Does Managed Care Reduce Preventable Hospitalizations in the Medicare Population?
The Impact of Medicare Advantage on Ambulatory Care Sensitive Hospital Admissions and Use of Preventive Services

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DOES MANAGED CARE REDUCE PREVENTABLE HOSPITALIZATIONS IN THE MEDICARE POPULATION?
THE IMPACT OF MEDICARE ADVANTAGE ON AMBULATORY CARE SENSITIVE HOSPITAL ADMISSIONS AND USE OF PREVENTIVE SERVICES

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ABSTRACT

One controversial option to control growth in the rate of federal spending on health care is to transform Medicare into a "voucher" program for beneficiaries to purchase health insurance from managed care plans in the private market. Approximately one-quarter of Medicare beneficiaries are currently enrolled in a private health plan through Medicare Advantage, which has higher average costs than the traditional fee-for-service program but potentially reduces costly and unnecessary medical services by increasing the use of preventive care. Using a nationally representative sample of Medicare beneficiaries from the Medical Expenditure Panel Survey (MEPS) from 2006 to 2010, I compared the prevalence of potentially avoidable hospital admissions and use of preventive services for beneficiaries in Medicare Advantage to beneficiaries in the traditional fee-for-service program. Using propensity score estimation to control for observable bias, I found no relationship between enrollment in Medicare Advantage and potentially avoidable hospital admissions, and a significant but small positive relationship with use of select preventive services. Considered together, these findings suggest that Medicare Advantage may not achieve better health outcomes for beneficiaries than the traditional fee-for-service program. These findings have implications for policy discussions surrounding the future expansion of private managed care plans in the Medicare program.

The research and writing of this thesis
is dedicated to my beautiful wife Frankie, without who's constant encouragement
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INTRODUCTION

Many policymakers believe that growth in federal health care costs is the primary driver of future United States fiscal instability (Orszag, 2007). By 2020, national health expenditures are projected to reach nearly 20 percent of gross domestic product (GDP), driven by continued annual rates of growth far exceeding GDP growth rates (Keehan et al., 2011). Medicare, the federal government health insurance program for the elderly and disabled, is similarly projected to have a rate of growth that outpaces national health expenditures. According to the Congressional Budget Office (CBO), Medicare expenditures will represent 18.9 percent of the federal budget by 2022 under current law (CBO, 2012). This growth rate is widely considered to be unsustainable, and the Medicare Hospital Insurance Trust Fund is projected to become insolvent by 2024 (Boards of Trustees, 2012).

One of the most visible and contentious options for Medicare reform, being widely debated among politicians as part of various deficit reduction packages, is to transform Medicare from a defined benefit to a defined contribution program that would provide beneficiaries with a "voucher" to purchase health insurance in the private market, also known as "premium support." Variations of this reform have been proposed by Chairman of the House Budget Committee Paul Ryan and Senator Ron Wyden and featured in several bipartisan deficit reduction plans, including the Bowles-Simpson plan developed by the President's Task Force on Deficit Reduction (National Commission on Fiscal Responsibility and Reform, 2010; United States House of Representatives, 2012). Advocates believe that expanding the role of private managed care plans in the Medicare program will lower health care spending through price competition

and increased efficiency, while critics fear that such a change will instead lead to increased cost-sharing by beneficiaries (Song, Cutler, & Chernew 2012).

Medicare has over 30 years of experience contracting with private health plans through a program currently known as Medicare Advantage (or Medicare Part C). Medicare Advantage is estimated to cost between 12 and 14 percent more per beneficiary than the traditional fee-for-service program, and research on differences in quality or health outcomes—potentially due to the enhanced care coordination and preventive care touted by managed care plans—has been limited (McGuire, Newhouse, & Sinaiko 2011; Gold, 2012). As enrollment and costs both continue to increase in Medicare Advantage, and as policymakers consider expanding the role of private health plans in the Medicare program, an important question policymakers need answered is: Are providers achieving better quality and health outcomes for beneficiaries in Medicare Advantage than in traditional fee-for-service?

To examine quality and health outcomes in the Medicare program, I focus on the issue of potentially preventable hospital admissions. Reducing avoidable hospitalizations and hospital readmissions is a goal of many programs to increase quality in health care delivery authorized by the Patient Protection and Affordable Care Act of 2010 (ACA). Access to preventive services, such as diagnostic screenings or routine physicals, is also widely regarded as a measure of quality in health care. Preventive care has been shown to decrease rates of hospitalization for conditions that could have potentially been avoided (Agency for Healthcare Research and Quality [AHRQ], 2004; Rizzo, 2005). In addition, inpatient hospital care represents the largest category of spending on Medicare beneficiaries at $132 billion annually, or 24 percent of the Medicare program in 2010 (Medicare Payment Advisory Commission [MedPAC], 2012a); this

high concentration of spending has implications for reform proposals aiming to achieve spending reductions.

Unlike the fee-for-service program, Medicare Advantage plans—which receive a prospective monthly payment from the federal government to cover all of the health care services required by each individual beneficiary—have a financial incentive to encourage greater use of preventive care services in order to reduce avoidable hospital admissions. As managed care offers a clinical and administrative structure to coordinate patient care, rewards efficiency, and aims to lower use of expensive, high-intensity services, one would expect to observe greater use of preventive care services and a lower prevalence of avoidable hospital admissions in beneficiaries enrolled in Medicare Advantage than in the traditional fee-for-service Medicare program.

Using longitudinal patient-level data for a nationally representative sample of Medicare beneficiaries from the Medical Expenditures Panel Survey (MEPS) from 2006 to 2010, I estimate the relationship between enrollment in Medicare Advantage on two types of outcomes: 1) the likelihood of avoidable hospital admission, and 2) the use of preventive care services. This study adds to the growing literature on preventable hospital admissions among Medicare beneficiaries by using survey data rather than hospital discharge data, combining an examination of preventive care use and preventable hospital admissions into a single research study, and using data collected from a more recent period of observation than prior studies.

Employing propensity score weighting to control for observable bias, I found no significant difference between Medicare Advantage and fee-for-service beneficiaries in the likelihood of avoidable hospital admissions. In addition, my results show that enrollment in

Medicare Advantage has a significant but small impact on a limited number of preventive care services. Considered together, these findings suggest that a) Medicare Advantage may not achieve better health outcomes for beneficiaries than the traditional fee-for-service program, and b) policy discussions surrounding the expansion of private health plans in the Medicare program should consider the relationship between type of health plan and the strength of financial incentives to improve quality and reduce the use of costly and unnecessary health care services.

BACKGROUND

Fee-for-service, the predominant system of payment in the Medicare program, is one major factor in the accelerating growth of public health care costs in the United States (Hackbarth, Reischauer, & Mutti 2008). This form of payment rewards the volume of services delivered by physicians, hospitals, and other health care providers over the quality of care received by patients or their outcomes. The prospective payment systems implemented by the Health Care Financing Administration (now the Centers for Medicare & Medicaid Services [CMS]) for acute care hospitals in 1982 and post-acute care providers in the late 1990s were an attempt by the federal government to slow the growth in rising health care costs (Altman, 2012).

In addition to reforming the fee-for-service program, lawmakers authorized Medicare to contract with private, risk-based health insurance plans in 1982 through the Tax Equity and Fiscal Responsibility Act. This program—formally known as Medicare Part C—was created in order for Medicare to benefit from the types of financial gains being observed in the commercial insurance market, where health maintenance organizations (HMOs) were shown to achieve cost savings and reductions in hospitalizations (McGuire, Newhouse, & Sinaiko 2011).

Since its inception in 1982, Medicare Part C has been reformed on numerous occasions. The Balanced Budget Act of 1997 renamed the program Medicare+Choice and expanded the types of private health plans with which Medicare could contract beyond HMOs to include local preferred provider organizations (PPOs), private fee-for-service (PFFS) plans, and medical savings accounts (MSAs). After regulatory and programmatic changes implemented under the Medicare Prescription Drug Improvement and Modernization Act of 2003 (MMA), the Medicare+Choice program became Medicare Advantage. MMA added a new type of health plan to the program—the regional PPO—and changed the methodology used in calculating payments to health plans in order to better account for patient severity of illness using patient health status, clinical conditions, region, and other factors.

Since passage of MMA, enrollment in the Medicare Advantage program has increased from 4.6 million beneficiaries in 2003 to 12.8 million beneficiaries in 2012; this represents 26 percent of the current Medicare population (MedPAC, 2012b). In 2009, Medicare Advantage payments ranged from an average of 105 percent to 122 percent of per-capita costs for beneficiaries in traditional fee-for-service Medicare (Feder et al., 2012).

A significant driver of health care spending, which has been targeted lawmakers through the ACA and by government officials at CMS through payment policy changes, is potentially preventable hospital admissions. These admissions could have been avoided through adequate ambulatory care, and represent approximately 25 percent of all initial Medicare hospitalizations (Sadownik & Ray, 2012). Similarly, potentially preventable emergency department visits could have been avoided through providing care in less costly ambulatory settings (such as the physician's office), and represent 59 percent of all emergency department visits that do not result

in an inpatient hospital admission. In 2005, heart failure, COPD, and pneumonia comprised nearly 2 million hospital admissions for Medicare beneficiaries; roughly 11 percent of these hospital admissions resulted in a *readmission* and cost the Medicare program nearly $1.5 billion (MedPAC, 2007). Policies that succeed in preventing unnecessary hospital admissions can simultaneously reduce health care costs to the federal government and improve health outcomes for beneficiaries, but identifying these policies empirically can be challenging.

LITERATURE REVIEW

Studies comparing differences in health care expenditures or utilization between populations with different levels of insurance coverage often suffer from selection bias (Manning et al., 1987; Levy & Meltzer, 2001). It has been well documented that enrollees in comprehensive managed care plans are often younger and healthier (Altman, Cutler, & Zeckhauser, 2003), and this trend has been observed in the Medicare Advantage population (Basu & Mobley, 2007; McGuire, Newhouse, & Sinaiko, 2011; Basu, 2012; Basu & Mobley, 2012).

Although Medicare Advantage plans are required to enroll any beneficiary that applies, early research on the program found that plans were still exercising favorable risk selection. Beneficiaries enrolling in Medicare Advantage plans were more likely to be younger and healthier and, even after adjusting for demographic characteristics, these beneficiaries had lower utilization and mortality rates (Berenson, 2004; McGuire, Newhouse, & Sinaiko, 2011).

Research on the impact of HMOs on health care expenditures, quality, and satisfaction is therefore complicated by the issue of selection bias, and the results to date have been mixed. According to a literature review by Miller and Luft (2002), HMOs have reduced hospitalizations

and other expensive services somewhat while achieving comparable levels of quality to non-HMO plans, but enrollees report greater dissatisfaction with their insurance as well as barriers to accessing care. Coverage of preventive services tends to be more comprehensive in HMOs, but this finding was strongest for cancer screenings. Other research has shown that specific vulnerable subgroups of Medicare beneficiaries—such as the older, female, more severely ill, low income, and less educated—experience greater disparities in access to care when enrolled in managed care plans than beneficiaries in traditional fee-for-service (Elliot et al., 2011).

However, using MEPS data from 1996, Rizzo (2005) found statistically significantly higher rates of preventive care use for individuals with HMO coverage than individuals with traditional fee-for-service coverage, both in the commercial health insurance market and in the Medicare program. These results were robust to instrumental variable regression designed to remove potential bias associated with selection into an HMO (using managed care penetration by sampling area and employer size as instruments for health insurance status), suggesting that the relationship is causal.

Another method increasingly used by researchers, government officials, and administrators to measure quality in health care delivery, which is based on health care outcomes rather than on utilization of services, is to estimate rates of ambulatory care sensitive (ACS) hospital admissions. Hospitalizations for ACS conditions are admissions to the inpatient hospital or emergency room that could have potentially been avoided through better primary care and preventive services.

Over the past decade, numerous published research studies have found lower rates of potentially avoidable hospitalizations or hospital readmissions in the Medicare Advantage

program than in traditional fee-for-service (Basu & Mobley, 2007; Basu, 2012; Basu & Mobley, 2012; Lemieux et al., 2012). However, nearly all of these studies have relied on hospital discharge data within or across geographic regions—specifically, the Hospital Cost and Utilization Project (HCUP) national and state-level databases made available by AHRQ—and do not control for observable characteristics omitted from discharge data, such as income, education, or the presence of chronic diseases and other underlying health conditions.

In addition, studies using hospital discharge data to calculate small area population-based hospital admission rates suffer from the ecological fallacy, in which inferences about individuals are being derived from analyses conducted at the population level (Culler, Parchman, & Przybylski, 1998). Using hospital discharge data, it is not possible to determine if the beneficiaries experiencing a preventable hospital admission are the same beneficiaries who lack access to ambulatory or preventive care services. Culler, Parchman, and Przybylski (1998) corrected for this issue by using the Medicare Current Beneficiary Survey (MCBS) to identify the factors that influence an individual's likelihood of an ACS hospital admission, but this study excluded beneficiaries enrolled in managed care due to concerns that hospital use may have been under-reported by this population during the study period. More recent studies have determined that, based on encounter data collected by Medicare Advantage plans, it is possible to construct measures of ACS admissions for beneficiaries in Medicare Advantage that are statistically reliable and not biased by selective data reporting (McCall, Harlow, & Dayhoff, 2001).

