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Who Joins Medicare Managed Care? Voluntary Enrollment and Positive Selection

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ABSTRACT

Objective. To test for biased selection into and out of Medicare managed care (MMC), and to demonstrate a novel way of obtaining health status information about MMC enrollees.

Data Sources. Medicare enrollment limited data set (LDS) and Healthcare Cost and Utilization Project State Inpatient databases from Arizona, Florida, New Jersey and New York from 1999-2004 supplemented with data from the Area Resource File (ARF) and the Census bureau.

Study Design. Fixed effects linear probability models are used to examine the probability of MMC enrollment conditional on beneficiary demographic, socioeconomic and health status characteristics for a random sample of elderly Medicare beneficiaries.

Data Extraction. The 5 percent LDS enrollment file was merged with ARF and Census data. E-codes and ICD-9 codes were used to identify Medicare beneficiaries hospitalized for accidents and marker conditions in the SID to generate a plausibly random sample.

Principal Findings. Results provide evidence of biased selection into MMC; those with several comorbid conditions or more serious health conditions are likely to remain in Fee-for-Service Medicare, while MMC plans attract enrollees with uncomplicated diabetes and hypertension. Younger beneficiaries and minorities are more likely to enroll in MMC. Minorities, the previously disabled, and dual-eligibles are more likely to disenroll from MMC mid-year.

Conclusions. Higher payments to MMC plans relative to Fee-for-Service spending may not effectively target the beneficiaries with the greatest health and financial needs.

INTRODUCTION

Recent Federal policy has attempted to promote enrollment in Medicare managed care (MMC) plans through increased funding to the program currently known as Medicare Advantage. MMC plans contract with the government to provide basic Medicare coverage and supplemental benefits to Medicare beneficiaries who elect the managed care option. Roughly twenty percent of beneficiaries are currently enrolled and Federal projections suggest that nearly thirty percent of Medicare beneficiaries will join a managed care plan by 2017 (CBO, 2007). The growth in MMC enrollment has been accompanied by considerable policy debate about the role of managed care in Medicare. While MMC plans can play an important role in providing additional benefits for enrollees, under current law the plans also cost the government more per enrollee than remaining in traditional Fee-for-Service (FFS) Medicare (GAO, 2008).

Economic theory predicts that when choice of coverage is voluntary, healthier beneficiaries will select into the less costly alternative, MMC in this case, leaving the sicker beneficiaries in Fee-for-Service Medicare. Managed care plans should compete to attract healthier enrollees, causing an adverse selection problem if MMC enrollees are healthier, or less likely to use health care, than those who remain in FFS (Rothschild and Stiglitz, 1976; Frank et al, 2000). If this occurs, estimates of the overpayments to MMC plans relative to FFS will be understated and the additional spending may be directed towards a healthier subpopulation rather than targeting benefits to sicker and low-income Medicare beneficiaries (CBO, 2007).

Empirical literature analyzing data through the mid-1990s found that MMC enrollees on average are less costly than those remaining in FFS (Mello et al., 2003; Maciejewski et al., 2001, CMS, 1999). Since that time, several Federal policy changes governing payments to plans and program availability have attempted to encourage program enrollment through several strategies including promoting availability of benefit packages that will attract beneficiaries with greater health needs to managed care. Though policymakers frequently debate reducing payments to MMC plans, they have lacked information about enrollee health characteristics.

This paper uses administrative Medicare enrollment data to model beneficiary enrollment and disenrollment in MMC plans from 1999 through 2004 and inpatient hospitalization data to examine differences in health status of current enrollees in MMC and FFS. Unlike previous papers, I am able to address all factors which can influence biased selection; enrollment into MMC, disenrollment, and differences between those currently enrolled in managed care and Fee-

