congressional Budget Office 1997; Morgan, et al. 1997; Cutler and Zeckhauser 2000; Glied 2000; Newhouse 2002; McGuire, et al. 2011; Breyer et al. 2012).

As a result of the observed favorable selection into MA, Medicare took two additional steps in the past decade to decrease selection. First, it incorporated diagnostic information into its risk adjustment scheme. Specifically, starting in 2000 Medicare adjusted its then fixed payment to plans using information on inpatient diagnoses, but gave that system only 10% weight; the other 90% of the weight continued to be on the old demographic system.[7] This system continued until 2004, when Medicare began a transition to a system that incorporated diagnostic information from both inpatient and outpatient settings (Pope, et al. 2004). That system, which Medicare continues to use, is called CMS-HCC's or just HCC's, and in 2004 it had 30% weight in determining payment, in 2005 50% weight, in 2006 75% weight, and the transition was complete in 2007. Which enrollees are profitable are influenced by these weights, which we exploit later in our year-by-year analyses. During the transition, the remaining weight was on the old system that consisted mostly (90%) of demographic variables.

The HCC risk adjustment system effectively sets a relative price for each plan enrollee that is a function of the relative spending to treat an enrollee with similar observable characteristics in TM. For example, an MA plan would be reimbursed considerably more for a 75 year old woman living in the community with congestive heart failure (HCC80) than for a 75 year old woman living in the same

[7] The small weight on the diagnosis-based system was to mitigate an incentive to hospitalize just to record a diagnosis.

community with breast cancer (HCC10) (Pope et al. 2004). Like the old system, however, this newer system just makes budget neutral transfers among MA plans; it does not incorporate TM.

Second, Medicare made it more difficult for beneficiaries to move between TM and MA. Prior to 2006 Medicare allowed a beneficiary to move between MA and TM at the end of any month, in contrast to commercial insurance where an individual typically chooses a health insurance contract for an entire year during an annual open enrollment period. The ability for Medicare beneficiaries to change from MA to TM monthly was initially seen as a beneficiary protection against underservice by or dissatisfaction with an MA plan but it facilitated selection, since a beneficiary in MA with a new diagnosis who wanted to use an out-of-network physician to treat the problem could move to TM almost immediately.

Starting in 2006, however, a beneficiary who chose MA was locked in to the chosen plan for the last six months of the calendar year, but could still change plans monthly during the first half of the year. Beginning in 2007 the lock-in period was the last 9 months and in 2011 it was extended to the last 10.5 months of the year. Nonetheless, by allowing a plan change in the first six weeks of the year Medicare remains less restrictive than commercial insurance. The lock-in, however, does not apply to the minority of Medicare beneficiaries also eligible for Medicaid, so-called dual eligibles.

Coincident with these changes, Medicare also introduced new types of MA plans that were limited to certain beneficiaries. In particular, two types of Special Needs Plans (SNP's) were introduced, one for dual eligibles (those also eligible for Medicaid) and one for the institutionalized.[8] Another type of plan, private fee-for-service plans, were authorized in 1997 legislation and entered the market in 1998. They were open to all beneficiaries, but attracted few enrollees before 2004, after which time they grew rapidly. These plans, however, had very different characteristics than the other MA options, which we describe in more detail below.

Estimates of Selection Effects

Virtually all the historical evidence on selection and much of the more recent evidence compares use of medical services among those currently in TM who subsequently switch to MA with those who remain in TM. The limitation to those in TM reflects the availability of TM data and the lack of analogous MA data. In addition to examining those in TM who switch to MA, the literature also often compares those now in TM who recently left MA with those who were always in TM.[9] These comparisons are typically adjusted for age, gender, Medicaid status, employment status, and county, which were also the principal adjusters for plan payment in the 1990's.

The early literature cited above, using data from the 1990's, found that those enrolling in MA were relatively low utilizers when they were enrolled in TM immediately prior to their enrollment in MA,

[8] There were also separate plans for those with certain chronic diseases. Of the various types of SNP's, the one for the duals dominated numerically; 83% of SNP enrollees were in those plans (Medicare Payment Advisory Commission 2007).
[9] Selection, of course, is unidentified if one simply compares use in TM and MA contemporaneously, since differences could arise from selection, differences in medical management, and differences in cost sharing.

when compared with those who remained in TM and did not switch to MA. Data on the use of the much less numerous group disenrolling from MA were mildly conflicting; some data showed the disenrollees to be relatively high users after moving to TM when compared with the group that had remained in TM, and other data showed the use of the two groups was similar. In short, these data suggested that good risks were enrolling in MA and bad risks might be disenrolling (Physician Payment Review Commission 1996; Medicare Payment Advisory Commission 2000). It was on the basis of such comparisons between switchers and stayers that the CBO determined that MA program added to Medicare program cost.

There are three problems with inferring selection from such studies. The first two arise from status quo bias, the tendency of beneficiaries to remain in the same plan year after year (Samuelson and Zeckhauser 1988). First, because of status quo bias, only a small percentage of beneficiaries switch from TM to MA each year, as we confirm below. As a result, even if those who switch exhibit the expected type of selection, the characteristics of the much larger stock of beneficiaries who remain in their plans year after year could differ substantially from the characteristics of those who switch.

Second, even if those few who switch differ in their unobserved characteristics at the time of the switch, initial differences appear to regress to the mean. For example, in 1998 the age-sex-Medicaid adjusted mortality rate among those who were enrolled in MA for less than a year was 21 percent less than those who remained in TM, but for those who had been in MA five years or more, the difference was only 11 percent (Newhouse, et al., 2012). We note in passing that these mortality data support the inference that in the 1990's there was favorable selection into MA since it is implausible that any causal effect of MA on mortality could be 21 percent or even 11 percent. Note these mortality differences apply to the stock of beneficiaries in each type of plan, not just the small flow between them.

The third problem is methodological. One would like to know the magnitude of selection net of those who switch into and out of MA, but a methodological problem interferes with such a calculation.[10] In the period we are examining, however, many fewer persons, only about a fifth as many, switch out of MA into TM as switch into MA from TM; hence we focus here on those switching into rather than out of MA.[11]

More recent data, however, show less evidence of favorable selection than the data from the 1990s did. By 2008 the difference in age-sex-Medicaid adjusted mortality among those enrolled in MA for less than a year had fallen from its 1998 value of 21 percent to 13 percent and the difference among

[10] The difficulty in reaching a summary value for those switching in both directions is that the risk score for those switching into MA must be based on lagged diagnoses, since historically diagnostic data were not available from MA enrollees. For the same reason among those disenrolling the risk score must be based on concurrent diagnoses because lagged diagnoses are not available; as a result, these scores are not comparable. Nonetheless, the difference in numbers of those switching into MA relative to those switching out of MA means the characteristics of those switching in, the group we focus on, would likely dominate any summary value of selection.