METHODOLOGY

The purpose of this research study is to estimate the effect of enrollment in Medicare Advantage on: 1) the likelihood of an avoidable hospital admission, defined as a hospitalization for

an ACS condition, and 2) use of preventive care services. ACS conditions are widely regarded as conditions that, when properly monitored and addressed through primary care and use of preventive services, should not result in a hospital admission; these conditions have been used widely by researchers and policymakers to identify potentially preventable or avoidable hospitalizations in the Medicare fee-for-service and managed care populations (Krakauer et al., 1996; McCall, Harlow, & Dayhoff, 2001; Backus et al., 2002).

Unlike the fee-for-service program, which is uncoordinated and does not provide for continuous care management over time, Medicare Advantage plans have the financial incentives and provider networks to provide primary care and other services intended to prevent hospitalizations. The fee-for-service insurance model, the dominant form of insurance under the Medicare program, financially rewards providers for each additional service delivered and does not incentivize the coordination of care or delivery of primary care and other preventive services. Managed care, and specifically capitation—or the coverage of all health care services under one pre-determined payment for a specified period of time—has the opposite set of incentives. Under capitation, health care providers are financially penalized for each additional service provided to a patient, and are therefore incentivized to provide the most cost-effective care that is clinically appropriate. Whether avoidable or not, hospital admissions generate revenues for hospitals and physicians under a fee-for-service model; under capitation, hospital admissions represent high intensity, high cost services that count against profits by consuming a large proportion of the comprehensive, pre-determined payment rate. Therefore, one would expect to observe a lower rate of potentially preventable hospitalizations under capitation.

Managed care plans also frequently provide enrollees with care coordination services, such as disease management for conditions like diabetes, cardiovascular disease, or asthma, in order to reduce the development of downstream medical complications. Disease management programs and preventive care, including routine physicals and screenings for common forms of cancer, are inexpensive in comparison to unnecessary hospitalizations. Given the financial incentives to reduce unnecessary health care services under capitation, preventive care creates a mechanism for managed care plans to provide services to their enrollees that maintain or improve health status while protecting profits.

Methodological Approach and Conceptual Model

The key dependent variables examined in this research study are two related health outcomes. Enrollment of Medicare beneficiaries into a managed care plan has been shown to increase the use of preventive care services at the beneficiary level and to decrease the rate of preventable hospital admissions at the population level. My hypothesis is that beneficiaries in Medicare Advantage will use more preventive care services than beneficiaries in traditional fee-for-service. Combined with the financial incentives created by a global budget under managed care to avoid costly and unnecessary health care services, beneficiaries in Medicare Advantage should have a lower prevalence of preventable hospital admissions than those beneficiaries enrolled in traditional fee-for-service.

In addition to the effects of managed care and preventive services, the literature indicates that there are a variety of other factors associated with preventable hospital admissions, which I have grouped into three categories: 1) demographic characteristics, 2) clinical characteristics, and 3) insurance status and risk. Some demographic characteristics, such as age, influence

likelihood of hospitalization by directly affecting health status (i.e., older beneficiaries are more likely to become ill), while some demographic characteristics, such as race or income, affect beneficiary access to health care services (Culler, Parchman, & Przybylski, 1998). The presence of one or more chronic clinical conditions, such as asthma, diabetes, or cardiac disease, as well as cognitive and functional limitations, also increases the likelihood of hospital admission (MedPAC, 2010). In my analytic model, I use these beneficiary-level factors of health status and behavior in order to control for all observable bias that could influence estimates of the treatment variable (Medicare Advantage).

Figure 1. Conceptual Framework for Factors Related to Preventable Hospital Admissions

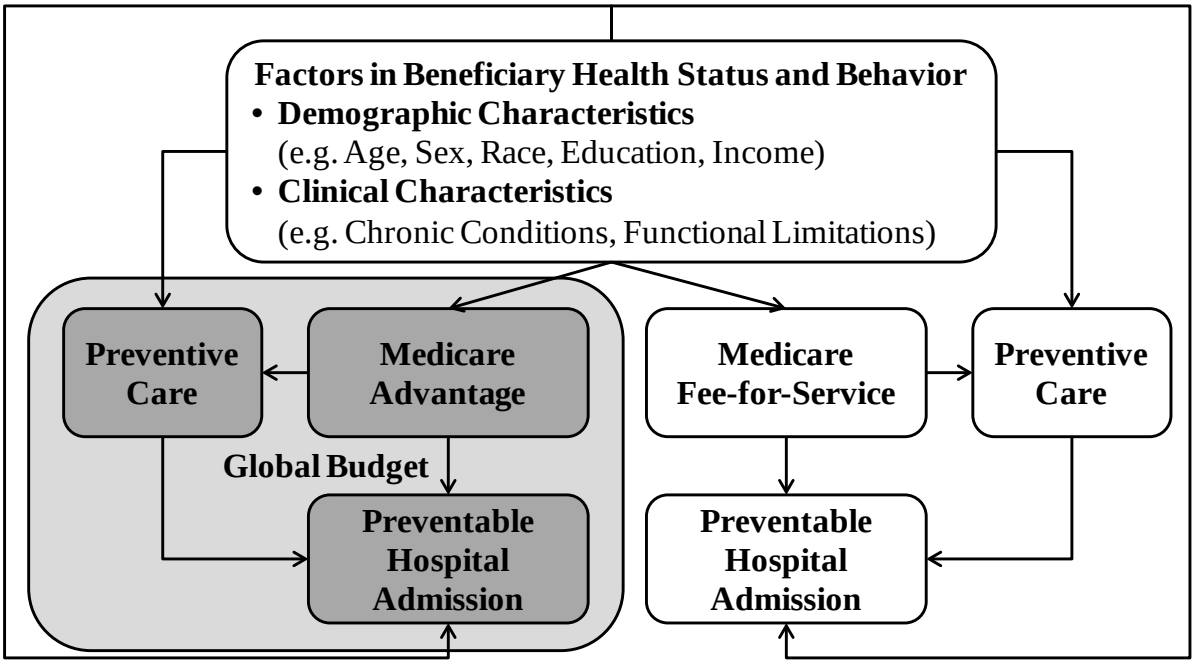


Figure 1 presents the relationship between the various factors influencing preventable hospital admissions. The relationship of primary interest (highlighted in grey) is between Medicare Advantage, the use of preventive care, and avoidable hospital admissions. As beneficiaries enrolled in Medicare Advantage are more likely to be younger and healthier, the

prevalence of preventable hospitalizations or other adverse outcomes in the Medicare Advantage population could be influenced by underlying health status in addition to enrollment in a managed care plan itself. Therefore, in order to study the effect of Medicare Advantage on potentially preventable hospitalizations, it is necessary to control for characteristics in the Medicare population that are correlated with selection into Medicare Advantage.

Without data collected through a large, controlled experiment that randomly assigned Medicare beneficiaries into a treatment group (Medicare Advantage) and a control group (traditional fee-for-service), it is not possible to fully account for selection bias due to *unobservable* characteristics. Such an experiment has never been conducted and would not be practically or politically feasible. However, given the availability of observational data on the background characteristics and health care utilization of Medicare beneficiaries in both Medicare Advantage and traditional fee-for-service, it may be possible to develop a better estimate of the relationship between insurance type, use of preventive care, and preventable hospital admissions through controlling for all *observable* characteristics.

Empirical Model and Estimation Strategy

It is difficult to directly compare the background characteristics and health care utilization of beneficiaries in Medicare Advantage to traditional fee-for-service using solely administrative data (e.g., claims data), as the Medicare Advantage program does not pay for services based on provider claims and participating health plans are not required to report encounter data to CMS. However, MEPS, which includes Medicare Advantage enrollees, is a beneficiary-level panel dataset that uses a combination of administrative and survey data to create a complete picture of

health care service utilization and spending among a nationally representative sample of Medicare beneficiaries over time.

Using the MEPS survey data and hospital and emergency room event files for 2006 to 2010, I constructed a person-year level database that tracks demographic information and changes in insurance coverage, health status, and health care service utilization and expenditures over time. The years 2006 to 2010 represent a period of time when the current Medicare Advantage payment system was implemented and enrollment in the program grew substantially, from 6.9 million in 2006 to 11.0 million in 2010 (MedPAC, 2012b). It is conceivable that the influence of selection bias in managed care enrollment is less of a concern during this period than prior periods, as improvements in the methodology adopted by CMS to set capitated payment rates could have diminished the incentive for favorable risk selection by Medicare Advantage plans (Basu & Mobley, 2012).

Hospital admissions and emergency room visits for ACS conditions over the study period were identified using a modified methodology developed and documented by AHRQ (2004) and used in many prior research studies (Billings, Anderson, & Newman, 1996; Culler, Parchman, & Przybylski, 1998; McCall, Harlow, & Dayhoff, 2001; Backus et al., 2002; Basu & Mobley, 2007; Basu & Mobley, 2012). This dataset represents an improvement over the hospital discharge data used in prior studies because, given the nature of the survey, MEPS includes information on demographic characteristics and changes in clinical conditions and health behaviors over time that are not typically available in administrative data. Depending on the relative importance of these characteristics to the individual probability of preventable hospital admission, the use of survey data that captures rich demographic, clinical, and health behavior

information may produce a less biased estimate of managed care's effect on preventable hospital admissions than hospital discharge data.

Although the issue of selection bias in managed care enrollment has been well documented in the literature, "in some observational studies, it may be reasonable to assume that treatment assignment is unconfounded with potential outcomes conditional on a sufficiently rich set of covariates or pretreatment variables" (Hirano & Imbens, 2002). The identifying assumption of ordinary least squares (OLS) regression, the basis of my analysis, is that all of the covariates correlated with both the dependent (or outcome) variable *and* the treatment variable have been included in the model and therefore the model does not suffer from omitted variable bias. This assumption can be difficult to meet, but has also inspired researchers to improve methods of controlling for observable bias. Over the past several decades, numerous techniques have been developed and shown to improve comparisons between treatment and control groups by matching members of the treatment group to members of the control groups based on a wide range of observable characteristics.

This study relies on a propensity score model that uses a logistic regression to predict the likelihood of an individual to be a member of the treatment group (Medicare Advantage) based on pre-treatment variables. The propensity score becomes a single composite characteristic that appropriately summarizes the collection of background characteristics and is thereby able to adjust for all observable covariates between the treatment and control groups (Rubin, 1997). Propensity scores have been used widely in health services research to compare outcomes between treatment and control groups using large observational datasets (Rubin, 1997; Hirano & Imbens, 2002; Stuart, 2010).

It is important to recognize that there are many different methodological considerations implicit in the propensity score model, including: choosing the matching mechanism itself, specifying the matching function, diagnosing the quality of the match, and determining appropriate levels of balance and common support between sub-classifications of propensity scores (Stuart, 2010). None of these decisions can be made *a priori* and often require an iterative process to achieve the most appropriate model, given the dataset available and the research question of interest. However, using the propensity score—if estimated in a sufficiently flexible manner—for each observation as a weight in OLS regression has been shown to give stable estimates over a wide range of values without requiring as many decisions about the specification of the propensity score and/or the conditional mean of the outcome (Hirano & Imbens, 2002).

The empirical model for the study, based on the model developed by Hirano and Imbens (2002), will be an OLS estimation of the regression function

(1) $Y_i = \alpha_0 + \tau \cdot T_i + \alpha_1' Z_i + \alpha_2'(Z_i - \bar{Z}_1) \cdot T_i + \varepsilon_i$,

where α_0 is a constant, τ is the average treatment effect on the treated (ATT), T_i indicates whether the treatment was received, Z_i is a vector of pre-treatment variables, and $\bar{Z}_1$ is the sample average of Z for the subsample of the treated units. The weights to be used in this regression estimate are

(2) $\omega(t,z) = t + (1-t) \cdot \frac{\hat{e}(z)}{1-\hat{e}(z)}$,

where $\hat{e}(z)$ is the propensity score for each observation i estimated using the logistic regression equation

(3) $e(z) = Pr(T = 1 | Z = z)$.

In this specification, the weights for observations in the treatment group are equal to 1, and the weights for observations in the control group are $\hat{e}(z)/(1 - \hat{e}(z))$; therefore, observations in the control group that have a higher propensity score (meaning they are more likely to be in the treatment group) are weighted more heavily in the regression results.