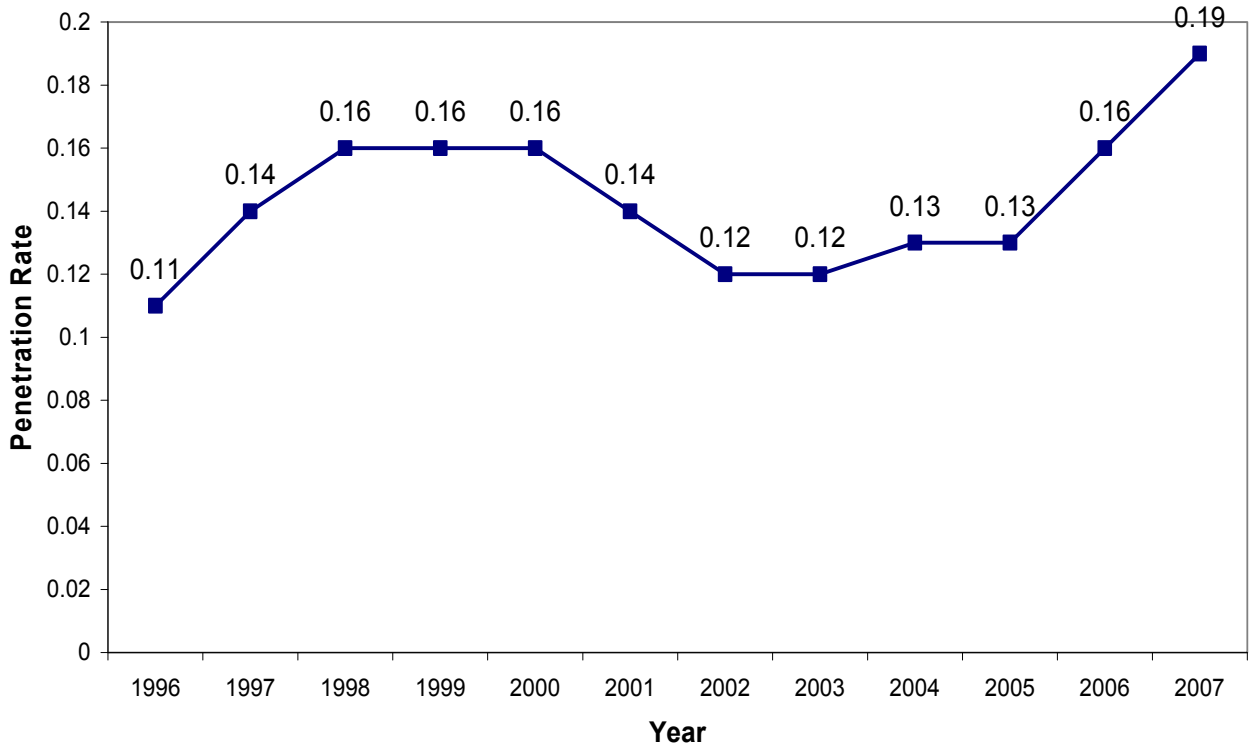
for-Service (Mello et al., 2003). In particular, I use data and methods that have not previously been applied to this issue to provide further evidence of positive selection on health status in MMC. Administrative hospital discharge abstract data from patients hospitalized for accidents or acute conditions unrelated to recent health care use provide a new way to observe underlying differences in health status between managed care and fee-for-service. I find that MMC enrollees have fewer total comorbid conditions on average and are one to two percentage points less likely to have many comorbid conditions than those in FFS. However, beneficiaries with uncomplicated diabetes and hypertension, conditions with predictable monitoring and treatment needs, are more likely to enroll in MMC.

BACKGROUND

The original Medicare Risk program was introduced under the 1982 Tax Equity and Fiscal Responsibility Act (TEFRA), which allowed health maintenance organizations (HMOs) to contract with the government to provide beneficiaries with traditional Medicare benefits. Plans were paid 95 percent of the average county level spending per beneficiary, and had to use payment amounts exceeding costs and a certain amount of profit to provide additional benefits to enrollees (Berenson, 2004). This program was successful at attracting beneficiaries, and MMC penetration reached 16 percent by 1997. However, plans primarily attracted healthy beneficiaries, causing the government to lose money. The costs for the average Medicare managed care enrollee were estimated at between 85 and 87 percent of average FFS spending (CMS, 1999). A series of recent Federal legislative efforts including the 1997 Balanced Budget Act (BBA), the Benefit Improvement and Protection Act (BIPA) of 2000 and the 2003 Medicare Modernization Act (MMA) have attempted to expand the role of managed care, largely by changing payment rates to plans, with mixed results (Gold et al., 2004). Figure 1 presents trends in MMC enrollment over time.

MMC penetration declined between 2000 and 2002 following the BBA reforms resulting in payment rates which did not keep pace with escalating health care costs in many areas, causing plans to scale back benefits, increase cost sharing, or exit markets (Biles et al., 2004a). Plans may face particular incentives to engage in cream skimming by designing benefit packages that will attract healthier enrollees when payment rates are less generous. Between 1999 and 2003, M+C penetration fell from 17.3 percent to 12.2 percent nationwide.