[11] This decision means our conclusions on selection may be somewhat optimistic because those disenrolling from MA into TM in the more recent period do appear sicker than those who remain in TM continuously (Newhouse, et al., 2012).

those enrolled five years or more in MA, instead of 11 percent, was an insignificant 1 percent less, again consistent with regression toward the mean.[12]

Other data in addition to the mortality data suggest selection behavior changed in the past decade. To implement the risk adjustment described above, the Center for Medicare and Medicaid Services (CMS) computes a risk score, which is simply the average weight of the HCCs among the plan's enrollees. The risk score, which is proportional to the average spending in TM for an enrollee with the given observable characteristics including diagnosis, changed substantially among those switching into MA over the 2004-2008 period relative to those remaining in TM. In 2003 those in TM switching into MA in 2004 had risk scores that were about 10% less than those who remained in TM, consistent with the earlier studies of favorable selection into MA; by 2008 that figure had fallen to 3% (Newhouse, et al., 2012).[13] This period coincided with the introduction of the CMS-HCC's and the lock-in.

These risk score data, of course, are subject to the caveat noted above that the characteristics of the switchers may not closely represent those of the stock of beneficiaries. McWilliams, et al. (2012), however, compared self-rated health status as well as utilization among the stock of those in MA and those in TM over the 2001-2007 period. Like the mortality data between 1998 and 2008, these comparisons showed a striking change. The proportion of beneficiaries who rated their health as fair or poor, the two worst categories, was over 20% less in MA than in TM in 2001-2003, but by 2006-2007 was only 5% less and one could not reject the null of no significant difference.[14] McWilliams, et al. (2012) also compared changes in the total utilization of medical services over this period. If medical management techniques were relatively constant, such changes would primarily reflect changes in selection.[15] Utilization in MA was about 18% less in the 2001-2003 period, but only about 8% less in 2006-2007. Drug fills, which in 2001-2003 were less in MA than TM, were greater by 2006-2007.

In short, these data suggest that a different mix of beneficiaries began to choose MA, at a rate large enough to affect characteristics of the entire stock of beneficiaries in the two plan types. One additional piece of data suggests that by later in the period, the distribution of beneficiaries in MA and TM were coming into balance. Newhouse, et al. (2013) obtained data for 2010-2011 from one MA plan on its revenues and its medical cost (i.e., its payout to physicians, hospitals, etc.) for beneficiaries in 48 common HCC's or combinations of HCC's, e.g., chronic obstructive pulmonary disease, or chronic obstructive pulmonary disease and specified heart arrhythmias. In these data each beneficiary only entered one of the 48 groups. Revenue to MA plans for persons in a given HCC or combination of HCC's

[12] Because of medical management, a 1 percent difference could potentially be causal.

[13] These results are consistent with Brown, et al.'s findings in their Figure 2. Brown, et al., point out that the upper part of the risk score distribution was unprofitable; however, this is based on TM spending patterns that do not replicate in MA (Newhouse, et al., 2013). In Newhouse (2013) we had cost data by HCC from 2 MA plans; in one of them, but not the other, the profitability of a beneficiary fell monotonically with the risk score, consistent with Brown, et al. Brown, et al. interpret their results as consistent with the second model of plan selection, however, we interpret them as consistent with the first model of plan selection, as we describe below.

[14] Even in 2006-2007, however, about 10% more of MA beneficiaries, however, said their health had worsened relative to the prior year.

[15] Any improvement in medical management techniques, the expected direction of any change, would mean the inference of reduced selection was understated.

is approximately proportional to what TM pays for these HCC's or combinations of HCC's. Because the plan had a varying ability to influence cost in these various disease categories and because it faced varying degrees of market power across physicians who treated different diseases, its margins varied by 160 percentage points over these categories, which would appear to give it strong incentives to select by HCC category.[16] Nonetheless, there was almost no difference between the distribution of beneficiaries across these 48 categories in the MA plan and the distribution in TM. The mean absolute difference in the share of beneficiaries in MA and TM across the 48 categories was only 0.34 percentage points. In this one plan at least, there was no evidence that, post risk adjustment and lock-in changes, the plan was structuring its product to attract beneficiaries in the relatively more profitable HCC categories.

But What Happened to Profitability?

Although the earlier literature suggested that in the 1990's plans benefited financially from favorable selection, the results just cited do not answer the question of whether plans changed their selection mechanism as the new HCC risk adjustment phased in such a way that they maintained or enhanced their profit. As Brown, et al. (2011) point out, after the implementation of the HCC system, it was profitable for plans to select within an HCC category rather than simply select low utilizers within an age-sex category. Brown, et al. present empirical evidence that plans did change their behavior in exactly this fashion. In the remainder of this paper we describe Brown's basis for this claim and then re-estimate their key equation on a much larger data set and more targeted population.

Brown, et al. estimated the following two equations using data from 1994 to 2007. The two equations compare the risk score and Medicare spending for persons in TM who switch from TM to MA for some part of the following year with those who do not switch to MA and remain in TM. The question of interest is whether those opting for MA at the end of 2003, and so starting MA enrollment in 2004, differ in their use (relative to stayers in TM) from those opting for MA in prior years. The sample Brown, et al. use comes from Medicare claims that are linked to the Medicare Current Beneficiary Survey (MCBS) and is limited to persons who were in TM in year *t* since no analogous data are available for those enrolled in MA.

$$Risk\ Score_{it} = \alpha_0 + \alpha_1 Fraction\ of\ Next\ Year\ Spent\ in\ MA_{t+1} + \alpha_2 Fraction\ of\ Next\ Year\ Spent\ in\ MA_{i,t+1} x\ After\ 2002_t + \alpha_3 Year\ Dummies_t + \epsilon_{it}$$

[16] For example, the least profitable diagnosis for the plan was unstable angina and other acute ischemic heart disease where medical intervention by the plan would be minimal because of the acute nature of the treatment. Similarly diseases typically treated by specialists, such as cancer and multiple sclerosis, were much less profitable than chronic diseases typically treated by primary care physicians such as diabetes. Specialists, being fewer in number, have more market power vis-à-vis plans than do primary care physicians. Although an unknown amount of the 160 point spread across conditions is attributable to sampling error, there is a clear pattern in the more and less profitable diagnoses, suggesting the variation by diagnosis is not merely noise.

$$Gov\ \$_{it} = \beta_0 + \beta_1 Fraction\ of\ Next\ Year\ Spent\ in\ MA_{i,t+1} + \beta_2 Fraction\ of\ Next\ Year\ Spent\ in\ MA_{i,t+1} x\ After\ 2002_t + \beta_3 Year\ Dummies + \beta_4 Risk\ Score_{it} + \varepsilon_{it}$$

In both equations *Risk Score*$_{it}$ is the CMS-HCC value for beneficiary *i* in year *t*, and in the second equation *Gov \$*$_{it}$ is TM spending on beneficiary *i* in year *t*, including any out-of-pocket spending by the beneficiary. *Gov \$*$_{it}$ is thus a measure of how sick the beneficiary is in year *t*. *After 2002* takes the value 1 for the years 2003 and later and is zero otherwise.