DESCRIPTION OF DATA

MEPS provides nationally representative estimates of health care use, expenditures, sources of payment, and health insurance coverage for the U.S. civilian noninstitutionalized population, based on a subsample of households included in the National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics (NCHS) (AHRQ, 2012). MEPS oversamples Asian, Black, and Hispanic persons, as well as low-income households. The final dataset is comprised of the following MEPS public use files, downloaded directly from the AHRQ website (http://www.meps.ahrq.gov):

1) Household Component – Full Year Consolidated Data Files, 2006-2010
2) Household Component – Hospital Inpatient Stay Files, 2006-2010
3) Household Component – Emergency Room Visits Files, 2006-2010

As the MEPS panels are each two years in duration, this dataset represents Year 2 of Panel 10, Years 1 and 2 for Panels 11-14, and Year 1 of Panel 15. The dataset was constructed at the person-year level, although some variables were captured multiple times within a given year during different rounds of the survey administration (of which there are five rounds across two years). The final sample includes all individuals participating in MEPS from 2006-2010 that were covered by Medicare in January and December of each calendar year. Of the 186,037 total person-year observations represented in MEPS from 2006 to 2010, 25,652 observations were for

individuals covered by Medicare at the beginning and end of the calendar year across the five-year period.

These data include variables on geography, demographics, income, clinical conditions, health insurance status, access to care, utilization, expenditures, and event-level data on hospital inpatient stays and emergency room visits (such as diagnoses and procedures). All diagnoses and procedures are coded by professional coders using fully specified International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) and Current Procedural Terminology (CPT) codes (AHRQ, 2012). (See Appendix, Table A-1 for a complete list of variables, the specification for each variable, and values for mean, minimum, maximum, and standard deviation of each variable.)

The key dependent variables used in the following analyses are grouped into two categories: 1) whether the Medicare beneficiary experienced an ACS hospital admission, and 2) whether the Medicare beneficiary used a preventive care service. The ACS condition variables identify whether or not the beneficiary experienced a hospital admission for the following potentially preventable conditions: bacterial pneumonia, dehydration, urinary tract infection, perforated appendix, angina, congestive heart failure (CHF) or hypertension, asthma, chronic obstructive pulmonary disease (COPD), diabetes, and diabetes-related amputation. In addition, there is an indicator variable to identify whether the participant had a hospital admission for *any* of the 10 ACS conditions above.

ACS conditions were identified using the AHRQ Preventive Quality Indicators, which categorize ACS conditions based upon a series of inclusion and exclusion criteria for each condition using ICD-9-CM diagnosis and procedure codes. Due to privacy concerns, the MEPS

public use file truncates the ICD-9-CM diagnosis codes to three digits and the ICD-9-CM procedure codes to two digits.[a] As the ICD-9-CM codes were truncated, it is possible that hospital admissions for conditions that do not meet the AHRQ definition were captured in the ACS condition indicator variables constructed for this study—this issue is discussed in more detail in the Limitations section.

Each preventive care variable indicates the length of time since a participant received a specific service or test. A set of indicators variables was created for the following services: blood pressure check, cholesterol check, routine check-up, flu shot, mammogram, colonoscopy, prostate-specific antigen (PSA) test, pap smear, and breast exam. The set of indicator variables for each of these services identifies if the participant has never received the service (or the value was missing), if s/he received the service within one year, if s/he received the service within one to two years, or if s/he had not received the service within the past two years. Consistent with the preventive care measures examined by Rizzo (2005), who observed a positive impact of managed care on use of preventive care for Medicare beneficiaries using MEPS data from 1996, I focus on whether each preventive care service was received within the past year.

The key independent variables used have been categorized as follows: demographic characteristics, clinical conditions, and insurance status and risk. The demographic variables include indicator variables for each Census region (Northeast, Midwest, South, West), whether the participant lived in an urban area (as defined by Metropolitan Statistical Area [MSA]) during the year, the participant's age band (under 65, between 65 and 74, between 75 and 84, and 85

[a] For this reason, hospital admissions for CHF and hypertension could not be distinguished and were combined into one ACS condition category.

years of age),[b] gender (male), race (white, black, or other/missing), Hispanic, whether the participant lives with his or her spouse, highest educational degree achieved (no degree, high school, college, or graduate), and income (less than $10,000, between $10,000 and $20,000, and greater than $20,000 per year), as well as continuous variables for age and income.[c]

Unlike hospital discharge data, MEPS includes information on a variety of clinical indicators, including individual assessment of health status, the presence of chronic conditions, body mass index (BMI), and functional limitations. The dataset includes a set of indicator variables for the individual's health status and mental health status (excellent, very good, good, fair, or poor). Chronic conditions are captured by the following indicator variables: high blood pressure, heart condition (defined as coronary artery disease, angina, acute myocardial infarction, or other), stroke, emphysema, high cholesterol, diabetes, joint pain, arthritis, and asthma. BMI is captured by a set of indicator variables that identify whether the beneficiary is underweight, normal weight, overweight, or obese.

To capture participants with functional limitations, the dataset includes one indicator variable for whether the beneficiary has any difficulties with activities of daily living (ADL)—such as walking, bathing, or eating—and one indicator variable for difficulties with instrumental activities of daily living (IADL)—such as housework, managing money, or grocery shopping. Eight specific functional limitations included in the dataset reflect difficulties with the following activities: lifting, climbing steps, walking three blocks, walking one mile, standing, bending, reaching, and grasping. The overall degree of functional ability for each beneficiary is further captured through a continuous variable that combines the responses for each specific limitation

[b] MEPS top-codes the age variable at 85 years.

[c] In the regression analyses, I used a log transformation of income in order to capture the effects of income as a percent rather than as an absolute value.

to create a scale of the number of functional limitations a participant can report on MEPS (from 0 to 8). Additional variables related to functional limitations include indicator variables for whether the participant had less than two or two or more functional limitations, and a whether the participant required assistance with his or her functional limitation(s) for more than three months. Other physical limitations include whether the participant is blind or deaf. The presence of cognitive limitations is also indicated.

The insurance status and risk variables include the key independent variable (or treatment variable), which is an indicator variable identifying whether the beneficiary was in Medicare Advantage. Other indicator variables indentify the presence of additional types of insurance coverage, such as Medicare Part B (physician and ambulatory care), Medicare Part D (prescription drugs), Medicaid, and private insurance. In addition to insurance status, there is an indicator variable for whether the beneficiary has a usual source of care. Other indicators of risk include whether the beneficiary currently smokes and whether the beneficiary wears a seatbelt always or nearly always.

RESULTS

Of the total raw number of observations (25,652), approximately 32 percent (6,276) were categorized as Medicare Advantage. This percentage is higher than the national average, but this proportion falls to 24 percent after adjusting the sample using the MEPS person-level survey weights, which is consistent with the national average of 26 percent (MedPAC, 2012b). All of the following descriptive statistics and regression analyses are presented using the person-level survey weights provided by MEPS.

Table 1 presents the average values for a selection of independent variables described above according to enrollment in traditional Medicare fee-for-service or Medicare Advantage. In comparison to traditional fee-for-service, beneficiaries in Medicare Advantage on average are more likely to live in the West, live in an urban area, be older, be Hispanic, have only a high school degree, have high cholesterol, have difficulty walking one mile, have Medicare Part B and Part D coverage, and have a usual source of care; they are less likely to live in the Midwest or South, be less than 65 years of age, have a graduate degree, report fair or poor mental health status, require help with IADLs, be underweight, have private insurance or Medicaid, or smoke.

Table 1. Descriptive Statistics of Beneficiaries in Traditional Fee-for-Service and Medicare Advantage

Variable	Traditional Fee-for-service Mean (Std. Err.)		Medicare Advantage Mean (Std. Err.)	
Demographic Characteristics				
Region				
Northeast (%)	0.194	(0.009)	0.190	(0.012)
Midwest (%)	0.238	(0.012)	0.186***	(0.012)
South (%)	0.404	(0.011)	0.309***	(0.017)
West (%)	0.164	(0.007)	0.315***	(0.015)
Urban (%)	0.774	(0.016)	0.881***	(0.013)
Age				
Average age (years)	70.8	(0.261)	72.2***	(0.312)
< 65 years old (%)	0.161	(0.006)	0.128***	(0.009)
65-74 years old (%)	0.409	(0.008)	0.415	(0.013)
75-84 years old (%)	0.310	(0.007)	0.326	(0.012)
85 years old (%)	0.120	(0.006)	0.132	(0.008)
Male (%)	0.443	(0.006)	0.394***	(0.010)
Race				
White (%)	0.853	(0.007)	0.837	(0.010)
Black (%)	0.102	(0.005)	0.107	(0.007)
Other (%)	0.045	(0.004)	0.056	(0.007)
Hispanic (%)	0.063	(0.005)	0.098***	(0.007)
Live with spouse (%)	0.496	(0.009)	0.469	(0.015)
Education				
No degree (%)	0.237	(0.007)	0.233	(0.010)
High school (%)	0.499	(0.008)	0.536**	(0.012)
College (%)	0.114	(0.005)	0.104	(0.007)
Graduate (%)	0.074	(0.004)	0.058**	(0.004)
Income ($)	25,238	(432.51)	25,086	(707.823)

Table 1. Descriptive Statistics of Beneficiaries in Traditional Fee-for-Service and Medicare Advantage

Variable	Traditional Fee-for-service Mean (Std. Err.)		Medicare Advantage Mean (Std. Err.)	
Clinical Characteristics				
Health Status				
Health status good (%)	0.289	(0.005)	0.306	(0.010)
Health status fair (%)	0.212	(0.005)	0.202	(0.008)
Health status poor (%)	0.126	(0.006)	0.105	(0.009)
Mental health status good (%)	0.306	(0.006)	0.298	(0.011)
Mental health status fair (%)	0.113	(0.005)	0.091**	(0.007)
Mental health status poor (%)	0.037	(0.003)	0.025**	(0.004)
Clinical Conditions				
High blood pressure (%)	0.676	(0.007)	0.690	(0.009)
Heart disease (%)	0.398	(0.008)	0.390	(0.011)
Stroke (%)	0.148	(0.006)	0.144	(0.010)
Emphysema (%)	0.086	(0.005)	0.082	(0.007)
High cholesterol (%)	0.587	(0.007)	0.613*	(0.010)
Diabetes (%)	0.186	(0.006)	0.176	(0.009)
Joint pain (%)	0.694	(0.007)	0.705	(0.010)
Arthritis (%)	0.590	(0.007)	0.609	(0.012)
Asthma (%)	0.127	(0.006)	0.123	(0.009)
Functional and Mental Limitations				
Help with IADLs (%)	0.264	(0.007)	0.240*	(0.010)
Help with ADLs (%)	0.150	(0.006)	0.138	(0.010)
Number of functional limitations	1.473	(0.035)	1.576	(0.053)
Help with functional limitations 3+ months (%)	0.492	(0.008)	0.471	(0.013)
Difficulty walking 1 mile (%)	0.049	(0.008)	0.060*	(0.005)
Cognitive limitations (%)	0.230	(0.007)	0.217	(0.011)
Blind (%)	0.010	(0.002)	0.007	(0.002)
Deaf (%)	0.008	(0.001)	0.007	(0.002)
BMI				
Underweight (%)	0.066	(0.004)	0.052*	(0.005)
Obese (%)	0.282	(0.007)	0.289	(0.010)
Insurance Status and Risk				
Other Insurance				
Private insurance (%)	0.479	(0.009)	0.301***	(0.011)
Medicaid (%)	0.171	(0.007)	0.141**	(0.009)
Other Medicare coverage				
Part D (%)	0.586	(0.009)	0.828***	(0.011)
Part B (%)	0.220	(0.006)	0.289***	(0.011)
Wears a seatbelt always/nearly always (%)	0.901	(0.005)	0.916	(0.007)
Smokes (%)	0.122	(0.005)	0.104*	(0.007)
Has usual source of care (%)	0.922	(0.004)	0.950***	(0.004)

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

N = 25,652

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

While there are numerous statistically significant differences between these two populations, it is not clear that beneficiaries in Medicare Advantage have a better health status on average than beneficiaries in traditional fee-for-service. For example, in Medicare Advantage beneficiaries are slightly older on average and more likely to report high cholesterol, but are less likely to be disabled (i.e., under 65 years of age), have ADL limitations, and report poor mental health status. In addition, beneficiaries in Medicare Advantage are less likely to have Medicaid coverage; this population, known as "dual eligibles" (for being dually eligible for both Medicare and Medicaid), tends to be less healthy than the general Medicare population (MedPAC, 2011).

Given the statistically significant differences between beneficiaries in fee-for-service and Medicare Advantage across a variety of demographic, clinical, insurance status, and risk variables, it is necessary to balance these characteristics between the treatment and control groups before comparing use of preventive care services and prevalence of preventable hospital admissions. To do this, I employed a propensity score weighting methodology (Hirano & Imbens, 2002).

The propensity score for each person-year observation, estimated using the logistic regression described in equation (3), predicts the likelihood of each observation to represent a beneficiary in the treatment group (Medicare Advantage) based on a set of pre-treatment variables. A value of 1 means the observation is perfectly likely to represent a beneficiary in Medicare Advantage, while a value of 0 means the observation is perfectly unlikely.