Figure 1: Medicare Managed Care Penetration, 1996 - 2007



Source: CMS Medicare Managed Care State County Plan Files

More recently, participation has rapidly grown in response to higher payment rates introduced in 2004 under the MMA. Higher payment rates allow plans to offer additional benefits, providing an important source of coverage for beneficiaries who face difficulties affording Medicare cost-sharing requirements. While the lowest income Medicare beneficiaries are likely to have supplemental coverage through Medicaid, beneficiaries with 2004 incomes between $10,000 and $20,000 without access to supplemental coverage were more likely to enroll in MMC than remain in FFS (Atherly and Thorpe, 2005). Prior to the introduction of the Medicare prescription drug benefit, researchers estimated positive consumer surplus for MMC enrollees, largely resulting from prescription drug coverage, which was unavailable in FFS at the time (Town and Liu, 2003).

ENROLLMENT IN MEDICARE MANAGED CARE

A number of papers have characterized the adverse selection problem which occurs when consumers with superior information about their underlying health status choose between insurance coverage options (Glazer and McGuire, 2000; Newhouse, 1996; Cutler and Reber, 1998). In a market such as the Medicare program, healthier beneficiaries, who anticipate using fewer services, are expected to choose the less costly coverage option. Since health plans cannot directly observe beneficiary health status and must accept all interested beneficiaries, they are expected to offer benefit packages that encourage the more profitable low-risk beneficiaries to self-select into their plans. Studies of MMC before the 1997 reforms typically suggest that MMC plans experienced favorable selection (Greenwald et al., 2000; see CMS, 1999 and Mello et al., 2003 for a comprehensive review).

Although the Centers for Medicare and Medicaid Services collect comprehensive utilization data on FFS enrollees, comparable data on MMC enrollees is largely unavailable. Absent access to administrative utilization data on those currently enrolled in MMC, researchers have typically examined selection by comparing self-reported health status and demographic information, pre-enrollment service use or post-enrollment mortality (Mello et al., 2003).

Evidence of positive or negative selection into MMC is not apparent from analyses limited to demographic characteristics. Consistent with positive selection, on average MMC enrollees are younger than those in FFS, and live longer (Maciejewski et al., 2001). Several characteristics suggest adverse selection into managed care. MMC enrollees are more likely to be non-white, although this difference is partially explained by plan availability; minorities are more likely to live in urban areas where plans tend to be offered (AHIP, 2005). MMC enrollees are also more likely to be low-income and dually-eligible for Medicaid, characteristics associated with worse health status (Atherly and Thorpe, 2005; Maciejewski et al, 2001).

Mello et al. (2003) review eighteen studies of MMC enrollees through 1996 in addition to their own survey data analysis, finding evidence of positive selection on many but not all measures of health status and sociodemographic characteristics used to proxy for health status. In one of the few studies to use current data, Mobley et al (2007) analyze survey data from MMC plan disenrollees and find that those leaving MMC are likely to be worse health than those who remain in MMC.

Little research has evaluated current MMC beneficiary characteristics under improved managed care benefit packages. Sicker beneficiaries are expected to select managed care plans as benefits become increasingly generous. Medicare managed care plans generally cover preventative services that FFS Medicare does not, so plans may be keeping beneficiaries healthier over time. Some research suggests that selection into plans currently varies by benefit plan design, with benefits for pharmaceuticals, preventative care, eyeglasses, and physical therapy inducing adverse selection, while dental benefits, podiatry coverage, and higher copayments can cause favorable selection (Atherly et al., 2004).

This paper extends the literature on selection bias and MMC enrollment in several ways. I address the three areas sources of total selection bias in enrollment highlighted by Welch (1985) and Mello and colleagues (2003); enrollment, disenrollment, and differences between those currently enrolled in each coverage option. Unlike existing studies, I am able to directly compare MMC and FFS enrollees on a multiple health characteristics collected from an administrative inpatient hospitalization dataset spanning four states over six years.

MODELS OF ENROLLMENT AND DISENROLLMENT

Administrative enrollment data is used to test for positive selection into MMC using linear probability models of MMC enrollment following:

$$P(MMC_{c,t}) = \beta X_{c,t} + C_c + Y_t + \varepsilon_{c,t} \quad (1)$$

where MMC is an indicator for managed care enrollment; X is a vector of beneficiary demographic characteristics; C is a vector of county fixed effects to address time-invariant county characteristics that affect enrollment and Y is a vector of year fixed effects which control for changes in MMC enrollment over time across all counties. Two measures of MMC enrollment are considered; full-year enrollment and partial-year enrollment, which includes beneficiaries with any months of enrollment. Clustered standard errors are robust to arbitrary heteroskedasticity and autocorrelation at the county level.