It is easiest to interpret these equations if one simply assumes that those who switched to MA spent the entire next year in MA so that the fraction of the next year spent in MA is 1 for those who switched and zero for those who did not. Then for those who switched into MA for 1995, the risk score based on the diagnoses recorded in TM in 1994 is $\alpha_0 + \alpha_1$, whereas for those who remained in TM it is just α_0. For subsequent years one simply adds the coefficient of the year dummy to both groups, with an additional effect for the MA group in the *After 2002* years. Consistent with the results from the literature cited above showing favorable selection in the 1990's, Brown et al. find α_1 negative and highly significant in the first equation, indicating that those who switched to MA had a lower risk score when in TM and presumptively spent less. We also found this result (Newhouse, et al., 2012).

The results of estimating the second equation are of greater interest since the second equation not only measures total Medicare spending but also controls for the risk score, which was used to adjust payments to plans starting in 2004. *Gov \$*$_{it}$, the total spending by TM beneficiaries in 1994 who switched to MA in 1995 is $\beta_0 + \beta_1$, and starting in 2003 it is $\beta_0 + \beta_1 + \beta_2$ plus a year fixed effect that applies to both switchers and stayers. Brown, et al.'s test of whether the spending for those who chose to switch into MA in the years 2003 and later (and so were in MA in 2004 and later) differed from those who chose switch in prior years is whether one can reject the hypothesis that β_2 = 0, since the transition to the HCC system began in 2004. They estimate β_2 to be negative with a t-statistic of 2.02. Since risk score is controlled for, Brown, et al. interpret this as indicating that plans changed their selection behavior to select those within HCC who were spending less in TM the year before they joined an MA plan.

Brown, et al.'s use of claim files linked to the MCBS severely limits their sample size. There are about 16,000 observations per year in total in the MCBS. The share in TM varies over the time period, but averages around 90% in the pre-HCC period and somewhat less in the post-period. Of that 90% about 1-4 percent switch into MA in a given year, or about 150-600 per year, which is likely why Brown, et al pooled the nine years before the introduction of the HCC's to compare with the four subsequent years.[17] As we described earlier, the incentives to select varied by year during the 2004-2007 period,

[17] Note that this averages to only about 2-8 persons per HCC per year. Although the original specification of the CMS-HCC model included 189 HCC's, only 70 were ultimately used in the risk adjustment scheme, presumably for reasons of precision (Pope, et al., 2004). Beneficiaries with multiple diseases typically have weights for each disease added to arrive at a risk score, although there are a handful of one-way interactions in the model.

that is, these four years encompassed the transition to the HCC method. To obtain greater precision we re-estimated Brown, et al.'s equations using the much larger 20% random sample of Medicare claims from each calendar year in the 2001-2011 period.

Brown, et al. include all TM enrollees in their sample, but we limit our sample to those whose original reason for Medicare eligibility was old age, thus excluding beneficiaries who became eligible before 65 for reasons of disability or having End Stage Renal Disease. Table 1 shows that the group whose original reason for eligibility was old age comprises 79% of Medicare beneficiaries. We focus on the group that became eligible from turning 65 because it comprises the bulk of Medicare beneficiaries and makes the population more homogeneous. For the latter reason we also exclude the dual eligibles and the institutionalized. There are, however, additional reasons to exclude the dual eligibles and the institutionalized. The 2003 Medicare Modernization Act created separate Special Needs Plans (SNPs) for the duals, the institutionalized, and those with certain chronic conditions as part of the MA program.[18] Thus, legislative authorization for these plans did not exist until 2003, so the menu of choices for these two groups expanded coincident with the introduction of the HCC's. Moreover, the lock-in provisions that took effect in 2006 do not apply to duals, and the institutionalized are paid with a separately estimated risk adjustment formula.

Descriptive data on the group we focus on is shown in Table 2; similar data on two groups we exclude, the duals and the institutionalized, are shown in Tables 3 and 4. As can be seen, these two groups are both smaller and spend considerably more than the non-institutionalized, non-duals.

One type of plan that flourished between 2006 and 2010 was the private-fee-for-service (PFFS) plan. Although this plan was paid like an MA plan, its characteristics are similar to TM. PFFS plans generally did not have networks, so that enrollees could see any provider who saw Medicare patients without a differential out-of-pocket payment; the provider was paid at TM rates.[19] Unlike other MA plans, there was by law no medical management. PFFS plans only had 80,000 enrollees in 2005 (and less than half that in prior years), but grew to 800,000 in 2006, 1.5 million in 2007, 2.3 million in 2008, 2.4 million in 2009, and then began to decline because of a requirement that PFFS plans have networks that took effect in 2011.[20] In this period PFFS dominated TM for many beneficiaries (McWilliams, et al. 2011). Because PFFS plans are both different from HMO and PPO plans but also because they attracted many switchers in some years, we will show results including and excluding those who switched to PFFS plans. Tables 5 and 6 disaggregate the sample shown in Table 2 into those switching to HMO's and PPO's versus those switching to PFFS.

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[18] These plans could have changed selection patterns among the dual eligibles and institutionalized. Such plans first entered the market in 2004, but there were only 11 such plans in that year, a number that grew to 125 plans in 2005. The first enrollment data we have found are for 2006, when there were 276 SNP plans with 541,000 enrollees out of a total of 6.9 million MA enrollees.[18] In 2006, 226 of the 276 plans were for dual eligibles, and they had 440,000 enrollees (6% of all MA enrollees); there were also 37 plans for the institutionalized with 20,000 enrollees (Medicare Payment Advisory Commission 2007).

[19] Starting in 2011 PFFS plans were required to have networks; at that time many transformed themselves into PPO plans.

[20] The enrollment data are from various reports of the Medicare Payment Advisory Commission.

The samples shown in Tables 1-6 include only those who were enrolled in both Parts A and B of Medicare in the prior year and who were enrolled in Medicare on January 1 of the succeeding year. This is necessary to allow us to identify those who switched from TM to MA, but it does exclude those who died in the prior year. They also exclude the relatively small numbers of beneficiaries in cost-based MA plans, because the reimbursement for such plans is based on their medical costs and is not fixed as it is for most MA plans. Cost-based plans enrolled 10% of enrollees in 1996, but only 4% in 2014 (Prospective Payment Assessment Commission 1997; Centers for Medicare and Medicaid Services 2014). Finally and importantly, risk scores for new Medicare enrollees in MA are based only on demographic variables because newly eligible Medicare beneficiaries have no prior claims information. Lacking diagnostic information for this group with which one could compute an HCC score, we also exclude them.

Three conclusions are immediately apparent from the data in Tables 1-6. First, as already noted, the proportion of switchers in any given year is small. Second, the raw means indicate risk adjustment has a considerable burden if selection is to be mitigated; in the ten years shown in Table 2, mean spending in TM among who switched to MA in the year before they switched was 17% to 34% less than among the much larger group that remained in TM. Third, the number of switchers among the duals and the institutionalized is small in absolute terms, especially in the pre-HCC years; in those years the number of switchers to PFFS plans is also small.