To determine which covariates to include in the propensity score model, I estimated a series of bivariate logistic regressions on the treatment variable (whether an individual was in Medicare Advantage) to determine which covariates had a statistically significant relationship

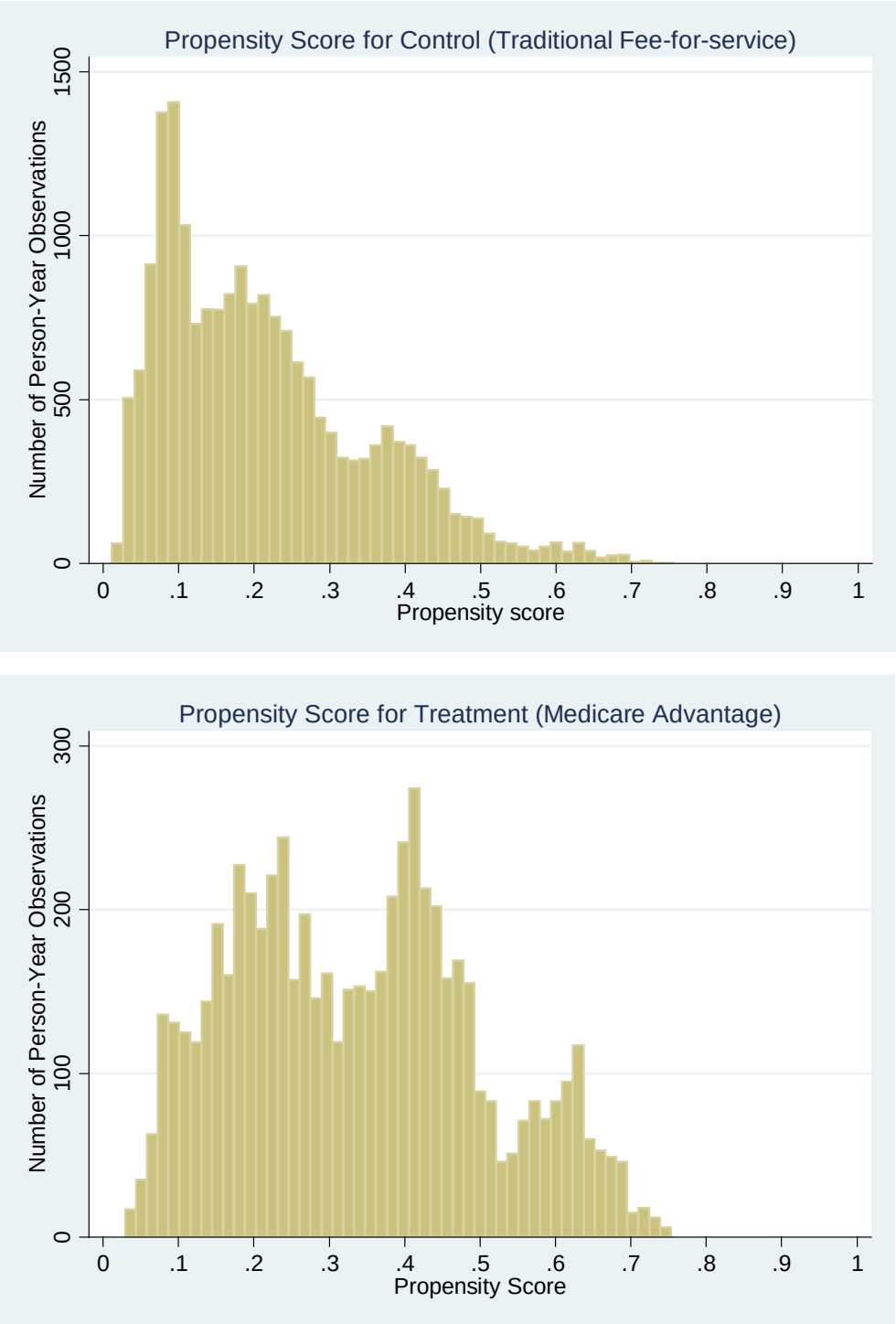
with the treatment. Based on this series of bivariate regressions, I only included covariates with a t-score of ≥ 2 in the final propensity score model, which predicts the propensity of each observation to be in Medicare Advantage.[d] This methodology has been shown to reduce sensitivity of the estimator to the specification of the regression function and has been validated in comparison to other bias-adjusted matching estimators (Hirano & Imbens, 2002).

As seen in the top panel of Figure 2, the distribution of propensity score values for beneficiaries in traditional fee-for-service is heavily skewed to the right, with the majority of observations concentrated in the 0 to 0.2 range and a median value of 0.19. The propensity score distribution for beneficiaries in Medicare Advantage is more normally distributed, with an interquartile range of 0.20 to 0.45 and a median value of 0.33.

The results of the propensity score estimation are favorable, showing that there is considerable overlap (technically referred to as common support) between the traditional fee-for-service and Medicare Advantage groups in the likelihood of being in Medicare Advantage (based on observable characteristics that are highly correlated with the treatment variable). After determining that there was enough overlap in the treatment and control groups to provide common support for comparisons between the two based on the propensity score, I re-weighted the sample using the formula presented in equation (2), proposed by Hirano and Imbens (2002), to estimate the ATT using the model presented in equation (1). The results of the re-weighted sample are shown in Table 2, which compares the mean value of each covariate between beneficiaries in traditional fee-for-service and Medicare Advantage.

[d] These variables included the following: Midwest, South, West, urban, age, male, race (other), Hispanic, high school degree, graduate degree, income, mental health status fair, mental health status poor, high cholesterol, difficulty walking one mile, underweight, private insurance, Medicaid, Medicare Part D, Medicare Part B, and usual source of care.

Figure 2. Distribution of Propensity Scores for Control (Traditional Fee-for-service) and Treatment (Medicare Advantage)



Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Table 2. Comparison of Survey-weighted and Propensity Score-weighted Means between Beneficiaries in Traditional Fee-for-Service and Medicare Advantage

	Survey-weighted				Propensity Score-weighted			
	Traditional Fee-for-service		Medicare Advantage		Traditional Fee-for-service		Medicare Advantage	
Variable	**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**	
Demographic Characteristics								
Region								
Northeast (%)	0.194	(0.009)	0.190	(0.012)	0.190	(0.010)	0.190	(0.012)
Midwest (%)	0.238	(0.012)	0.186***	(0.012)	0.189	(0.012)	0.186	(0.012)
South (%)	0.404	(0.011)	0.309***	(0.017)	0.307	(0.011)	0.309	(0.017)
West (%)	0.164	(0.007)	0.315***	(0.015)	0.314	(0.012)	0.315	(0.015)
Urban (%)	0.774	(0.016)	0.881***	(0.013)	0.879	(0.012)	0.881	(0.013)
Age								
Average age (years)	70.8	(0.261)	72.2***	(0.312)	72.072	(0.230)	72.235	(0.312)
< 65 years old (%)	0.161	(0.006)	0.128***	(0.009)	0.138	(0.006)	0.128	(0.009)
65-74 years old (%)	0.409	(0.008)	0.415	(0.013)	0.396	(0.010)	0.415	(0.013)
75-84 years old (%)	0.310	(0.007)	0.326	(0.012)	0.338	(0.010)	0.325	(0.012)
85 years old (%)	0.120	(0.006)	0.132	(0.008)	0.128	(0.007)	0.132	(0.008)
Male (%)	0.443	(0.006)	0.394***	(0.010)	0.397	(0.008)	0.395	(0.010)
Race								
White (%)	0.853	(0.007)	0.837	(0.010)	0.852	(0.009)	0.837	(0.010)
Black (%)	0.102	(0.005)	0.107	(0.007)	0.094	(0.005)	0.107*	(0.007)
Other (%)	0.045	(0.004)	0.056	(0.007)	0.054	(0.006)	0.056	(0.008)
Hispanic (%)	0.063	(0.005)	0.098***	(0.007)	0.098	(0.007)	0.098	(0.007)
Live with spouse (%)	0.496	(0.009)	0.469	(0.015)	0.462	(0.012)	0.468	(0.015)
Education								
No degree (%)	0.237	(0.007)	0.233	(0.010)	0.229	(0.009)	0.233	(0.010)
High school (%)	0.499	(0.008)	0.536**	(0.012)	0.537	(0.011)	0.535	(0.012)
College (%)	0.114	(0.005)	0.104	(0.007)	0.109	(0.007)	0.105	(0.007)
Graduate (%)	0.074	(0.004)	0.058**	(0.004)	0.057	(0.004)	0.058	(0.004)
Income ($)	25,238	(434)	25,086	(718)	24,288	(437)	25,086	(708)

Table 2. Comparison of Survey-weighted and Propensity Score-weighted Means between Beneficiaries in Traditional Fee-for-Service and Medicare Advantage

	Survey-weighted				Propensity Score-weighted			
	Traditional Fee-for-service		Medicare Advantage		Traditional Fee-for-service		Medicare Advantage	
Variable	**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**	
Clinical Characteristics								
Health Status								
Health status good (%)	0.289	(0.005)	0.306	(0.010)	0.295	(0.007)	0.306	(0.010)
Health status fair (%)	0.212	(0.005)	0.202	(0.008)	0.215	(0.008)	0.202	(0.008)
Health status poor (%)	0.126	(0.006)	0.105	(0.009)	0.117	(0.008)	0.105	(0.009)
Mental health status good (%)	0.306	(0.006)	0.298	(0.011)	0.319	(0.008)	0.298	(0.011)
Mental health status fair (%)	0.113	(0.005)	0.091**	(0.007)	0.088	(0.004)	0.091	(0.007)
Mental health status poor (%)	0.037	(0.003)	0.025**	(0.004)	0.027	(0.003)	0.025	(0.004)
Clinical Conditions								
High blood pressure (%)	0.676	(0.007)	0.690	(0.009)	0.701	(0.009)	0.690	(0.009)
Heart disease (%)	0.398	(0.008)	0.390	(0.011)	0.396	(0.010)	0.390	(0.011)
Stroke (%)	0.148	(0.006)	0.144	(0.010)	0.150	(0.008)	0.144	(0.010)
Emphysema (%)	0.086	(0.005)	0.082	(0.007)	0.084	(0.007)	0.082	(0.007)
High cholesterol (%)	0.587	(0.007)	0.613*	(0.010)	0.615	(0.010)	0.614	(0.010)
Diabetes (%)	0.186	(0.006)	0.176	(0.009)	0.180	(0.007)	0.176	(0.009)
Joint pain (%)	0.694	(0.007)	0.705	(0.010)	0.705	(0.008)	0.706	(0.010)
Arthritis (%)	0.590	(0.007)	0.609	(0.012)	0.611	(0.009)	0.609	(0.012)
Asthma (%)	0.127	(0.006)	0.123	(0.009)	0.126	(0.007)	0.123	(0.009)
Functional and Mental Limitations								
Help with IADLs (%)	0.264	(0.007)	0.240*	(0.010)	0.265	(0.011)	0.240	(0.010)
Help with ADLs (%)	0.150	(0.006)	0.138	(0.010)	0.150	(0.009)	0.138	(0.010)
Number of functional limitations	1.473	(0.035)	1.576	(0.053)	1.526	(0.045)	1.574	(0.053)
Help with functional limitations 3+ months (%)	0.492	(0.008)	0.471	(0.013)	0.504	(0.011)	0.470*	(0.013)
Difficulty walking 1 mile (%)	0.049	(0.008)	0.060*	(0.005)	0.062	(0.005)	0.060	(0.005)
Cognitive limitations (%)	0.230	(0.007)	0.217	(0.011)	0.225	(0.009)	0.217	(0.011)
Blind (%)	0.010	(0.002)	0.007	(0.002)	0.011	(0.003)	0.007	(0.002)
Deaf (%)	0.008	(0.001)	0.007	(0.002)	0.008	(0.001)	0.007	(0.002)

Table 2. Comparison of Survey-weighted and Propensity Score-weighted Means between Beneficiaries in Traditional Fee-for-Service and Medicare Advantage

	Survey-weighted				Propensity Score-weighted			
	Traditional Fee-for-service		Medicare Advantage		Traditional Fee-for-service		Medicare Advantage	
Variable	**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**	
BMI								
Underweight (%)	0.066	(0.004)	0.052*	(0.005)	0.053	(0.004)	0.052	(0.005)
Obese (%)	0.282	(0.007)	0.289	(0.010)	0.288	(0.009)	0.289	(0.010)
Insurance Status and Risk								
Other Insurance								
Private insurance (%)	0.479	(0.009)	0.301***	(0.011)	0.298	(0.009)	0.301	(0.011)
Medicaid (%)	0.171	(0.007)	0.141**	(0.009)	0.145	(0.008)	0.141	(0.009)
Other Medicare coverage								
Part D (%)	0.586	(0.009)	0.828***	(0.011)	0.827	(0.006)	0.828	(0.011)
Part B (%)	0.220	(0.006)	0.289***	(0.011)	0.290	(0.009)	0.289	(0.011)
Wears a seatbelt always/nearly always (%)	0.901	(0.005)	0.916	(0.007)	0.919	(0.005)	0.916	(0.007)
Smokes (%)	0.122	(0.005)	0.104*	(0.007)	0.104	(0.005)	0.104	(0.007)
Has usual source of care (%)	0.922	(0.004)	0.950***	(0.004)	0.949	(0.003)	0.950	(0.004)

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.
Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$.