Favorable selection may also occur if less healthy beneficiaries leave the MMC program. I test this hypothesis by estimating

$$P(D_{c,t} \mid MMC_{c,t}) = \beta X_{c,t} + C_c + Y_t + \zeta_{c,t} \quad (2)$$

where D indicates disenrollment from MMC during the year. During the study period, beneficiaries can enter or leave the program monthly and plans can leave markets on an annual basis. By examining mid-year disenrollment, I only observe voluntary disenrollments.

HEALTH STATUS OF CURRENT MMC AND FFS ENROLLEES

I exploit a novel data source to directly compare the health status of current MMC and FFS enrollees. Hospital discharge abstracts for Medicare beneficiaries hospitalized for accidents and marker conditions unrelated to underlying health status allow me to estimate the probability of MMC enrollment conditional on demographics and health status:

$$P(MMC_{c,t}) = \beta X_{c,t} + \gamma H_{c,t} + C_c + Y_t + \varepsilon_{c,t} \quad (3)$$

where H is a vector of health conditions. This approach is similar in spirit to Doyle (2005), who compares treatment of car crash victims with and without health insurance. The observation that accidents cause hospitalizations for people who would not necessarily present for medical treatment otherwise provides a quasi-random sample of Medicare beneficiaries.

Mello and colleagues (2003) suggest that selection into MMC may vary with county managed care penetration rates. If the healthiest enrollees select into managed care, the marginal enrollee should be more similar in health status to non-enrollees in counties with high MMC penetration.

This can be tested in these data by reestimating equation (3) including county MMC penetration rates and an interaction term between each health condition and the penetration rate.

DATA

Enrollment Data

Medicare managed care enrollment status and beneficiary demographic characteristics are taken from the annual five percent Medicare Limited Data Set (LDS), an administrative enrollment file released by the Center for Medicare and Medicaid Services (CMS). This file provides beneficiary age, sex, race, county of residence and original reason for Medicare enrollment (old age or disability). MMC enrollment status is recorded monthly, allowing identification of beneficiaries who are continuously enrolled in MMC throughout the year as well as those enrolled part time. The LDS is a repeated cross-section of Medicare enrollment

information and does not allow identification of individuals over time. Non-elderly disabled Medicare beneficiaries and those living outside of the continental United States are excluded.

Beneficiaries are classified as leaving MMC if they are enrolled in MMC for at least one month of the calendar year, but not currently enrolled as of December of the calendar year if are alive for the entire year. Decedents are classified as leaving if they are enrolled in MMC for at least one month of the calendar month but not in MMC during the month of death. I observe whether a beneficiary initially qualified for Medicare coverage through a disability (rather than aging into the program at age 65), which can proxy for chronic health conditions or greater health care utilization. The primary indicator of socioeconomic status is whether the beneficiary has a state coverage buy-in for full or partial dual-eligibility for Medicaid, the means-tested health insurance program.[1]

Table 1 provides descriptive information about the elderly Medicare beneficiaries in the sample. Across all years, 15 percent of the sample selecting an MMC plan stays in the plan for the entire year, and 17 percent spends at least some time in a plan.[2] Disenrollment is common, with 12 percent of enrollees in a given year disenrolling on average. In contrast, only 1.2 percent of eligible FFS enrollees disenroll into managed care annually.

MMC enrollees are slightly younger on average (74.2 vs. 74.6) and more likely to be Black or Hispanic than FFS enrollees. MMC enrollees live in counties with more physicians on average and higher per capita incomes, consistent with the greater availability of MMC in urban settings also served by commercial managed care plans (Brown and Gold, 1999). MMC enrollees are half as likely to be dually-eligible for Medicare and Medicaid than those who remain in FFS (6.5 versus 13 percent).

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[1] The LDS data tends to underreport dual-eligibility status because CMS only reports whether a beneficiary has his Part B premium paid by a state. It is impossible to determine whether a beneficiary has full or partial (Special Low-Income Medicare Beneficiaries and Qualified Medicare Beneficiaries) Medicaid coverage from the state buy-in field (ResDAC, 2006). I code all beneficiaries with any months of state buy-in coverage as being dually eligible to minimize this bias. 87 percent of full-year Medicare beneficiaries with any months of buy-in coverage are covered for all 12 months.

[2] These figures are higher than the national average for the period because of sample selection, particularly the exclusion of non-elderly disabled Medicare beneficiaries from this paper. They are included in the 5 percent sample and significantly less likely than elderly beneficiaries to be enrolled in MMC (Gold et al., 1997).