The left hand panel Table 7 shows results from re-estimating Brown, et al.'s second equation using the sample shown in Table 2. The key coefficients are those for *Switched to MA the following year* and *Switched to MA the following year*Year*. For those who were in TM in 2001 and switched to MA on January 1, 2002, the *Switched to MA* coefficient indicates that they spent $174 less on average within each HCC than those who remained in TM assuming they spent the full year in MA. In 2002 this amount increased to $393 (=174+219). Using the data from Table 2, these amounts were 3-6% of mean spending in those years. In 2003-2005, as the HCC system was transitioning into place, favorable selection within HCC increased, especially among those choosing to switch in 2004 and 2005. These results are consistent with Brown, et al.'s result that within-HCC selection increased among those choosing to enroll in MA in 2003 and later.

After 2005, however, selection fell, and from 2006-2010, the years when the HCC system was fully in place, the amount of selection within HCC was approximately the same as in 2001-2002, before the HCC system was implemented. If one averages the within-HCC selection for 2001-2002, the two years before the transition, the within-HCC selection was $284; the analogous figure for 2006-2010, the five years after the system was fully in place, was $320. The $36 difference between these two means is well within one standard deviation of the difference.

Although the data in Table 7 suggest that in 2003-2005 there was additional favorable selection within HCC when compared with the pre-HCC years, in those years there was 70%, 50%, and 25% weight, respectively, on the old demographic system. As a result, it may well not have been profitable to select within HCC, especially in 2003 and 2004, because during these phase-in years even low cost patients in a high cost HCC likely would be more expensive than a patient with no HCC's and so would have reduced the plan's profit. We therefore do not regard the data for these transition years as necessarily indicating that plans chose to select within HCC.

The right hand panel in Table 7 shows results for the same years using the old demographic risk adjustment methods, that is, excluding the risk score but adjusting for age and gender.[21] The results show much greater selection from use of the old system. When only age and gender are adjusted for, those who remained in TM in 2001 and 2002 spent $1,689 and $2,239 (=1,689+550) more in TM than those who switched, respectively.[22] Thus, the comparison of the $1,689 and $2,239 values (average $1,964) with the $320 figure from the years following full implementation of the HCC's (Table 7, left hand panel) indicates that the combination of the HCC risk adjustment system and the lock-in greatly reduced selection.

Although Table 7 contains our principal findings, we examined the robustness of our findings to including as explanatory variables the MA penetration in the beneficiary's county of residence and a main effect for those who moved (Table 8). The inclusion of these variables did not change our qualitative conclusions, namely that at a given level of penetration, selection in the era before HCC's with only demographic adjusters was notably greater than in the era after implementation of the HCC's, and that selection within HCCs was little different among those who switched in the 2006-2010 period than it was in 2001 and 2002. Interestingly, however, starting in 2002 the effect of a 10 percentage point change in MA penetration in a county became monotonically more negative, a period when MA enrollment was rising substantially, from around 15% of all beneficiaries in 2001-2002 to around 24% in 2010-2011. The usual economic model of selection (Cutler and Reber 1998; Feldman and Dowd 1982) suggests that an increase in penetration should attract worse risks into MA (as well as raise the average risk in TM). The data in Table 8 do not support this prediction; starting in 2005 the coefficient on the penetration variable turns negative and becomes steadily more negative. During this period penetration rose nationally every year; the steadily more negative coefficients indicate that, if anything, increasingly better risks were being attracted to MA as county-level penetration increased in the cross section. This is consistent with a finding we had reached earlier using different methods (Newhouse et al. 2012).

As described above, PFFS plans differed considerably from HMO plans, and one might therefore anticipate selection patterns would differ. Hence, we reestimated the results in Table 7 using only those who switched to HMO plans.[23] These results are shown in Table 9. We were unable to identify whether the plan was a PFFS or an HMO plan for those who switched in 2010, so Table 9 has once less post-HCC year than Table 7. The average switcher in the 3 post-HCC years shown in Table 9 spent $365 less in TM the year prior to the switch, compared with the $320 figure in Table 6. This difference of $45 is also within one standard error; thus, our findings are robust to considering just those who switch to HMO and PPO plans rather than all MA plans, including PFFS.

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[21] The earlier formula also adjusted for Medicaid and institutionalized status, but those groups are not in our sample.

[22] Although the earlier system also used Medicaid eligibility and institutional status to risk adjust, this sample omits those two groups and thus we only adjust using age and gender.

[23] Very few persons switched to PFFS in 2001 and 2002 (Table 6) so that comparisons of pre- and post HCC years are imprecise.

We suggested above that the more unique physicians a beneficiary anticipated seeing, the more likely the beneficiary would prefer TM because it would be more likely that they would want to use out-of-network physicians if they enrolled in MA. Table 10 shows that the average number of unique physicians seen by a beneficiary rises monotonically with the number of HCC's. Thus, the costliest beneficiaries within an HCC may inherently prefer the greater provider choice in TM.

Conclusions

We have two main results:

- Although there appears to be selection within HCC that favors MA, the magnitude of this selection is little changed from the period two years before the HCC system was introduced to the five years following its full introduction.
- Although some favorable selection into MA appears to remain, the introduction of the HCC system and the lock-in has markedly diminished it. Since these two innovations were introduced at approximately the same time, we have not tried to decompose the amount of reduction attributable to each. This decrease in selection is consistent with other evidence (Newhouse, et al. 2012; Newhouse et al. 2013; Newhouse and McGuire 2014).

A key policy question, of course, is the magnitude of the remaining selection in the MA program. How much should these findings influence one's judgment on that question? Given the small proportion of beneficiaries who switch from TM to MA in a given year relative to the stock of enrollees in TM, one to four percent of all beneficiaries, we think rather little. Because of status quo bias, beneficiaries tend to remain in the plan they selected, and over time there is regression to the mean. Stated differently, the longer that beneficiaries remain in TM or MA, concerns about the effects of any initial differential selection are mitigated. For example, age-sex-Medicaid adjusted mortality in 2008 was 13 percent less after in the year immediately after enrolling in MA compared with mortality among those who stayed in TM, but for those who have been in MA five years or more, adjusted mortality was an insignificant one percent less relative to those who stayed in TM. In addition, McWilliams, et al. (2012) made a straightforward comparisons of self-rated health status among all TM and MA beneficiaries, not just those in TM who switched compared with those who did not. That comparison showed that the proportion of MA beneficiaries who rated their health fair or poor was notably less in MA in 2001-2003, in the pre-HCC and lock-in era, but that it had converged toward the TM rate by 2006-2007. Thus, the mix of risks overall among all those enrolled in MA and TM may be close.

We return now to the two types of selection identified in the health economics literature and the associated inefficiencies, and consider what our results mean in those terms. The first type of selection problem is when individuals sort themselves inefficiently between plan types, due to the premium for the more generous plan being "too high" because more costly types are more likely to prefer the more generous coverage. The premium thus reflects the average incremental cost between plans (as it needs to for efficiency) but also a component due to selection (which interferes with efficient sorting). When risk adjustors better track expected costs, as we found evidence for here, premium differences between plans in a competitive market will contain less of a component due to selection.[24] Thus, our findings suggest that inefficiencies in plan choices in Medicare Advantage have likely diminished. It is worth keeping in mind, however, that any single premium cannot sort beneficiaries efficiently so some selection problems of this first type would remain even if selection as we measure it here were completely eliminated (McGuire, et al. 2013). Efficient plan choice of premium and benefits may also be interfered with by institutional rules that discourage plans from deviating from a premium exactly equal to the mandatory Part B premium automatically paid by all beneficiaries who elect an MA plan (Newhouse and McGuire 2014).