N = 25,652

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

After re-weighting based on the propensity score values, the statistically significant differences ($p \leq .05$) between the treatment and control groups are removed in all but two independent variables: beneficiaries in Medicare Advantage are more likely to be black and less likely to require help with a functional limitation for more than three months. Therefore, this methodology successfully removed significant differences between the treatment and control groups, allowing for less biased comparisons of the use of preventive care and rates of ASC hospital admissions between the treatment and control groups.

Table 3 compares the use of several preventive care services received by beneficiaries in Medicare fee-for-service to beneficiaries in Medicare Advantage. Prior to propensity score weighting, beneficiaries in Medicare Advantage were significantly more likely to use preventive care with the exception of one variable—the percent of beneficiaries who received a PSA test within the past year. On average, beneficiaries in Medicare Advantage were more likely to have received a blood pressure check, cholesterol check, routine check-up, flu shot, mammogram, colonoscopy, papsmear, and breast exam in the past year than beneficiaries in fee-for-service.

After weighting by propensity score, a trend emerges that is similar to the one observed in the demographic characteristics, clinical characteristics, and insurance status and risk variables shown in Table 2. The significant differences between beneficiaries in traditional fee-for-service and Medicare Advantage in use of preventive care are removed for most measures after propensity score re-weighting, with the only significant differences remaining in blood pressure and cholesterol checks ($p \leq .05$) and routine check-ups ($p \leq .01$).

Table 3. Comparison of Survey-weighted and Propensity Score-weighted Means for Preventive Care Measures between Beneficiaries in Traditional Fee-for-service and Medicare Advantage

	Survey-weighted				Propensity Score-weighted			
	Traditional Fee-for-service		Medicare Advantage		Traditional Fee-for-service		Medicare Advantage	
Variable	Mean	(Std. Err.)	Mean	(Std. Err.)	Mean	(Std. Err.)	Mean	(Std. Err.)
Blood pressure check during past year (%)	0.925	(0.004)	0.950***	(0.004)	0.937	(0.004)	0.950*	(0.004)
Cholesterol check during past year (%)	0.826	(0.006)	0.862***	(0.008)	0.839	(0.007)	0.862*	(0.008)
Routine check-up during past year (%)	0.821	(0.006)	0.870***	(0.007)	0.838	(0.007)	0.870**	(0.007)
Flu shot during past year (%)	0.674	(0.007)	0.705*	(0.011)	0.694	(0.007)	0.705	(0.011)
Mammogram during past year (%)	0.279	(0.006)	0.326***	(0.011)	0.304	(0.009)	0.326	(0.011)
Colonoscopy during past year (%)	0.054	(0.003)	0.076*	(0.008)	0.061	(0.005)	0.076	(0.008)
PSA test during past year (%)	0.254	(0.006)	0.232*	(0.008)	0.227	(0.007)	0.232	(0.008)
Papsmear during past year (%)	0.160	(0.004)	0.177*	(0.008)	0.179	(0.006)	0.177	(0.008)
Breast exam during past year (%)	0.287	(0.006)	0.331**	(0.012)	0.310	(0.008)	0.331	(0.012)

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$.

N = 25,652

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

Table 4. Comparison of Survey-weighted and Propensity Score-weighted Means for ACS Hospital and Emergency Room Admissions between Beneficiaries in Traditional Fee-for-service and Medicare Advantage

	Survey-weighted				Propensity Score-weighted			
	Traditional Fee-for-service		Medicare Advantage		Traditional Fee-for-service		Medicare Advantage	
Variable	**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**		**Mean (Std. Err.)**	
ACS hospital admission (%)	0.075	(0.004)	0.079	(0.006)	0.074	(0.005)	0.079	(0.006)
Bacterial pneumonia (%)	0.017	(0.001)	0.016	(0.003)	0.017	(0.002)	0.016	(0.003)
Dehydration (%)	0.006	(0.001)	0.006	(0.002)	0.006	(0.001)	0.006	(0.002)
Urinary tract infection (%)	0.010	(0.001)	0.009	(0.002)	0.011	(0.001)	0.009	(0.002)
Perforated appendix (%)	0.001	(0.000)	0.001	(0.001)	0.000	(0.000)	0.001	(0.001)
Angina (%)	0.001	(0.001)	0.002	(0.001)	0.001	(0.000)	0.002	(0.001)
CHF/Hypertension (%)	0.021	(0.002)	0.022	(0.004)	0.022	(0.003)	0.022	(0.004)
Asthma (%)	0.005	(0.001)	0.004	(0.002)	0.006	(0.002)	0.004	(0.002)
COPD (%)	0.008	(0.001)	0.012	(0.003)	0.007	(0.002)	0.012	(0.003)
Diabetes (%)	0.007	(0.001)	0.007	(0.002)	0.006	(0.001)	0.007	(0.002)
Diabetes-related amputation (%)	0.000	(0.000)	n/a	n/a	0.000	(0.000)	n/a	n/a

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$.

N = 25,652

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

The lack of significant differences in use of preventive care between beneficiaries in traditional fee-for-service and Medicare Advantage suggests that, during the period 2006 to 2010, managed care plans did not respond as strongly as would be expected to financial pressures that create incentives to provide and expand access to primary care, cancer screenings, and other types of preventive services. The services for which a significant difference between the treatment and control groups remains after propensity score weighting—blood pressure check, cholesterol check, and routine check-up—are all primary care services, as opposed to screening procedures for cancer.

However, the greater use of primary care services among Medicare Advantage beneficiaries did not appear to impact the likelihood of ACS hospital admissions and emergency room visits. As shown in Table 4, prior to propensity score weighting there was no difference in the prevalence of ACS hospital admissions or emergency room between the traditional fee-for-service and Medicare Advantage populations for the 10 ACS conditions examined—bacterial pneumonia, dehydration, urinary tract infection, perforated appendix, angina, CHF/hypertension, asthma, COPD, diabetes, and diabetes-related amputation. After propensity score weighting, across all ACS conditions, as well as within each specific ACS condition category, there was still no significant difference in the rate of hospital or emergency room admission between beneficiaries in traditional fee-for-service and Medicare Advantage.

In order to determine if the likelihood of an ACS hospital or emergency room admission is related to enrollment in Medicare Advantage, I estimated the ATT with the OLS regression specified in equation (1) using the weights in equation (2). The regression includes the primary independent variable—an indicator variable for the treatment (Medicare Advantage)—as well as

the other independent variables in the dataset that are highly correlated with the outcome, conditional on the treatment.[e] The results of this regression are presented in Table 5.

Table 5. Average Effect of Treatment on Treated (ATT) Using OLS Regression on ACS Hospital and Emergency Room Admissions, Weighted by Propensity Score

Dependent Variable = Probability of ACS Hospital or Emergency Room Admission		
Variable	**Coefficient**	**(Std. Err.)**
Treatment		
Medicare Advantage	0.006	(0.007)
Demographic Characteristics		
Age <65	-0.036**	(0.013)
Age 65-74	-0.010	(0.009)
Male	-0.011	(0.008)
White	0.007	(0.011)
Black	0.024	(0.014)
Lives with spouse	-0.012	(0.009)
No degree	0.007	(0.011)
Graduate	-0.005	(0.014)
Clinical Characteristics		
Health status excellent	-0.013	(0.011)
Health status very good	-0.008	(0.009)
Health status fair	0.032*	(0.013)
Health status poor	0.034	(0.018)
Mental health status excellent	0.003	(0.009)
Mental health status poor	0.058	(0.047)
High blood pressure	0.007	(0.008)
Heart condition	0.035***	(0.009)
Stroke	-0.005	(0.015)
Emphysema	0.059*	(0.024)
Diabetes	0.024*	(0.012)
Joint pain	-0.006	(0.008)
Arthritis	0.011	(0.009)
Asthma	0.070***	(0.017)
Help with IADLs	0.013	(0.012)
Help with ADLs	0.040	(0.020)
Difficulty walking 1 mile	0.010	(0.015)
Difficulty reaching	-0.003	(0.017)
Difficulty grasping	0.040***	(0.012)
Two or more functional limitations	-0.026	(0.019)

[e] I estimated a series of multivariate regressions on the outcome variable (whether an individual experienced an ACS hospital admission) to determine which covariates had a statistically significant relationship with the outcome, conditional on the treatment (Medicare Advantage). Based on this series of regressions on the outcome variable, I only included in the final regression specification covariates with a t-score of ≥ 2 conditional on the treatment variable. These variables included the following: age less than 65, age 65 to 74, male, white, black, lives with spouse, no degree, graduate degree, health status excellent, health status very good, health status fair, health status poor, mental health status excellent, mental health status poor, high blood pressure, heart disease, stroke, emphysema, diabetes, joint pain, arthritis, asthma, IADLs, ADLs, difficulty walking one mile, difficulty reaching, difficulty grasping, greater than two functional limitations, need assistance with functional limitations for more than three months, cognitive limitations, private insurance, Medicaid, wears a seatbelt always/nearly always, smokes, and has a source of usual care.

Table 5. Average Effect of Treatment on Treated (ATT) Using OLS Regression on ACS Hospital and Emergency Room Admissions, Weighted by Propensity Score

Dependent Variable = Probability of ACS Hospital or Emergency Room Admission		
Variable	**Coefficient**	**(Std. Err.)**
Help with functional limitations for 3+ months	-0.008	(0.013)
Cognitive limitations	0.009	(0.015)
Insurance Status and Risk		
Private insurance	-0.005	(0.008)
Medicaid	0.010	(0.016)
Wears seatbelt	-0.010	(0.018)
Smokes	-0.002	(0.012)
Usual source of care	0.013	(0.010)
$R^2 = 0.0763$		
N = 25,652		

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$.

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

Medicare beneficiaries under age 65 are less likely to have an ACS hospital or emergency room admission, while those beneficiaries reporting their health status as fair or who have a heart condition, asthma, or difficulty grasping are all more likely to have an ACS hospital or emergency room visit. However, as the coefficient for Medicare Advantage is not statistically significant at any conventional level, we cannot reject the null hypothesis that the treatment variable has any effect on the likelihood of an ACS hospital or emergency room admission.[f] Therefore, beneficiaries in traditional fee-for-service and Medicare Advantage have no statistically significant difference in the probability of experiencing a potentially preventable admission to the hospital or emergency room.

To determine whether enrollment in Medicare Advantage had an impact on use of preventive care services, I estimated the ATT on each of the nine preventive care measures presented in Table 3. For each preventive care service, I specified an OLS regression with the

[f] In addition to OLS, which allows for predicted values to exceed the boundaries of 0 and 1 when using a binary dependent variable, I specified the same regression equation using a logit model in order to bound the predicted values between 0 and 1. The results were comparable, and therefore not shown simplicity.

preventive care measure as the dependent variable, the treatment variable (Medicare Advantage) as the primary independent variable, and additional independent variables that were highly correlated with the outcome, conditional on the treatment.[g] The results for the treatment coefficient in these regressions are presented in Table 6, which represent the average difference in likelihood of using a preventive care services within the past year between beneficiaries in Medicare Advantage and traditional fee-for-service.

[g] I employed the same methodology described in Footnote 'e'. For a complete list of covariates included in each regression on a preventive care measures, see Appendix, Tables A-2a, A-2b, and A-2c.

Table 6. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score (Summary)

	Dependent Variable								
Variable	**Blood Pressure Check within Past Year** Coefficient (Std. Err.)	**Cholest-erol Check within Past Year** Coefficient (Std. Err.)	**Routine Check-up within Past Year** Coefficient (Std. Err.)	**Flu Shot within Past Year** Coefficient (Std. Err.)	**Mammo-gram within Past Year** Coefficient (Std. Err.)	**Colon-oscopy within Past Year** Coefficient (Std. Err.)	**PSA Test within Past Year** Coefficient (Std. Err.)	**Papsmear within Past Year** Coefficient (Std. Err.)	**Breast Exam within Past Year** Coefficient (Std. Err.)
Treatment									
Medicare Advantage	0.014**	0.024**	0.034***	0.015	0.025	0.015	0.014	-0.008	0.024
	(0.005)	(0.009)	(0.012)	(0.067)	(0.016)	(0.008)	(0.022)	(0.014)	(0.016)
Demographic Characteristics	x	x	x	x	x	x	x	x	x
Clinical Characteristics	x	x	x	x	x	x	x	x	x
Insurance Status and Risk	x	x	x	x	x	x	x	x	x
R^2	0.1987	0.1683	0.123	0.116	0.126	0.059	0.147	0.103	0.109
N	25,652	25,652	25,652	25,652	14,673	25,652	10,979	14,673	14,673

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.
Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$. For mammogram, papsmear, and breast exam, the regressions excluded males. For PSA test, the regression excluded females.