Table 1: Elderly Medicare Beneficiaries by Medicare Managed Care Enrollment, 1999 - 2004

	All Beneficiaries	Any MMC months	No MMC Months
Any MMC months during Year	0.17	1	0
	(0.38)	-	-
Full Year MMC Enrollment	0.15	0.90	0
	(0.36)	(0.30)	-
Disenrolled MMC	0.008	0.05	0
	(0.09)	(0.21)	-
MMC Payment Rate ($100/yr)	67.3	71.3	66.5
	(11.6)	(11.8)	(11.3)
Age	74.6	74.2	74.6
	(7.64)	(7.11)	(7.77)
Female	0.58	0.58	0.58
	(0.49)	(0.49)	(0.49)
Black	0.08	0.09	0.08
	(0.27)	(0.28)	(0.27)
Hispanic	0.02	0.03	0.02
	(0.13)	(0.16)	(0.14)
Other Race	0.03	0.03	0.03
	(0.17)	(0.18)	(0.17)
Missing Race	0.003	0.002	0.003
		(0.05)	(0.05)
		0.07	0.07
		(0.26)	(0.26)
		0.07	0.13
		(0.25)	(0.34)
CountyAvg. Income ($1000s)	30.0	32.2	29.6
	(9.32)	(8.91)	(9.34)
Hospitals per 1,000 Pop.	0.02	0.02	0.02
	(0.03)	(0.01)	(0.03)
General Practitioners per 1,000	0.24	0.23	0.25
	(0.12)	(0.09)	(0.12)
Physicians per 1,000	2.54	2.90	2.47
	(1.83)	(1.63)	(1.86)
Ambulatory Surg. Centers/1,000	0.01	0.01	0.01
	(0.01)	(0.01)	(0.02)

Notes: Analysis of CMS Medicare Enrollment Limited Dataset 5% Sample for 1999 - 2004 and Area Resource File, 1999-2004. Standard deviations in parentheses. Calculations include Medicare beneficiaries aged 65 and over residing in the continental U.S. The any MMC group includes those who remain continuously enrolled in Medicare Managed Care throughout the calendar year or until their month of death and those who join or leave the program during the year. Hispanic is one of the choices for race, there is no ethnicity variable. This may result in an undercount of Hispanic beneficiaries.

Hospitalization Data

A major limitation of the Medicare data is that it does not collect health status or utilization measures for MMC enrollees. I overcome this by using discharge abstracts from FFS and MMC enrollees collected through the Healthcare Cost and Utilization Project's State Inpatient Databases (SID). Hospitalized patients are likely to be sicker than those who are not hospitalized in a given year. To avoid this source of bias, my sample uses ICD-9 and E codes to identify hospitalizations for accidents and marker conditions, two types of admissions that occur independently of underlying health status. Marker admissions are inpatient hospitalizations for acute conditions requiring inpatient admission which are unlikely to be affected by the amount or quality of recent primary care. Marker hospitalizations include heart attacks with length of stay greater than 5 days, gastrointestinal obstruction, hip fracture, and appendicitis (Billings, 2003). The accident sample includes hospital admissions resulting from accidents involving motor vehicle traffic, pedal cyclists, pedestrians, other forms of transportation, and weather or natural disasters. The vehicle observations include drivers who caused crashes, passengers, and pedestrians and motorists hit by other vehicles, though it is not possible to determine which role a patient played in the accident.[3]

ICD-9 codes are also used to identify patient comorbidities as a measure of health status using an algorithm developed by the Agency for Healthcare Research and Quality based on Elixhauser (1998). This provides an administrative measure of whether a Medicare beneficiary suffers from a rich set of acute and chronic conditions. These data provide a higher level of detail than surveys typically collect and avoid problems of nonresponse. The sample includes 562,639 marker hospitalizations and 12,479 accidents from Arizona (1999-2004); Florida (1999-2004); New Jersey (2003-2004); and New York (1999-2003), the only participating state-years for which MMC status is reported.

Table 2 presents descriptive statistics for the hospitalization sample. Consistent with the enrollment data, hospitalized MMC enrollees are younger than hospitalized FFS stayers and more likely to be non-White. FFS enrollees have higher rates of most chronic conditions examined and more total conditions on average, with the exception of uncomplicated diabetes, hypertension and obesity. Although 23 percent of Medicare beneficiaries in SID states spend at

[3] Doyle (2005) reports that 23 percent of severe car crash victims are passengers. His analysis excludes Medicare beneficiaries, however, as they have universal insurance coverage.