The second type of selection occurs when plans distort their mix of premiums and benefits to attract profitable enrollees. The new risk adjustment system greatly changed plans' financial incentives to favor low cost beneficiaries within an HCC rather than low cost beneficiaries within an age-sex group. Our first conclusion suggests that plans did not alter their selection behavior in response to this change in incentive. We find this conclusion plausible; while plans choose networks, formularies, cost-sharing structure, and marketing, under the new system they would have to motivate the physicians and hospitals with whom they contract to select profitable patients *within an HCC*, and it is not obvious how plans, who mostly have arms-length contracts with hospitals and physicians, would do that. It certainly is conceivable that a plan could form networks of providers who happen to have low cost patients within a diagnosis at a given point in time, but given the randomness in spending among a given panel of patients at the provider level along with the turnover in patients at any given provider or provider group, providers that appear to be low cost today may be high cost tomorrow (Hofer, et al. 1999; Bronskill, et al. 2002). Also the more stringent lock-in periods may have inhibited some plan switching in response to health status changes.

Furthermore, in other work we failed to find evidence of selection across HCC's (Newhouse, et al. 2013). It seems plausible that it is less costly to select across HCC's than within HCC, since networks and formularies might be structured to attract or not attract individuals with certain diagnoses. Our failure to find this type of selection with the HCC system in place strengthens our confidence that selection mechanisms did not change in response to the HCC's.

One other phenomenon may explain some remaining selection. Newhouse, et al. (2012) showed that more than half of those who disenrolled from Medicare Advantage re-enrolled within 12 months from disenrolling. This is consistent with beneficiary provider shopping: when a beneficiary wants a medical procedure performed by an out-of-network provider, they switch to TM to have it done, and then re-enroll in the MA plan, for example, a hip replacement done by a particular surgeon. Although the lock-in could have reduced such provider shopping, this type of behavior may plausibly have been approximately constant before and after the HCC system and the lock-in, that is, it is related to the inherent difference between TM and MA of freedom of provider choice within TM.

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[24] Although premiums and cost sharing for TM are set administratively, the expected cost of MA premiums and cost sharing is constrained to equal to or less than TM's actuarial value. In practice by 2007 the expected cost of MA was less for almost all beneficiaries (McWilliams, et al., 2011). Thus, this constraint on the actuarial value of MA plans is rarely binding.

Balancing profitability across groups of beneficiaries according to their health care use, as the HCC system seeks to do, is likely to mitigate incentives to distort certain services in relation to others, but our findings do not allay concerns about the basic incentives to reduce premiums and benefits to attract profitable types. Nonetheless, in contrast to the basic Rothschild-Stiglitz model where there is no regulator and no constraint on contracts that can be offered, Medicare has numerous instruments with which to address selection and it appears to have made substantial progress in doing so.

In sum, improving the match between risk adjusted payments and expected costs in MA is likely to have improved the efficiency of the MA program, both in terms of efficient sorting of beneficiaries between TM and MA and in terms of the nature of plan offerings. Efficiency problems would, however, persist even with a complete elimination of selection as studied here because of Medicare's single premium policy. Attention to premium policy as well as risk-adjustment policy is called for to more fully address performance of the MA program.

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Table 1: Beneficiaries by Age and Original Reason for Eligibility (ORE)*

		ORE=Aged		ORE=Disability or ESRD			
	Total	Age 65+		Age 65+		Age <65	
2001	5,760,821	4,563,388	79.2%	422,207	7.3%	775,226	13.5%
2002	5,959,061	4,701,352	78.9%	442,511	7.4%	815,198	13.7%
2003	6,095,807	4,779,197	78.4%	458,698	7.5%	857,912	14.1%
2004	6,143,162	4,781,953	77.8%	465,479	7.6%	895,730	14.6%
2005	6,129,633	4,740,059	77.3%	467,811	7.6%	921,763	15.0%
2006	5,974,412	4,607,287	77.1%	459,927	7.7%	907,198	15.2%
2007	5,887,761	4,506,823	76.5%	460,829	7.8%	920,109	15.6%
2008	5,820,956	4,427,286	76.1%	465,482	8.0%	928,188	15.9%
2009	5,871,707	4,429,056	75.4%	476,663	8.1%	965,988	16.5%
2010	5,958,291	4,462,672	74.9%	498,891	8.4%	996,728	16.7%

*The following types of beneficiaries were excluded from the sample: newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year. In addition, beneficiaries who switched into cost MA plans or special needs plans were excluded.

Table 2a: Unadjusted expenditures by Year and Switching Status,

Non-Institutionalized, Non-Duals*

	Stay in TM in next Year			Switch to MA in Next Year		
	N	Mean $	SD	N	Mean $	SD
2001	3,731,431	5,325	11,144	24,562	3,739	8,711
2002	3,851,378	6,001	13,034	26,129	4,006	9,628
2003	3,971,622	6,358	13,433	41,798	4,183	9,416
2004	3,927,310	6,651	13,837	77,193	4,566	10,060
2005	3,789,618	6,871	14,169	160,230	4,722	10,210
2006	3,687,693	6,958	14,406	161,753	5,750	11,947
2007	3,610,107	7,016	14,527	156,727	5,822	12,222
2008	3,531,134	7,015	14,670	126,855	5,374	11,752
2009	3,537,119	7,263	15,349	111,616	5,776	12,908
2010	3,577,950	7,343	15,510	91,620	5,590	12,256

*2007$ The following types of beneficiaries were excluded from the sample: Beneficiaries whose original eligibility was attributable to disability or ESRD; newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year; the institutionalized; and dual eligibles. In addition, beneficiaries who switched into cost MA plans or special needs plans were excluded.

Table 2b: Unadjusted Risk Scores* by Year and Switching Status

Non-Institutionalized, Non-Duals

	Stay in TM in next Year			Switch to MA in Next Year		
	N	Mean Score	SD	N	Mean Score	SD
2001	3,731,431	0.922	0.760	24,562	0.788	0.658
2002	3,851,378	0.953	0.817	26,129	0.804	0.687
2003	3,971,622	0.976	0.844	41,798	0.809	0.686
2004	3,927,310	0.983	0.852	77,193	0.842	0.714
2005	3,789,618	1.000	0.868	160,230	0.853	0.716
2006	3,687,693	1.018	0.886	161,753	0.927	0.800
2007	3,610,107	1.023	0.881	156,727	0.947	0.813
2008	3,531,134	1.004	0.829	126,855	0.883	0.730
2009	3,537,119	1.010	0.838	111,616	0.898	0.753
2010	3,577,950	0.967	0.799	91,620	0.846	0.708

*Risk scores are computed using the 2007 CMS-HCC model.