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

Unlike the likelihood of experiencing a potentially avoidable hospitalization, Medicare Advantage has a statistically significant impact on the likelihood of beneficiaries using select preventive care services. Beneficiaries in Medicare Advantage are 1.4 percentage points more likely to have received a blood pressure check within the past year ($p \leq .01$), 2.4 percentage points more likely to have received a cholesterol check within the past year ($p \leq .01$), and 3.4 percentage points more likely to have had a routine check-up within the past year ($p \leq .001$) as beneficiaries in traditional fee-for-service.[h] This finding is consistent with Rizzo (2005), although the magnitude of the coefficients is substantially smaller.

For flu shot and for the cancer screening services of mammogram, colonoscopy, PSA test, papsmear, and breast exam, there was no statistically significant difference between beneficiaries in traditional fee-for-service and Medicare Advantage in the likelihood of receiving these services within the past year. This finding is somewhat inconsistent with Miller and Luft (2002), who found stronger coverage of cancer screenings in HMOs, and with Rizzo (2005), who found a statistically significant relationship between Medicare managed care and likelihood of receiving a breast exam, papsmear, and mammogram within the past year.

While the finding that Medicare Advantage increases the likelihood of Medicare beneficiaries to receive blood pressure checks, cholesterol checks, and routine check-ups is positive—and supports the hypothesis that managed care increases patient use of preventive care services—the impact is substantively small. In addition, given the insignificant impact of Medicare Advantage on ACS hospital and emergency room admissions, use of these preventive

[h] As with the regression presented in Table 5, I specified each of the equations regressing a preventive care measure on Medicare Advantage using a logit model in addition to OLS, in order to bound the predicted values between 0 and 1. The results were comparable, and therefore not shown for simplicity.

care services does not appear to reduce the prevalence of avoidable hospitalizations in the Medicare population.

POLICY IMPLICATIONS

The finding that Medicare Advantage does not impact the likelihood of Medicare beneficiaries to experience an ACS hospital admission or emergency room visit has important implications for ongoing entitlement reform discussions among policymakers in Washington. Many legislators support Representative Paul Ryan's plan to transition Medicare from its current benefit system to a voucher or premium support program, which is based in large part on a belief that the private-sector health insurance market is better able to control costs through higher quality and increased efficiency.

Although a policy to transition Medicare from the current system to a voucher program would differ in many ways from an expansion of existing Medicare Advantage plans, the experience of Medicare Advantage can be instructive in understanding how private health plans operate within a government-funded health care marketplace. While Medicare Advantage does increase the use of select preventive care services—in this study, specifically blood pressure checks, cholesterol checks, and routine check-ups—the effect of greater preventive care service use on downstream utilization is unclear.

Hospitalizations represent the largest category of medical service use among Medicare beneficiaries (24 percent), and many policymakers and health care providers view potentially preventable hospitalizations as an obvious area on which to focus delivery system and payment reforms. If Medicare Advantage is not driving reductions in ACS hospital admissions and emergency room visits through providing beneficiaries with better primary care or access to

preventive services, then efforts to expand the role of private managed care plans in the Medicare program may not improve quality and health outcomes or achieve greater efficiency without other structural changes to the Medicare program.

One potential explanation for Medicare Advantage's lack of effect on preventable hospitalization rates is the growth in PPO and PFFS plans in during the period of observation (2006-2010). These types of managed care plans do not have the same incentives as HMOs to coordinate patient care and reduce utilization of unnecessary and/or costly services (Berenson, 2004; McGuire, Newhouse, & Sinaiko 2011). A recent study of hospital discharges from Arizona, Massachusetts, and New York found that Medicare Advantage enrollment is negatively correlated with ASC admissions but that the association was weaker in 1995 than 2005, suggesting that the growth in PPO and PFFS plans as a share of the Medicare Advantage program may explain this trend (Basu, 2012). This explanation could also explain why Rizzo (2005) found significant and substantively larger effects of Medicare managed care on a broader range of preventive care services in 1996, when all Medicare Part C plans were HMOs.

As managed care continues to be proposed as a remedy to the projected rate of growth in Medicare expenditures, it will be important to consider how the effect of expanding managed care on beneficiary health outcomes and spending will depend in part on the types of managed care plans available and the financial incentives faced by providers under these health plans. Future research on the differential effects of HMOs, PPOs, PFFS plans, and MSAs on health outcomes for Medicare beneficiaries, such as ACS hospital admissions or 30-day condition-specific readmission rates, would greatly inform the debate. Similar research would also be relevant to the Medicaid program, where many states have mandated that certain populations,

such as children and young adults, enroll in managed care organizations (MCOs); much of the future growth in this program is expected to be in MCOs as Medicaid expansion begins in 2014.

LIMITATIONS

Although the propensity score weighting methodology employed in this study has been shown to be more robust than other matching estimators, in order to represent a causal effect the model must meet the same identifying assumption as OLS: that all variables correlated with the dependent variable and the key independent variable have been included in the model. The strength of the propensity score model is enhanced by the nature of the MEPS survey data, which includes information on demographic characteristics, clinical conditions, and health behaviors not typically available in administrative data. However, there may be covariates related to enrollment in Medicare Advantage and likelihood of avoidable hospital admissions or use of preventive care services that are omitted from the model. The estimated treatment effect of Medicare Advantage on avoidable hospital admissions may therefore suffer from omitted variable bias.

For example, no geographic measures of population health, health care supply, or insurance market characteristics are included in the study, as the regional variables included in MEPS (census region, and whether the individual lives in a MSA) represent areas too large to be meaningfully linked to external databases (such as data from the Census Bureau or the Area Resource File [ARF]). The level of managed care penetration in a geographic area has been found to explain some of the variation in ACS hospital admission rates (Basu, 2012). Additional studies have also found that the density level of primary care providers in a geographic region is negatively correlated with ACS admissions, although this relationship was observed only for privately-insured adults (Basu, Friedman, & Burstin 2002; Basu, Friedman, & Burstin 2004).

However, other research has shown that several measures of health care supply available by geographic area—such as whether the individual lives in a health professional shortage area, hospital capacity, or number of physician and nonphysician clinicians per capita—were not significantly correlated with preventable hospitalizations in the Medicare program (Culler, Parchman, & Przybylski 1998; Basu & Mobley, 2012). The impact of this limitation on the results is therefore uncertain.

Another limitation is the specification of the ACS variables. In order to protect participant confidentiality, the MEPS public use files truncate each ICD-9-CM diagnosis code to three digits and procedure code to two digits. As AHRQ uses the full five-digit ICD-9-CM diagnosis codes and three digit procedure codes to specify its inclusion and exclusion criteria for ACS hospital and emergency room admissions, it is possible that the variable specification in the model captures hospital admissions that do not meet the strict definition of an ACS condition. If the variable specification for ACS hospital admissions reflects classical measurement error,[i] then estimate of the treatment effect for Medicare Advantage remains unbiased but has higher variance than it would if the ACS hospital admissions were measured more precisely.

Finally, while MEPS indicates whether each Medicare beneficiary participating in the survey was enrolled in managed care or not, the survey does not distinguish between HMOs and the other types of managed care plans including PPOs, PFFS plans, and MSAs. The expectation that Medicare Advantage plans would have strong financial incentives to increase preventive care services and decrease hospital use for its members is not nearly as strong for PPOs or PFFS plans as for HMOs. In 2011, HMOs only represented 65 percent of the Medicare Advantage

[i] Classical measurement error assumes that the error component of the variable being measured is purely random, with a mean value of zero and no correlation with either the variable itself or the error term of the regression function (Stock & Watson, 2011).

program, while PPOs represented 27 percent and PFFS plans represented 5 percent (Guram & Moffit, 2012). As a substantial proportion of the Medicare Advantage plans are not HMOs and it is not possible in MEPS to identify which Medicare Advantage enrollees are in an HMO versus a PPO or PFFS plan, the incentives to encourage use of preventive care and reduce preventable hospitalizations may be relatively weak for a number of the Medicare beneficiaries represented in the survey.

CONCLUSION

Using a propensity score weighting methodology to control for observable bias, I estimated the effect of Medicare Advantage of the likelihood of ACS hospital and emergency room admissions and use of preventive care services for a nationally representative sample of Medicare beneficiaries from 2006 to 2010. Holding demographic and clinical characteristics, insurance status, and risk constant, I found no effect of Medicare Advantage on preventable hospital admissions and a statistically significant but small relationship between Medicare Advantage and the receipt of a blood pressure check, cholesterol check, or routine check-up within the past year.

In its current form, the Medicare Advantage program is more expensive per beneficiary than the traditional fee-for-service program and, according to the findings of this research study, does not achieve better health outcomes in terms of avoidable hospital admissions or use of preventive care. Private managed care plans may not be able to achieve better health outcomes or reduce spending in comparison to the traditional fee-for-service program, or may need to be paid under capitation or a global budget arrangement—such as a HMO—that creates the appropriate financial incentives to do so. If policymakers continue to consider the expansion of private

managed care plans as a solution to growing health care costs in the Medicare program, it will be important to consider the methodology used to set payment rates and the importance of financial incentives in changing both provider and beneficiary behavior.