Table 2: Rates of Selected Comorbidites Amonsgst Hospitalized Elderly Medicare Patients by Coverage and Hospitalization AZ, FL, NJ, NY, 1999 - 2004

	MMC	FFS
Age	79.3	80.8
	(7.68)	(7.90)
Female	0.59	0.63
	(0.49)	(0.48)
Black	0.07	0.05
	(0.25)	(0.22)
Hispanic	0.12	0.06
	(0.32)	(0.24)
Zip Code Median Income ($1,000s)	41.5	43.2
	(14.4)	(17.6)
Congestive Heart Failure	0.29	0.30
	(0.45)	(0.46)
Valvular Disease	0.12	0.14
	(0.32)	(0.34)
Peripheral Vascular Disease	0.06	0.07
	(0.24)	(0.25)
Chronic Pulmonary Disease	0.02	0.02
	(0.14)	(0.14)
Diabetes w/o chronic complication	0.20	0.18
	(0.40)	(0.39)
Diabetes w/ chronic complication	0.03	0.03
	(0.17)	(0.18)
Hypothyroidism	0.10	0.11
	(0.30)	(0.31)
Obesity	0.020	0.016
	(0.14)	(0.13)
Metastatic Cancer	0.019	0.021
	(0.14)	(0.14)
Solid tumor w/out metastasis	*0.023*	*0.023*
	(0.15)	*(0.15)*
Fluid and Electrolyte Disorders	0.23	0.25
	(0.42)	(0.43)
Deficiency Anemias	0.14	0.15
	(0.35)	(0.36)
Hypertension	0.56	0.53
	(0.50)	(0.50)
Total Conditions	1.90	1.95
	(1.25)	(1.27)

Notes: Prevalence of comorbid condition for 586,136 Medicare beneficiaries hospitalized for accidents or marker conditions. State Inpatient Databases from Arizona, Florida, New Jersey and New York and the Medicare Limited Dataset Enrollment Files from 1999 - 2004. Comorbidities coded following Elixhauser et al., 1998. Standard deviations in parentheses. All differences between FFS and MMC statistically significant at 5% unless *italicized.*

least part of a year in an MMC plan, MMC enrollees account for only about 18 percent of accidents and marker hospitalizations. This offers additional evidence of positive selection since unobserved beneficiary characteristics such as being more careful in traffic or long-term good health habits may be correlated with health outcomes as well as managed care enrollment.

Although nearly 25 percent of MMC enrollees reside in one of the sample states during the study period, they may not be representative of beneficiaries nationwide. Appendix 1 formally tests the differences in the two samples by regressing demographic characteristics from the LDS data on indicator variables for MMC status, whether an enrollee resides in a SID state, and the interaction of these variables. MMC enrollees in SID states remain younger, more likely to be Black or Hispanic and Medicaid-eligible than other Medicare beneficiaries. They are also more likely to be male and disabled prior to age 65. Thus, the SID sample may be biased towards finding less of a difference in health status between MMC and FFS enrollees than in other states.

FINDINGS

Enrollment and Disenrollment

Table 3 analyzes the multivariate relationship between Medicare beneficiary demographics and MMC enrollment and disenrollment. Consistent with the descriptive statistics, younger Medicare beneficiaries are more likely to enroll in MMC and remain in MMC for the full year on average. Black Medicare beneficiaries are 3.6 percent more likely than Whites to enroll in MMC, but only 2.7 percent more likely to remain enrolled for the full year. Differences for Hispanics are statistically insignificant. Hispanics are likely to have some contact with the MMC program but are less likely to remain for the full year.

All else equal, Medicare beneficiaries who entered the program because of a disability prior to age 65 are more likely to enroll in MMC for part of the year (2.1%) or a full year (1.6%). In order to qualify for Medicare disability coverage, a beneficiary must first receive two years of Social Security Disability Insurance, indicating the presence of a disability that precludes work (and laborforce earnings). Beneficiaries with full or partial Medicaid coverage continue to be less likely to enroll in MMC in the multivariate models. Through Medicaid, this group has

access to more generous health insurance than those with only Medicare, so the supplemental benefits available though MMC plans may be less attractive to this group.

Medicare beneficiaries can enroll or disenroll from and MMC option monthly during the study period. Thus, beneficiaries should "vote with their feet" by joining the coverage option that best meets their needs. Disenrollment results are consistent with adverse selection out of MMC. On average, older enrollees and minorities are more likely to disenroll. Beneficiaries who are disabled pre-65 are 1 percent more likely to disenroll and dual-eligibles are 8.4 percent more likely to disenroll than other groups. Results are unchanged in models controlling for health care market characteristics and to specifications excluding dual-eligibles.