Table 3a: Unadjusted expenditures by Year and Switching Status

Non-institutionalized Duals

	Stay in TM in next Year			Switch to HMO in Next Year		
	N	Mean	SD	N	Mean	SD
2001	380,492	7,277	14,437	2,732	6,925	14,772
2002	395,135	8,376	16,866	3,023	7,881	15,810
2003	412,942	8,969	17,326	5,216	7,653	16,084
2004	404,749	9,214	17,675	12,546	8,225	16,357
2005	389,618	9,574	18,379	39,323	7,973	15,659
2006	375,952	9,756	18,745	28,342	8,885	16,522
2007	367,100	9,953	19,349	23,563	8,722	16,203
2008	408,096	10,357	19,788	20,555	8,865	17,365
2009	419,309	10,803	20,709	18,297	9,527	17,780
2010	427,833	10,665	20,520	18,567	9,052	17,715

*in 2007$ The following types of beneficiaries were excluded from the sample: Beneficiaries whose original eligibility was attributable to disability ,ESRD, or Alzheimer's; newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year; the institutionalized; and dual eligibles. In addition, beneficiaries who switched into cost MA plans or special needs plans were excluded.

Table 3b: Unadjusted Risk Scores* by Year and Switching Status

Non-institutionalized Duals

	Stay in TM in next Year			Switch to HMO in Next Year		
	N	Mean	SD	N	Mean	SD
2001	380,492	1.2801	0.9305	2,732	1.184	0.848
2002	395,135	1.3362	0.9960	3,023	1.211	0.897
2003	412,942	1.3731	1.0317	5,216	1.191	0.926
2004	404,749	1.3772	1.0385	12,546	1.253	0.931
2005	389,618	1.3979	1.0533	39,323	1.277	0.938
2006	375,952	1.4243	1.0818	28,342	1.342	0.989
2007	367,100	1.4336	1.0814	23,563	1.322	0.981
2008	408,096	1.4099	1.0215	20,555	1.284	0.922
2009	419,309	1.4403	1.0304	18,297	1.299	0.943
2010	427,833	1.3692	0.9835	18,567	1.228	0.888

* Risk scores are computed using the 2007 CMS-HCC model.

Table 4a: Unadjusted expenditures* by Year and Switching Status

Institutionalized

	Stay in TM in next Year			Switch to HMO in Next Year		
	N	Mean	SD	N	Mean	SD
2001	421,423	21,860	30,161	2,748	23,305	28,939
2002	423,218	17,899	27,276	2,469	20,997	28,985
2003	345,235	19,144	28,250	2,384	20,662	30,462
2004	356,336	19,949	29,052	3,819	21,077	30,964
2005	351,318	20,738	29,846	9,952	18,285	27,269
2006	345,477	20,996	30,421	8,070	20,755	30,130
2007	340,690	21,491	30,918	8,636	20,910	29,790
2008	334,485	22,264	31,560	6,161	20,742	28,957
2009	336,523	23,393	33,289	6,192	23,283	32,872
2010	341,551	23,560	33,600	5,151	23,015	32,490

*2007$. The following types of beneficiaries were excluded from the sample: Beneficiaries whose original eligibility was attributable to disability ,ESRD, or Alzheimer's; newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year. In addition, beneficiaries who switched into cost MA plans or special needs plans were excluded.

Table 4b: Institutionalized: Unadjusted Risk Scores by Year and Switching Status

Institutionalized

	Stay in TM in next Year			Switch to HMO in Next Year		
	N	Mean	SD	N	Mean	SD
2001	421,423	1.797	1.050	2,748	1.815	1.018
2002	423,218	1.720	0.999	2,469	1.780	0.991
2003	345,235	1.751	1.031	2,384	1.731	0.975
2004	356,336	1.753	1.036	3,819	1.747	0.989
2005	351,318	1.774	1.057	9,952	1.717	0.977
2006	345,477	1.793	1.068	8,070	1.800	1.047
2007	340,690	1.801	1.072	8,636	1.786	1.026
2008	334,485	1.751	0.987	6,161	1.717	0.921
2009	336,523	1.767	0.984	6,192	1.768	0.951
2010	341,551	1.687	0.946	5,151	1.702	0.922

Risk scores are computed using the 2007 CMS-HCC model.

Table 5a: Unadjusted expenditures by Year and Switching Status,

Non-Institutionalized, Non-Duals*

	Stay in TM in next Year			Switch to MA-HMO's in Next Year		
	N	Mean $	SD	N	Mean $	SD
2001	3,731,431	5,325	11,144	23,966	3,714	8,691
2002	3,851,378	6,001	13,034	24,988	4,033	9,725
2003	3,971,622	6,358	13,433	37,727	4,210	9,524
2004	3,927,310	6,651	13,837	58,207	4,657	10,288
2005	3,789,618	6,871	14,169	87,142	4,766	10,257
2006	3,687,693	6,958	14,406	53,373	5,279	11,456
2007	3,610,107	7,016	14,527	70,898	5,389	11,705
2008	3,531,134	7,015	14,670	74,039	4,940	10,973
2009	3,537,119	7,263	15,349	85,114	5,662	12,796

*2007$ The following types of beneficiaries were excluded from the sample: Beneficiaries whose original eligibility was attributable to disability ,ESRD, or Alzheimer's; newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year; the institutionalized; and dual eligibles. In addition, beneficiaries who switched into PFFS, cost MA plans or special needs plans were excluded. MA-PPO enrollees are included. 2010 values are not shown in this table because we are unable to identify the type of MA plan that was chosen in 2010.

Table 5b: Unadjusted Risk Scores* by Year and Switching Status

Non-Institutionalized, Non-Duals

	Stay in TM in next Year			Switch to MA-HMO's in Next Year		
	N	Mean Score	SD	N	Mean Score	SD
2001	3,731,431	0.922	0.760	23,966	0.786	0.658
2002	3,851,378	0.953	0.817	24,988	0.806	0.689
2003	3,971,622	0.976	0.844	37,727	0.817	0.695
2004	3,927,310	0.983	0.852	58,207	0.860	0.737
2005	3,789,618	1.000	0.868	87,142	0.872	0.735
2006	3,687,693	1.018	0.886	53,373	0.897	0.785
2007	3,610,107	1.023	0.881	70,898	0.901	0.779
2008	3,531,134	1.004	0.829	74,039	0.850	0.702
2009	3,537,119	1.010	0.838	85,114	0.891	0.751

*Risk scores are computed using the 2007 CMS-HCC model.