APPENDIX

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Dependent Variables					
Ambulatory Care Sensitive (ACS) Conditions					
Any ACSC	A dummy variable set equal to 1 if the participant had a hospital admission for any ACS condition	7.6%	(0.003)	0	1
Bacterial Pneumonia	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 481, 482, 483, 485, or 486 (excluding 2nd-4th diagnoses of 282)	1.7%	(0.001)	0	1
Dehydration	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 276	0.6%	(0.001)	0	1
Urinary Tract Infection	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 590, 595, or 599	1.0%	(0.001)	0	1
Perforated Appendix	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 540 or 541	0.1%	(0.000)	0	1
Angina	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 411 or 413 (excluding procedure codes 00, 35, 36, and 37)	0.2%	(0.000)	0	1
Congestive Heart Failure (CHF)/ Hypertension	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 398, 401, 402, 403, 404, or 428 (excluding procedure codes 00, 35, 36, and 37)	2.1%	(0.002)	0	1
Asthma	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 493	0.4%	(0.001)	0	1
Chronic Obstructive Pulmonary Disease (COPD)	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 491, 492, 494, or 496, and 466 and 490 if have a secondary diagnosis from list	0.9%	(0.001)	0	1
Diabetes	A dummy variable set equal to 1 if the participant had a primary diagnosis of ICD-9-CM code 250	0.7%	(0.001)	0	1
Amputation with Diabetes	A dummy variable set equal to 1 if the participant had a procedure of ICD-9-CM code 84 and a diagnosis of code 250 in any field (excluding procedure codes 89)	0.0%	(0.000)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Preventive Care					
No/missing BP check	A dummy variable set equal to 1 if the participant has never had or didn't report a blood pressure check	3.3%	(0.003)	0	1
BP check within 1 year	A dummy variable set equal to 1 if the participant had a blood pressure check within 1 year	93.1%	(0.003)	0	1
BP check within 1-2 years	A dummy variable set equal to 1 if the participant had a blood pressure check within 1-2 years	1.7%	(0.001)	0	1
BP check within 2+ years	A dummy variable set equal to 1 if the participant had a blood pressure check within 2+ years	1.9%	(0.001)	0	1
No/missing cholesterol check	A dummy variable set equal to 1 if the participant has never had or didn't report a cholesterol check	7.4%	(0.003)	0	1
Cholesterol check within 1 year	A dummy variable set equal to 1 if the participant had a cholesterol check within 1 year	83.5%	(0.005)	0	1
Cholesterol check within 1-2 years	A dummy variable set equal to 1 if the participant had a cholesterol check within 1-2 years	5.2%	(0.002)	0	1
Cholesterol check within 2+ years	A dummy variable set equal to 1 if the participant had a cholesterol check within 2+ years	3.8%	(0.002)	0	1
No/missing routine check-up	A dummy variable set equal to 1 if the participant has never had or didn't report a routine check-up	6.2%	(0.003)	0	1
Routine check-up within 1 year	A dummy variable set equal to 1 if the participant had a routine check-up within 1 year	83.3%	(0.005)	0	1
Routine check-up within 1-2 years	A dummy variable set equal to 1 if the participant had a routine check-up within 1-2 years	4.8%	(0.002)	0	1
Routine check-up within 2+ years	A dummy variable set equal to 1 if the participant had a routine check-up within 2+ years	5.7%	(0.003)	0	1
No/missing flu shot	A dummy variable set equal to 1 if the participant has never had or didn't report a flu shot	18.9%	(0.005)	0	1
Flu shot within 1 year	A dummy variable set equal to 1 if the participant had a flu shot within 1 year	68.1%	(0.007)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Flu shot within 1-2 years	A dummy variable set equal to 1 if the participant had a flu shot within 1-2 years	6.4%	(0.003)	0	1
Flu shot within 2+ years	A dummy variable set equal to 1 if the participant had a flu shot within 2+ years	6.6%	(0.003)	0	1
No/missing mammogram	A dummy variable set equal to 1 if the participant has never had or didn't report a mammogram	50.9%	(0.005)	0	1
Mammogram within 1 year	A dummy variable set equal to 1 if the participant had a mammogram within 1 year	29.1%	(0.005)	0	1
Mammogram within 1-2 years	A dummy variable set equal to 1 if the participant had a mammogram within 1-2 years	8.1%	(0.003)	0	1
Mammogram within 2+ years	A dummy variable set equal to 1 if the participant had a mammogram within 2+ years	11.9%	(0.004)	0	1
No/missing colonoscopy	A dummy variable set equal to 1 if the participant has never had or didn't report a colonoscopy	14.1%	(0.004)	0	1
Colonoscopy within 1 year	A dummy variable set equal to 1 if the participant had a colonoscopy within 1 year	6.0%	(0.003)	0	1
Colonoscopy within 1-2 years	A dummy variable set equal to 1 if the participant had a colonoscopy within 1-2 years	5.3%	(0.003)	0	1
Colonoscopy within 2+ years	A dummy variable set equal to 1 if the participant had a colonoscopy within 2+ years	15.4%	(0.005)	0	1
No/missing PSA	A dummy variable set equal to 1 if the participant has never had or didn't report a PSA test	67.0%	(0.005)	0	1
PSA within 1 year	A dummy variable set equal to 1 if the participant had a PSA test within 1 year	24.9%	(0.005)	0	1
PSA within 1-2 years	A dummy variable set equal to 1 if the participant had a PSA test within 1-2 years	4.0%	(0.002)	0	1
PSA within 2+ years	A dummy variable set equal to 1 if the participant had a PSA test within 2+ years	4.2%	(0.002)	0	1
No/missing papsmear	A dummy variable set equal to 1 if the participant has never had or didn't report a papsmear	49.5%	(0.005)	0	1
Papsmear within 1 year	A dummy variable set equal to 1 if the participant had a papsmear within 1 year	16.4%	(0.004)	0	1
Papsmear within 1-2 years	A dummy variable set equal to 1 if the participant had a papsmear within 1-2 years	8.5%	(0.003)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Papsmear within 2+ Years	A dummy variable set equal to 1 if the participant had a papsmear within 2+ years	25.6%	(0.005)	0	1
No/missing breast exam	A dummy variable set equal to 1 if the participant has never had or didn't report a breast exam	49.1%	(0.005)	0	1
Breast exam within 1 year	A dummy variable set equal to 1 if the participant had a breast exam within 1 year	29.8%	(0.005)	0	1
Breast exam within 1-2 years	A dummy variable set equal to 1 if the participant had a breast exam within 1-2 years	8.0%	(0.003)	0	1
Breast exam within 2+ years	A dummy variable set equal to 1 if the participant had a breast exam within 2+ years	13.1%	(0.004)	0	1
Independent Variables					
Treatment					
Medicare managed care	A dummy variable set equal to 1 if the participant had Medicare managed care coverage during first survey round of the year	24.4%	(0.007)	0	1
Demographic Characteristics					
Northeast	A dummy variable set equal to 1 if the participant resided in the Northeast Census Region	19.3%	(0.008)	0	1
Midwest	A dummy variable set equal to 1 if the participant resided in the Midwest Census Region	22.5%	(0.010)	0	1
South	A dummy variable set equal to 1 if the participant resided in the South Census Region	38.1%	(0.010)	0	1
West	A dummy variable set equal to 1 if the participant resided in the West Census Region	20.1%	(0.008)	0	1
Urban	A dummy variable set equal to 1 if the participant resided in a Metropolitan Statistical Area (MSA)	80.0%	(0.014)	0	1
Age	A continuous variable from 0 to 85 indicating the participant's age at the end of the calendar year	71.2	(0.230)	0	85
Age <65	A dummy variable set equal to 1 if the age of the participants was below 65	15.3%	(0.006)	0	1
Age 65-74	A dummy variable set equal to 1 if the age of the participants was between 65 and 74	41.0%	(0.008)	0	1
Age 75-84	A dummy variable set equal to 1 if the age of the participants was between 75 and 84	31.4%	(0.007)	0	1
Age 85	A dummy variable set equal to 1 if the age of the participants was 85*	12.3%	(0.005)	0	1
Male	A dummy variable set equal to 1 if the participant was male	43.1%	(0.005)	0	1
White	A dummy variable set equal to 1 if the participant was White	84.9%	(0.007)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Black	A dummy variable set equal to 1 if the participant was Black	10.3%	(0.005)	0	1
Other race/missing	A dummy variable set equal to 1 if the participant was Multiple races or Other	4.8%	(0.005)	0	1
Hispanic	A dummy variable set equal to 1 if the participant was Hispanic	7.1%	(0.005)	0	1
Live with spouse	A dummy variable set equal to 1 if the participant lives with his or her spouse	48.9%	(0.009)	0	1
No degree	A dummy variable set equal to 1 if the participant did not graduate high school	23.6%	(0.007)	0	1
High school	A dummy variable set equal to 1 if the participant received a high school diploma or GED	50.8%	(0.007)	0	1
College	A dummy variable set equal to 1 if the participant received a college degree	11.2%	(0.005)	0	1
Graduate	A dummy variable set equal to 1 if the participant received a graduate degree	7.0%	(0.004)	0	1
Other degree/missing	A dummy variable set equal to 1 if the participant completed an other degree or missing	7.4%	(0.004)	0	1
Income	A continuous variable from $0 to $285,909 measuring the participant's total income at the end of the calendar year	$25,201	(400)	$0	$285,909
Income < $10,000	A dummy variable set equal to 1 if the participant's income was below $10,000	24.1%	(0.006)	0	1
Income $10,000-$20,000	A dummy variable set equal to 1 if the participant's income was between $10,000 and $20,000	32.8%	(0.006)	0	1
Income > $20,000	A dummy variable set equal to 1 if the participant's income was greater than $20,000	43.0%	(0.008)	0	1
Clinical Characteristics					
Health status excellent	A dummy variable set equal to 1 if the participant reported their health status as excellent	14.0%	(0.004)	0	1
Health status very good	A dummy variable set equal to 1 if the participant reported their health status as very good	23.6%	(0.005)	0	1
Health status good	A dummy variable set equal to 1 if the participant reported their health status as good	29.3%	(0.005)	0	1
Health status fair	A dummy variable set equal to 1 if the participant reported their health status as fair	20.9%	(0.005)	0	1
Health status poor	A dummy variable set equal to 1 if the participant reported their health status as poor	12.1%	(0.005)	0	1
Health status missing	A dummy variable set equal to 1 if the participant did not report their health status	0.1%	(0.000)	0	1
Mental health status excellent	A dummy variable set equal to 1 if the participant reported their mental health status as excellent	28.0%	(0.007)	0	1
Mental health status very good	A dummy variable set equal to 1 if the participant reported their mental health status as very good	27.2%	(0.005)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Mental health status good	A dummy variable set equal to 1 if the participant reported their mental health status as good	30.4%	(0.006)	0	1
Mental health status fair	A dummy variable set equal to 1 if the participant reported their mental health status as fair	10.8%	(0.004)	0	1
Mental health status poor	A dummy variable set equal to 1 if the participant reported their mental health status as poor	3.4%	(0.002)	0	1
Mental health status missing	A dummy variable set equal to 1 if the participant did not report their mental health status	0.1%	(0.000)	0	1
High blood pressure	A dummy variable set equal to 1 if the participant has ever been diagnosed with high blood pressure	67.9%	(0.006)	0	1
Heart condition	A dummy variable set equal to 1 if the participant has ever been diagnosed with coronary artery disease, angina/angina pectoris, heart attack (acute myocardial infarction), or any other heart disease or condition	39.6%	(0.007)	0	1
Stroke	A dummy variable set equal to 1 if the participant has ever been diagnosed with high blood pressure	14.7%	(0.006)	0	1
Emphysema	A dummy variable set equal to 1 if the participant has ever been diagnosed with emphysema	8.5%	(0.005)	0	1
High cholesterol	A dummy variable set equal to 1 if the participant has ever been diagnosed with high cholesterol	59.3%	(0.006)	0	1
Diabetes	A dummy variable set equal to 1 if the participant has ever been diagnosed with diabetes	18.3%	(0.005)	0	1
Joint pain	A dummy variable set equal to 1 if the participant has experienced joint pain in the past year	69.7%	(0.006)	0	1
Arthritis	A dummy variable set equal to 1 if the participant has ever been diagnosed with arthritis	59.5%	(0.006)	0	1
Asthma	A dummy variable set equal to 1 if the participant has ever been diagnosed with asthma	12.6%	(0.005)	0	1
Help with IADLs	A dummy variable set equal to 1 if the participant needs assistance with 1 or more IADLs	25.8%	(0.007)	0	1
Help with ADLs	A dummy variable set equal to 1 if the participant needs assistance with 1 or more ADLs	14.7%	(0.006)	0	1
Difficulty lifting	A dummy variable set equal to 1 if the participant reported difficulty lifting	22.3%	(0.006)	0	1
Difficulty with steps	A dummy variable set equal to 1 if the participant reported difficulty with steps	18.6%	(0.005)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Difficulty walking 3 blocks	A dummy variable set equal to 1 if the participant reported difficulty walking 3 blocks	9.1%	(0.003)	0	1
Difficulty walking 1 mile	A dummy variable set equal to 1 if the participant reported difficulty walking 1 mile	5.2%	(0.002)	0	1
Difficulty standing	A dummy variable set equal to 1 if the participant reported difficulty standing	15.7%	(0.005)	0	1
Difficulty bending	A dummy variable set equal to 1 if the participant reported difficulty bending	15.6%	(0.005)	0	1
Difficulty reaching	A dummy variable set equal to 1 if the participant reported difficulty reaching	25.6%	(0.006)	0	1
Difficulty grasping	A dummy variable set equal to 1 if the participant reported difficulty grasping	37.8%	(0.007)	0	1
Number of functional limitations	A continuous variable from 0 to 8 indicating the number of functional limitations a participant reported	1.5	(0.030)	0	8
Less than two functional limitations	A dummy variable set equal to 1 if the participant has less than 2 functional limitations	65.5%	(0.007)	0	1
Two or more functional limitations	A dummy variable set equal to 1 if the participant has 2 or more functional limitations	34.5%	(0.007)	0	1
Functional limitations for 3+ months	A dummy variable set equal to 1 if the participant is expected to have his or her functional limitation for 3 months or more	48.7%	(0.007)	0	1
Cognitive limitations	A dummy variable set equal to 1 if the participant has a cognitive limitation	22.7%	(0.007)	0	1
Blind	A dummy variable set equal to 1 if the participant is blind	1.0%	(0.002)	0	1
Deaf	A dummy variable set equal to 1 if the participant is deaf	0.8%	(0.001)	0	1
BMI underweight	A dummy variable set equal to 1 if the participant had a BMI < 18.5	6.3%	(0.003)	0	1
BMI normal weight	A dummy variable set equal to 1 if the participant had a BMI between 18.5 and 24.9	31.1%	(0.006)	0	1
BMI overweight	A dummy variable set equal to 1 if the participant had a BMI between 25 and 29.9	34.3%	(0.006)	0	1
BMI obese	A dummy variable set equal to 1 if the participant had a BMI > 30	28.4%	(0.006)	0	1
Insurance Status and Risk					
Private insurance	A dummy variable set equal to 1 if the participant ever had private insurance coverage during the calendar year	43.5%	(0.008)	0	1
Medicaid	A dummy variable set equal to 1 if the participant ever had Medicaid coverage during the calendar year	16.4%	(0.007)	0	1

Table A-1. Definition and Distribution of Survey-weighted Ambulatory Care Sensitive, Preventive Care, Demographic Characteristic, Clinical Characteristic, and Insurance Status and Risk Variables

Variable	Definition	Mean	Linearized Std. Err.	Min	Max
Medicare Part D	A dummy variable set equal to 1 if the participant ever had Medicare prescription drug coverage during the calendar year	64.5%	(0.008)	0	1
Medicare Part B	A dummy variable set equal to 1 if the participant ever had Medicare Part B coverage during the calendar year	23.7%	(0.005)	0	1
Wears seatbelt	A dummy variable set equal to 1 if the participant wears a seat belt nearly always or always	90.5%	(0.004)	0	1
Smokes	A dummy variable set equal to 1 if the participant currently smokes	11.8%	(0.004)	0	1
Usual source of care	A dummy variable set equal to 1 if the participant has a usual source of health care	92.9%	(0.003)	0	1