Table 3: Medicare Managed Care Enrollment Amongst Elderly Medicare Beneficiaries, 1999 - 2004

	Any MMC	Full-Year MMC	Disenroll
Age	-0.001**	-0.001**	0.0004**
	(0.0002)	(0.0002)	(0.00005)
Female	0.007**	0.007**	-0.002**
	(0.001)	(0.001)	(0.0004)
Black	0.036**	0.027**	0.010**
	(0.01)	(0.01)	(0.002)
Hispanic	0.0001	-0.005	0.006**
	(0.01)	(0.01)	(0.002)
Other Race	-0.025**	-0.030**	0.009**
	(0.01)	(0.01)	(0.001)
Missing Race	-0.031**	-0.036**	0.031**
	(0.007)	(0.007)	(0.004)
Disabled Pre-65	0.021**	0.016**	0.010**
	(0.003)	(0.003)	(0.001)
Medicaid-Eligible	-0.103**	-0.106**	0.084**
	(0.015)	(0.015)	(0.003)
County Avg. Income ($1000s)	-0.001	-0.001	0.001
	(0.001)	(0.001)	(0.001)
Hospitals per 1,000 Pop.	0.382*	0.302*	0.138
	(0.16)	(0.13)	(0.50)
General Practitioners per 1,000	0.037*	0.032*	0.024
	(0.02)	(0.02)	(0.04)
Physicians per 1,000	-0.003	-0.002	-0.001
	(0.002)	(0.001)	(0.01)
Ambulatory Surg. Centers/1,000	-0.26	-0.161	-0.29
	(0.20)	(0.19)	(0.26)

Notes: Coefficients from linear probability regressions of any and full-year Medicare Managed Care enrollment on elderly Medicare beneficiary demographics and county-level supply variables. See Table 1 notes for data description. All models include county and year fixed effects. Clustered standard errors in parentheses. ** Significant at 1%, * Significant at 5%

Health Status of MMC and FFS Enrollees

Table 4 shows that health status influences the probability of MMC enrollment. Beneficiaries with diabetes with chronic complications, congestive heart failure, metastatic cancer, peripheral vascular disease are one to two percentage points less likely to enroll in managed care. Other conditions, including uncomplicated diabetes, chronic obstructive pulmonary disease and hypertension, significantly increase the probability of enrolling in MMC at the 1 percent level. Demographic variables continue to indicate mixed selection into MMC; being younger, male and non-White all increase the probability of enrollment. Overall results suggest that managed care plans may attract enrollees with predictable health care needs, but not those with more complex medical needs. A limitation of this study is that I do not have panel data, so it is impossible to determine whether individuals leave MMC as their health status changes.

Unlike earlier studies, I find that selection into MMC does vary with managed care penetration. The penetration*condition term is statistically significant for valvular disease, uncomplicated diabetes, hypothyroidism, hypertension, and non-metastatic cancer. All else equal, a diabetic in a county with only 5 percent MMC penetration would be 0.725 percent less likely to enroll in MMC while the same diabetic in a county with 30 percent penetration would be 0.65 percent more likely to enroll, indicating that enrollees become less positively selected as market share increases.

This result does not hold for all conditions; beneficiaries with valvular disease and hypothyroidism are significantly less likely to enroll if they live in counties with higher penetration. Effects are also negative, but insignificant for complicated diabetes and peripheral vascular disease. In markets with high penetration, plans may design product offerings to compete for healthier enrollees, and offer plans with broader appeal in low penetration markets to build up market share.

The finding that selection patterns into MMC vary by measure of health status is consistent with earlier studies. The market penetration results may differ from Mello et al's findings for several reasons. This study examines Medicare managed care after the Balanced Budget Act, while Mello et al. stop before the change in payment policy. The policy change may have altered the selection dynamic. I also use a richer set of health status indicators from administrative rather than self-reported data. Mello and colleagues examine self-reported history

Table 4: Medicare Managed Care Enrollment Amongst Elderly Beneficiaries, AZ, FL, NJ, NY, 1999-2004