Table 6a: Unadjusted expenditures by Year and Switching Status,

Non-Institutionalized, Non-Duals*

	Stay in TM in next Year			Switch to MA-PFFS in Next Year		
	N	Mean $	SD	N	Mean $	SD
2001	3,731,431	5,325	11,144	596	4,764	9,445
2002	3,851,378	6,001	13,034	1,141	3,416	7,155
2003	3,971,622	6,358	13,433	4,071	3,934	8,345
2004	3,927,310	6,651	13,837	18,986	4,286	9,323
2005	3,789,618	6,871	14,169	73,088	4,668	10,153
2006	3,687,693	6,958	14,406	108,380	5,982	12,175
2007	3,610,107	7,016	14,527	85,829	6,180	12,621
2008	3,531,134	7,015	14,670	52,816	5,982	12,739
2009	3,537,119	7,263	15,349	26,502	6,143	13,253

*2007$. The following types of beneficiaries were excluded from the sample: Beneficiaries whose original eligibility was attributable to disability ,ESRD, or Alzheimer's; newly eligible beneficiaries (since no prior claims information was available); beneficiaries who did not have 12 months of continuous enrollment in TM, both Parts A and B, in the prior year; the institutionalized; and dual eligibles. In addition, beneficiaries who switched into cost MA plans or special needs plans were excluded. 2010 values are not shown in this table because we are unable to identify the type of MA plan that was chosen in 2010.

Table 6b: Unadjusted Risk Scores* by Year and Switching Status

Non-Institutionalized, Non-Duals

	Stay in TM in next Year			Switch to MA-PFFS in Next Year		
	N	Mean Score	SD	N	Mean Score	SD
2001	3,731,431	0.922	0.760	596	0.8728	0.6707
2002	3,851,378	0.953	0.817	1,141	0.7611	0.6425
2003	3,971,622	0.976	0.844	4,071	0.7346	0.5912
2004	3,927,310	0.983	0.852	18,986	0.7849	0.6379
2005	3,789,618	1.000	0.868	73,088	0.8308	0.6918
2006	3,687,693	1.018	0.886	108,380	0.9416	0.8072
2007	3,610,107	1.023	0.881	85,829	0.9849	0.8379
2008	3,531,134	1.004	0.829	52,816	0.9286	0.7666
2009	3,537,119	1.010	0.838	26,502	0.9221	0.7565

*Risk scores are computed using the 2007 CMS-HCC model.

Table 7: Outcome = Expenditures in Year T, Predictor = Fraction of Year T+1 in MA (risk score adjustment vs. no adjustment), Non-Institutionalized, Non-Duals*

		Model 1: Adjusted for Risk Score				Model 2: Not adjusted for Risk Score			
		Coeff	SE	95%	CI	Coeff	SE	95%	CI
Fraction of months in MA in Next Year		-174.13	63.09	-297.79	-50.47	-1,688.84	76.19	-1,838.18	-1,539.50
Year (reference=2001)	2002	333.81	6.06	321.93	345.69	676.18	7.63	661.23	691.13
	2003	441.20	6.32	428.82	453.58	1,014.92	8.12	999.00	1,030.84
	2004	660.89	6.54	648.08	673.70	1,302.56	8.47	1,285.97	1,319.16
	2005	696.30	6.80	682.98	709.62	1,510.95	8.82	1,493.67	1,528.23
	2006	586.26	7.18	572.18	600.34	1,591.44	9.41	1,572.99	1,609.89
	2007	593.84	7.26	579.60	608.08	1,643.04	9.53	1,624.37	1,661.71
	2008	798.21	7.52	783.47	812.95	1,652.43	9.65	1,633.51	1,671.35
	2009	984.16	7.75	968.96	999.36	1,922.47	9.94	1,902.99	1,941.96
	2010	1,523.65	7.85	1,508.26	1,539.05	2,012.32	9.97	1,992.77	2,031.87
Fraction of months in MA in Next Year*Year	2002	-218.87	98.75	-412.41	-25.32	-549.81	122.32	-789.55	-310.07
	2003	-289.79	86.33	-458.98	-120.59	-828.00	105.29	-1,034.37	-621.63
	2004	-553.46	77.99	-706.32	-400.60	-772.56	95.99	-960.70	-584.42
	2005	-513.90	68.19	-647.56	-380.25	-571.23	82.88	-733.67	-408.78
	2006	-34.95	68.20	-168.62	98.72	556.52	83.47	392.91	720.12
	2007	-227.04	68.32	-360.93	-93.14	589.73	83.57	425.92	753.53
	2008	-147.75	69.72	-284.40	-11.09	242.79	84.81	76.56	409.01
	2009	-89.04	71.62	-229.41	51.33	501.16	87.40	329.86	672.47
	2010	-231.84	71.95	-372.86	-90.82	231.72	87.81	59.61	403.83
Risk Score (centered on 1)		10,829.92	7.69	10,814.83	10,845.00				
Age Group	70-					1,039.19	8.90	1,021.75	1,056.63

	74								
(reference=65-69)	75-79					2,198.67	10.18	2,178.72	2,218.63
	80-84					2,973.63	11.05	2,951.96	2,995.29
	85-89					3,449.23	13.09	3,423.57	3,474.90
	90-94					3,628.99	18.36	3,593.01	3,664.98
	95+					3,113.58	32.25	3,050.37	3,176.79
Male						48.40	10.49	27.83	68.97
Male*Age Group	70-74					325.25	13.90	298.00	352.49
	75-79					819.12	16.26	787.26	850.98
	80-84					1,123.17	18.35	1,087.21	1,159.13
	85-89					1,225.91	22.44	1,181.94	1,269.88
	90-94					1,143.91	33.94	1,077.40	1,210.43
	95+					1,427.16	68.08	1,293.72	1,560.60
Constant		6,174.42	4.69	6,165.22	6,183.62	3,215.42	8.52	3,198.72	3,232.12

*The sample is the same as in Table 2.

Table 8: Model Results with MA Penetration: Outcome = Expenditures in Year T, Predictor = Fraction of Year T+1 in MA (risk score adjustment vs. no adjustment), Non-Institutionalized, Non-Duals*

		Model 1: Adjusted for Risk Score				Model 2: Not adjusted for Risk Score			
		Coeff	SE	95%	CI	Coeff	SE	95%	CI
Fraction of months in MA in Next Year		-210.18	63.32	-334.28	-86.09	-1,964.87	76.49	-2,114.78	-1,814.95
Year (reference=2001)	2002	638.70	13.66	611.93	665.48	1,622.14	17.90	1,587.06	1,657.23
	2003	753.38	13.65	726.62	780.13	1,966.81	17.99	1,931.54	2,002.08
	2004	1,007.14	13.83	980.02	1,034.25	2,293.03	18.28	2,257.21	2,328.85
	2005	1,047.99	14.29	1,019.98	1,076.01	2,529.94	18.88	2,492.94	2,566.94
	2006	964.23	15.21	934.41	994.04	2,680.92	20.14	2,641.45	2,720.39
	2007	1,018.21	15.98	986.90	1,049.52	2,745.02	21.16	2,703.55	2,786.50
	2008	1,287.94	16.82	1,254.97	1,320.91	2,765.90	22.00	2,722.78	2,809.03
	2009	1,502.92	17.61	1,468.42	1,537.43	3,038.70	22.93	2,993.76	3,083.64
	2010	2,165.28	17.69	2,130.62	2,199.95	3,163.19	22.90	3,118.30	3,208.08
Fraction of months in MA in Next Year*Year	2002	-266.21	99.04	-460.33	-72.09	-617.10	122.70	-857.59	-376.61
	2003	-308.93	86.61	-478.69	-139.17	-811.81	105.68	-1,018.93	-604.68
	2004	-526.14	78.23	-679.47	-372.81	-641.32	96.30	-830.06	-452.58
	2005	-480.42	68.41	-614.51	-346.33	-345.08	83.17	-508.09	-182.08
	2006	-0.69	68.41	-134.77	133.39	826.28	83.74	662.15	990.41
	2007	-181.04	68.54	-315.39	-46.70	850.10	83.87	685.72	1,014.49
	2008	-91.17	69.96	-228.28	45.94	501.91	85.11	335.09	668.72
	2009	-25.10	71.85	-165.92	115.72	757.69	87.70	585.81	929.57
	2010	-160.31	72.16	-301.74	-18.87	491.97	88.10	319.30	664.64
MA Penetration in County (10% increase)		23.92	3.38	17.30	30.54	182.67	4.27	174.30	191.05
MA Penetration in County (10% incr)*Year	2002	25.96	4.71	16.73	35.19	26.25	5.93	14.62	37.88
	2003	13.71	4.99	3.92	23.49	9.70	6.42	-2.88	22.28