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

N = 25,652

Table A-2a. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	Blood Pressure Check within Past Year		Cholesterol Check within Past Year		Routine Check-up within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Treatment						
Medicare Advantage	0.014*	(0.005)	0.024**	(0.009)	0.034***	(0.009)
Demographic Characteristics						
Northeast			0.048**	(0.018)	0.071***	(0.015)
Midwest						
South	-0.005	(0.007)	0.026	(0.015)	0.007	(0.016)
West	-0.021*	(0.008)	-0.009	(0.017)	-0.037	(0.019)
Urban			0.014	(0.014)	0.043*	(0.019)
Age <65	-0.003	(0.009)	-0.021	(0.021)	-0.038	(0.022)
Age 65-74					-0.036	(0.019)
Age 75-84	0.003	(0.007)	0.012	(0.012)	-0.012	(0.016)
Age 85			-0.008	(0.024)		
Male	-0.003	(0.006)				
White	0.021*	(0.010)				
Black						
Other race/missing	0.022	(0.014)				
Hispanic	-0.013	(0.014)				
Lives with spouse			0.049***	(0.012)	0.031**	(0.012)
No degree	-0.016	(0.012)			-0.042***	(0.012)
High school	-0.004	(0.011)				
College			0.034*	(0.016)		
Graduate	0.014	(0.016)	0.067***	(0.017)	0.025	(0.018)
Other degree/missing	-0.026	(0.015)				
Income	0.004***	(0.001)	0.003	(0.002)	0.002	(0.002)
Clinical Characteristics						
Health status excellent	-0.016	(0.012)	-0.022	(0.016)	-0.014	(0.018)
Health status very good						
Health status good	0.014*	(0.007)	0.015	(0.011)	0.002	(0.014)
Health status fair	0.005	(0.008)	0.003	(0.014)	0.006	(0.014)
Health status poor						
Health status missing						
Mental health status excellent						
Mental health status very good						
Mental health status good					0.013	(0.011)
Mental health status fair						
Mental health status poor	0.027	(0.015)				
High blood pressure	0.048***	(0.007)	0.046***	(0.011)	0.070***	(0.012)
Heart condition	0.021***	(0.006)	0.049***	(0.010)	0.034**	(0.012)
Stroke	-0.007	(0.009)	0.026*	(0.012)	0.020	(0.015)
Emphysema						

Table A-2a. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	Blood Pressure Check within Past Year		Cholesterol Check within Past Year		Routine Check-up within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
High cholesterol	0.033***	(0.007)	0.124***	(0.012)	0.068***	(0.014)
Diabetes	0.011	(0.006)	0.046***	(0.010)	0.035**	(0.012)
Joint pain	0.010	(0.009)	-0.006	(0.013)	0.005	(0.015)
Arthritis	0.017*	(0.007)	0.059***	(0.013)	0.037*	(0.013)
Asthma	0.023***	(0.007)				
Help with IADLs	0.009	(0.008)				
Help with ADLs						
Difficulty lifting	-0.021*	(0.008)	-0.009	(0.019)		
Difficulty with steps	0.002	(0.009)				
Difficulty walking 3 blocks	0.002	(0.009)	0.021	(0.020)	0.012	(0.025)
Difficulty walking 1 mile						
Difficulty standing	0.000	(0.009)				
Difficulty bending	0.015	(0.009)			0.007	(0.021)
Difficulty reaching	0.009	(0.008)	0.030	(0.018)		
Difficulty grasping	-0.002	(0.007)	-0.004	(0.018)	0.015	(0.017)
Number of functional limitations						
Two or more functional limitations	0.005	(0.011)	-0.032	(0.021)	-0.022	(0.019)
Help with functional limitations for 3+ months	0.020*	(0.009)	0.018	(0.016)	0.004	(0.013)
Cognitive limitations	0.017*	(0.008)				
Blind						
Deaf						
BMI underweight	-0.251***	(0.028)	-0.207***	(0.028)	-0.250***	(0.028)
BMI normal weight						
BMI overweight	0.008	(0.008)	0.013	(0.015)	-0.006	(0.013)
BMI obese	0.004	(0.008)	0.045**	(0.014)	0.001	(0.016)
Insurance Status and Risk						
Private insurance	0.009	(0.006)			0.019	(0.014)
Medicaid	0.005	(0.009)	0.022	(0.013)		
Medicare Part D						
Medicare Part B	-0.005	(0.007)	-0.001	(0.013)	0.015	(0.014)
Wears seatbelt	0.157***	(0.018)	0.152***	(0.024)	0.122***	(0.020)
Smokes	-0.009	(0.011)	-0.023	(0.018)	-0.015	(0.018)
Usual source of care	0.172***	(0.020)	0.206***	(0.026)	0.198***	(0.026)
R^2		0.1987		0.1683		0.123
N		25,652		25,652		25,652

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$.

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

Table A-2b. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	Flu Shot within Past Year		Mammogram within Past Year		Colonoscopy within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Treatment						
Medicare Advantage	0.015	(0.012)	0.025	(0.017)	0.015	(0.008)
Demographic Characteristics						
Northeast						
Midwest						
South			0.010	(0.025)		
West						
Urban						
Age <65	-0.034	(0.027)				
Age 65-74			-0.010	(0.022)		
Age 75-84	0.076***	(0.017)				
Age 85	0.120***	(0.021)	-0.163***	(0.037)	-0.025*	(0.010)
Male						
White	0.012	(0.033)				
Black	-0.112*	(0.038)				
Other race/missing			-0.056	(0.049)	-0.019*	(0.007)
Hispanic						
Lives with spouse			0.064**	(0.021)		
No degree			-0.076**	(0.025)		
High school						
College			0.049	(0.032)		
Graduate	0.042	(0.028)				
Other degree/missing						
Income	0.010***	(0.003)	0.006	(0.004)		
Clinical Characteristics						
Health status excellent	-0.013	(0.018)	-0.038	(0.033)		
Health status very good			-0.044	(0.026)		
Health status good						
Health status fair			-0.009	(0.028)		
Health status poor			0.012	(0.043)		
Health status missing	0.127	(0.090)				
Mental health status excellent			0.051	(0.034)		
Mental health status very good						
Mental health status good			-0.037	(0.025)		
Mental health status fair			-0.069*	(0.032)	-0.011	(0.011)
Mental health status poor			-0.017	(0.066)		
High blood pressure	0.035*	(0.016)			0.003	(0.008)
Heart condition	0.038*	(0.015)			0.017	(0.009)
Stroke	-0.026	(0.022)				
Emphysema	0.063*	(0.029)				

Table A-2b. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	Flu Shot within Past Year		Mammogram within Past Year		Colonoscopy within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
High cholesterol	0.076***	(0.015)	0.092***	(0.025)	0.010	(0.009)
Diabetes	0.037*	(0.018)			-0.015	(0.009)
Joint pain	-0.003	(0.014)	-0.006	(0.023)	0.000	(0.009)
Arthritis	0.057***	(0.016)	0.049*	(0.023)	-0.002	(0.009)
Asthma	0.026	(0.023)				
Help with IADLs			-0.063*	(0.032)		
Help with ADLs			-0.010	(0.043)		
Difficulty lifting	-0.007	(0.022)			0.033	(0.022)
Difficulty with steps	0.010	(0.023)				
Difficulty walking 3 blocks	0.012	(0.030)	0.028	(0.037)		
Difficulty walking 1 mile						
Difficulty standing						
Difficulty bending	-0.010	(0.025)				
Difficulty reaching	-0.020	(0.024)				
Difficulty grasping	0.015	(0.024)			0.022	(0.013)
Number of functional limitations					-0.007	(0.005)
Two or more functional limitations	0.032	(0.031)				
Help with functional limitations for 3+ months	0.008	(0.023)	-0.047*	(0.022)		
Cognitive limitations						
Blind						
Deaf	0.002	(0.056)			-0.025	(0.016)
BMI underweight	-0.181***	(0.038)	-0.092**	(0.034)	0.003	(0.013)
BMI normal weight	0.022	(0.019)				
BMI overweight	-0.001	(0.019)				
BMI obese					0.008	(0.010)
Insurance Status and Risk						
Private insurance	0.027	(0.015)	0.028	(0.021)		
Medicaid	-0.018	(0.019)	0.005	(0.029)		
Medicare Part D						
Medicare Part B					0.111***	(0.013)
Wears seatbelt	0.183***	(0.027)	0.222***	(0.041)	0.040***	(0.007)
Smokes	-0.086***	(0.023)	-0.153***	(0.029)		
Usual source of care	0.120***	(0.029)	0.240***	(0.030)		
R^2		0.116		0.126		0.059
N		25,652		14,673		25,652

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$. Regression for mammogram excluded males.

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

Table A-2c. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	PSA Test within Past Year		Papsmear within Past Year		Breast Exam within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Treatment						
Medicare Advantage	0.014	(0.022)	-0.008	(0.014)	0.024	(0.016)
Demographic Characteristics						
Northeast						
Midwest			-0.042	(0.028)		
South	0.034	(0.024)	-0.012	(0.022)		
West					-0.016	(0.024)
Urban			0.063**	(0.024)	0.012	(0.028)
Age <65	-0.115*	(0.050)	0.140***	(0.029)	0.102***	(0.031)
Age 65-74	0.045	(0.040)			0.013	(0.025)
Age 75-84	0.078	(0.042)	-0.063**	(0.023)		
Age 85			-0.102***	(0.029)	-0.086*	(0.037)
Male						
White	0.102**	(0.037)	-0.017	(0.061)		
Black	0.094*	(0.046)	0.074	(0.064)	0.077**	(0.026)
Other race/missing					-0.044	(0.051)
Hispanic	-0.052	(0.039)				
Lives with spouse	0.046	(0.026)	0.046*	(0.021)	0.052*	(0.023)
No degree	-0.031	(0.028)	-0.046*	(0.021)	-0.051*	(0.023)
High school						
College	0.045	(0.035)	0.050	(0.038)	0.038	(0.038)
Graduate	0.095*	(0.041)	0.118*	(0.057)	0.033	(0.060)
Other degree/missing						
Income	0.008	(0.005)			0.007*	(0.004)
Clinical Characteristics						
Health status excellent			0.010	(0.031)	0.000	(0.034)
Health status very good	-0.022	(0.028)			-0.043	(0.026)
Health status good						
Health status fair			-0.017	(0.023)	-0.027	(0.031)
Health status poor	-0.002	(0.042)			-0.037	(0.040)
Health status missing					-0.174	(0.199)
Mental health status excellent			0.041	(0.028)	0.011	(0.031)
Mental health status very good	0.037	(0.026)				
Mental health status good			-0.024	(0.022)	-0.026	(0.025)
Mental health status fair	0.037	(0.041)			-0.018	(0.036)
Mental health status poor	-0.046	(0.091)				
High blood pressure	0.026	(0.022)	-0.016	(0.022)		
Heart condition			-0.032	(0.020)	-0.027	(0.023)
Stroke			-0.015	(0.033)	-0.056	(0.032)
Emphysema			-0.052	(0.033)	-0.051	(0.043)

Table A-2c. ATT Using OLS Regression on Preventive Care Measures, Weighted by Propensity Score

	Dependent Variable					
	PSA Test within Past Year		Papsmear within Past Year		Breast Exam within Past Year	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
High cholesterol	0.064**				0.066**	(0.022)
Diabetes			0.043	(0.026)		
Joint pain	0.025	(0.029)				
Arthritis	0.106***	(0.028)				
Asthma						
Help with IADLs	0.013	(0.044)	-0.075***	(0.023)	-0.074**	(0.027)
Help with ADLs	-0.104	(0.055)	0.022	(0.032)	0.006	(0.038)
Difficulty lifting						
Difficulty with steps						
Difficulty walking 3 blocks			0.068	(0.039)	0.101**	(0.036)
Difficulty walking 1 mile						
Difficulty standing						
Difficulty bending						
Difficulty reaching						
Difficulty grasping			-0.001	(0.030)		
Number of functional limitations						
Two or more functional limitations						
Help with functional limitations for 3+ months	-0.027	(0.029)	-0.023	(0.026)	-0.046*	(0.023)
Cognitive limitations	-0.022	(0.036)	-0.006	(0.024)	0.005	(0.028)
Blind			-0.168*	(0.067)		
Deaf						
BMI underweight	-0.186***	(0.053)	-0.019	(0.040)	-0.077	(0.040)
BMI normal weight						
BMI overweight	0.024	(0.022)			0.026	(0.023)
BMI obese						
Insurance Status and Risk						
Private insurance	0.047	(0.024)			0.060**	(0.022)
Medicaid	-0.051	(0.035)			0.010	(0.028)
Medicare Part D	-0.007	(0.017)				
Medicare Part B						
Wears seatbelt	0.103**	(0.037)	0.130***	(0.030)	0.224***	(0.038)
Smokes	-0.027	(0.034)			-0.065*	(0.028)
Usual source of care	0.234***	(0.032)	0.101**	(0.036)	0.188***	(0.039)
R^2		0.147		0.103		0.109
N		10,979		14,673		25,652

Source: Author's analysis of Medical Expenditure Panel Survey (MEPS) Full Year Consolidated Data Files, Hospital Inpatient Stay Files, and Emergency Room Visits Files, 2006-2010.

Notes: Propensity score-weighted results are estimated by multiplying MEPS survey weight by propensity score weight using the following formula (Hirano & Imbens, 2002): $\omega(t,z) = t + (1 - t) \cdot [(\hat{e}(z))/(1-\hat{e}(z))]$. Regression for PSA test excluded females, papsmear and breast exam excluded males.

* Significant at $p \leq .05$, ** Significant at $p \leq .01$, *** Significant at $p \leq .001$

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