	MMC	MMC
Congestive Heart Failure	-0.005**	0.002
	(0.002)	(0.003)
Valvular Disease	-0.016*	0.005
	(0.006)	(0.006)
Peripheral Vascular Disease	-0.008*	-0.002
	(0.003)	(0.002)
Chronic Pulmonary Disease	0.014**	0.005
	(0.004)	(0.004)
Diabetes w/o chronic complication	0.003	-0.01**
	(0.002)	(0.003)
Diabetes w/ chronic complication	-0.022**	-0.014**
	(0.006)	(0.004)
Hypothyroidism	-0.002	0.007*
	(0.002)	(0.003)
Obesity	0.012	-0.018*
	(0.008)	(0.008)
Metastatic Cancer	-0.009*	-0.017*
	(0.004)	(0.007)
Solid tumor w/out metastasis	0.001	-0.014**
	(0.004)	(0.005)
Hypertension	0.012**	-0.001
	(0.002)	(0.002)
Age	-0.003*	-0.003*
	(0.0004)	(0.0004)
Female	-.016**	-.016**
	(0.005)	(0.005)
Black	0.04**	0.04**
	(0.016)	(0.016)
Hispanic	0.007	0.006
	(0.02)	(0.02)
County MMC Penetration Rate		0.86**
		(0.06)
Pen*Congestive Heart Failure		-0.03
		(0.017)
Pen*Valvular Disease		-0.09*
		(0.045)
Pen*Peripheral Vascular Disease		-0.027
		(0.021)
Pen*Chronic Pulmonary Disease		0.039
		(0.026)
Pen*Diabetes		0.055**
		(0.019)
Pen*Complicated Diabetes		-0.036
		(0.024)
Pen*Hypothyroidism		-0.042**
		(0.014)
Pen*Obesity		0.13*
		(0.059)
Pen* Metastatic Cancer		0.031
		(0.041)
Pen* tumor w/out metastasis		0.067*
		(0.028)

Notes: Linear probability models of Medicare managed care enrollment status. See Table 2 notes for data description. All models control for zip code median income (1999 dollars), cause of admission, anemia and electrolyte disorder on admission, county and year fixed effects. Standard errors in parentheses. *Significant at 5%. **Significant at 1%.

of cancer, stroke and arthritis. I also find no relationship between MMC status and the penetration*metastatic cancer interaction and a penetration*peripheral vascular disease term, a risk factor for stroke. These differences underscore the need for encounter data from MMC enrollees since assessments of biased selection vary across health conditions.

CONCLUSION

This paper examines selection into and out of Medicare managed care between 1999 and 2004. Consistent with earlier studies, I find evidence of non-random selection into and out of MMC suggesting that MMC plans experience positive selection overall. While low-income and minority Medicare beneficiaries are more likely than others to enroll in MMC, they are also more likely to disenroll. This may be an indicator of quality problems or access restrictions in MMC. The disenrollment behavior raises questions about whether the MMC program is effectively targeting its additional benefits at Medicare beneficiaries with the greatest needs.

Administrative hospital discharge data allows me to consider a broad range of health outcomes associated with both positive and adverse selection into MMC. Compared to those who remain in FFS, MMC enrollees have lower rates of many complex chronic conditions, but higher rates of hypertension and uncomplicated diabetes. This suggests that MMC may be more appropriate for beneficiaries looking to reduce the cost of predictable health spending rather than those with complex health needs. As diabetes, which currently affects one quarter of Medicare beneficiaries becomes increasingly prevalent in this population, we may see greater diabetic participation in managed care (Sloan et al., 2008). It is impossible to determine whether those with uncomplicated but not complicated diabetes are more likely to be in managed care because of selection or better care management in MMC relative to FFS, though this is an important area for future research.

Consistent with previous studies, however, I also find that several chronic conditions and comorbidities reduce the probability of MMC enrollment. This is potentially concerning finding in light of the growth of Special Needs Plans, which the Medicare Modernization Act created to enroll dual eligibles and chronically ill Medicare beneficiaries. Enrollment growth in these plans has been driven by automatic, passive enrollment of dual eligibles (Milligan and Woodcock, 2008). The comparatively good health of the MMC enrollees also raises questions about whether higher payments to Medicare Advantage plans relative to FFS spending is an effective way of targeting resources to those with the greatest health needs.

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Appendix Table 1: Medicare Managed Care vs. Fee-for-Service Enrollees in AZ, FL, NJ, NY versus other states, 1999 - 2004

	MMC*SID
Full Year MMC Enrollment	-0.013**
	(0.0002)
Age	-0.30**
	(0.02)
Female	-0.004**
	(0.001)
Black	0.033**
	(0.0006)
Hispanic	0.011**
	(0.0003)
Other Race	-0.013**
	(0.0003)
Missing Race	-0.001**
	(0.0001)
Disabled Pre-65	0.011**
	(0.0005)
Medicaid-Eligible	0.025**
	(0.0007)

** Significant at 1%, * Significant at 5%

Notes: OLS regression coefficients of the interaction between the Medicare managed care enrollment indicator and an indicator of whether the beneficiary lives in one of the 4 states for which hospitalization data is available. Standard errors in parentheses. Analysis of CMS Medicare Enrollment Limited Dataset 5% Sample for 1999 - 2004.

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