	2004	-21.66	5.16	-31.77	-11.55	-35.60	6.70	-48.73	-22.47
	2005	-24.84	5.33	-35.28	-14.39	-73.33	6.90	-86.85	-59.80
	2006	-41.65	5.47	-52.36	-30.93	-142.98	7.14	-156.97	-128.98
	2007	-64.49	5.74	-75.74	-53.24	-152.11	7.46	-166.74	-137.48
	2008	-91.37	5.83	-102.81	-79.94	-157.29	7.43	-171.84	-142.73
	2009	-101.18	6.04	-113.01	-89.34	-163.35	7.65	-178.35	-148.35
	2010	-156.00	5.96	-167.69	-144.31	-179.84	7.52	-194.58	-165.11
Moved		334.30	11.51	311.75	356.85	961.84	15.32	931.80	991.87
Risk Score (centered on 1)		10,829.43	7.70	10,814.35	10,844.51				
Age Group	70-74					1,043.19	8.90	1,025.75	1,060.63
(reference=65-69)	75-79					2,196.12	10.18	2,176.17	2,216.07
	80-84					2,961.12	11.05	2,939.46	2,982.77
	85-89					3,428.98	13.09	3,403.33	3,454.63
	90-94					3,604.20	18.35	3,568.24	3,640.17
	95+					3,091.45	32.22	3,028.30	3,154.61
Male						44.28	10.50	23.71	64.85
Male*Age Group	70-74					328.06	13.90	300.81	355.30
	75-79					826.37	16.25	794.51	858.22
	80-84					1,132.36	18.34	1,096.41	1,168.31
	85-89					1,233.97	22.42	1,190.02	1,277.92
	90-94					1,148.87	33.91	1,082.40	1,215.34
	95+					1,428.28	68.03	1,294.95	1,561.62
Constant		5,810.87	12.97	5,785.44	5,836.29	2,034.76	18.15	1,999.18	2,070.33

*The sample is the same as Table 2.

Table 9: Outcome = Expenditures in Year T, Predictor = Fraction of Year T+1 in MA (risk score adjustment vs. no adjustment), Non-Institutionalized, Non-Duals Switching to HMO's and PPO's*

		Model 1: Adjusted for Risk Score				Model 2: Not adjusted for Risk Score			
		Coeff	SE	95%	CI	Coeff	SE	95%	CI
Fraction of months in MA in Next Year		-196.69	63.32	-320.80	-72.58	-1,704.53	76.56	-1,854.58	-1,554.48
Year (reference=2001)	2002	337.20	6.06	325.31	349.09	676.46	7.63	661.50	691.41
	2003	446.83	6.32	434.45	459.22	1,016.29	8.12	1,000.36	1,032.21
	2004	667.62	6.54	654.80	680.44	1,305.89	8.47	1,289.29	1,322.49
	2005	704.61	6.80	691.29	717.94	1,514.82	8.82	1,497.53	1,532.11
	2006	597.28	7.18	583.20	611.36	1,594.98	9.42	1,576.52	1,613.43
	2007	604.86	7.26	590.63	619.10	1,645.76	9.53	1,627.09	1,664.44
	2008	807.31	7.52	792.57	822.06	1,654.99	9.66	1,636.06	1,673.91
	2009	993.77	7.77	978.54	1,009.00	1,924.48	9.94	1,904.99	1,943.96
Fraction of months in MA	2002	-211.06	99.51	-406.10	-16.02	-507.30	123.54	-749.43	-265.17
in Next Yr*Yr	2003	-355.56	88.45	-528.92	-182.20	-808.93	108.16	-1,020.92	-596.93
	2004	-659.68	81.88	-820.16	-499.19	-585.88	101.25	-784.33	-387.43
	2005	-683.76	72.11	-825.10	-542.42	-486.88	87.82	-659.01	-314.76
	2006	-196.44	76.14	-345.67	-47.21	-55.24	94.60	-240.65	130.17
	2007	-155.84	73.67	-300.22	-11.45	194.29	90.71	16.50	372.08
	2008	-228.47	73.21	-371.97	-84.98	-160.82	89.11	-335.47	13.84
	2009	-120.70	74.07	-265.87	24.47	390.32	90.71	212.54	568.10
Risk Score (centered on 1)		10,724.59	7.93	10,709.06	10,740.13				
Age Group	70-74					1,023.49	9.34	1,005.20	1,041.79
(reference=65-69)	75-79					2,161.12	10.55	2,140.44	2,181.81
	80-84					2,904.99	11.43	2,882.59	2,927.38
	85-89					3,344.25	13.52	3,317.74	3,370.75

	90-94					3,485.41	18.98	3,448.22	3,522.61
	95+					2,966.50	33.10	2,901.63	3,031.38
Male						67.11	11.01	45.53	88.69
Male*Age Group	70-74					327.83	14.62	299.18	356.48
	75-79					830.72	16.90	797.60	863.85
	80-84					1,132.71	18.97	1,095.54	1,169.89
	85-89					1,235.56	23.27	1,189.95	1,281.17
	90-94					1,142.96	35.21	1,073.94	1,211.98
	95+					1,357.56	70.25	1,219.87	1,495.25
Constant		6,166.15	4.70	6,156.93	6,175.36	3,246.75	8.72	3,229.67	3,263.84

*The sample is the same as in Table 5.

Table 10: Mean number of providers seen in 2011 by number of HCCs

No. of HCCs	Subjects	Mean No. of Providers	SD	Min	Max
0	1,642,618	3.50	3.74	0	90
1	1,091,932	5.38	4.48	0	101
2	633,884	6.74	5.33	0	104
3	346,879	8.00	6.18	0	101
4	406,325	10.55	8.31	0	225

Source: 2011 20% Medicare claims sample and the Carrier file. Providers include MD's, DO's, and RN's billing independently other than radiologists, anesthesiologists, and pathologists as identified from the provider specialty variable on the Carrier file. All differences are significant at the 0.0001 level.