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Jin Kim
Northeastern Illinois University, j-kim24@neiu.edu

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Health Status, Medicare Part D Enrollment, and Prescription Drug Use Among Older Adults

Jin Kim

Northeastern Illinois University

To account for potential selection factors in the observed relationship between Medicare Part D coverage and prescription drug use, this study uses data from the 2010 and 2012 waves of the Health and Retirement Study (HRS) to first examine the determinants of Medicare Part D enrollment, paying particular attention to the role of functional health status on the enrollment decision. Next, the study assesses whether and to what extent Medicare Part D coverage moderates the effect of functional health status on prescription drug use and monthly out-of-pocket spending among older adults. As prior studies indicate, the findings reveal that individuals who take up Medicare Part D have poorer (functional) health relative to nonparticipants, and thus, exhibit greater demand for prescription drugs. Taking functional health status into account, Medicare Part D coverage is significantly associated with greater prescription drug use among those with few health limitations, and is also significantly associated with greater out-of-pocket spending among those with the most health limitations. Thus, while prior studies have compared Medicare eligible- to non-eligible individuals to find that Medicare Part D coverage significantly lowers out-of-pocket costs, and therefore, increases prescription drug use, this study compared Medicare Part D enrollees to eligible non-enrollees to generate findings that imply that the presumed effect of Medicare Part D coverage on prescription drug use may be spurious. In turn, advocacy efforts may be best directed at ensuring that the existing coverage gaps in Medicare Part D are continually addressed.

Key words: *health insurance, access to and utilization of services, health care policy*

In the current climate of massive health care reform in the U.S., older adults potentially enjoy greater access to both prescription drug insurance and to use of prescription drugs. Before health care reform, however, access to both

prescription drug insurance and medications was not so readily available. Researchers estimate that just prior to implementation of the Medicare prescription drug benefit program (Medicare Part D), approximately one quarter of individuals age 65 and over lacked prescription drug insurance coverage (Levy & Weir, 2009). Meanwhile, prescription drug use among older adults had been steadily increasing even before passage and implementation of the Medicare Part D program. According to estimates released by the Center for Disease Control, the rate of prescription drug use among individuals 65 years and over (i.e., the percent of individuals with at least one prescription drug in the past 30 days) had increased from 73.6% in 1994 to 84.7% by the year 2002 (Center for Disease Control, 2014).

Generally speaking, health service use, including the use of prescription drugs, should increase with greater health insurance coverage (Hurd & McGarry, 1997). So the increase in prescription drug use prior to implementation of Medicare Part D in 2006 may have reflected a combination of greater private insurance coverage, along with other factors such as a sicker older adult population, improvements in medicine, and/or more effective marketing by pharmaceutical companies.

Nevertheless, Congress responded to the lack of prescription drug insurance coverage (along with the increased demand for prescription drugs) among older adults by passing the Medicare Prescription Drug Improvement and Modernization Act, which established and implemented the Medicare Part D program effective January 1, 2006 to increase access to prescription drugs among older adults (House Committee on Ways and Means, 2014). With the new program in place, the vast majority of eligible retirees were now covered under some form of prescription drug insurance plan. Thus, by 2010, 89.7% of all individuals 65 years and over reported using prescription drugs (Center for Disease Control, 2014).

Prior research on the impact of the Medicare prescription drug benefit program on prescription drug use among older adults has found that Medicare Part D initially lowered out-of-pocket costs and therefore increased overall use in the early years of the program (Lichtenberg & Sun, 2007; Yin, Basu, Zhang, Rabbani, Meltzer, & Alexander, 2008). These studies generally rely on quasi-experimental designs to compare

out-of-pocket costs and rates of use between Medicare Part D eligible- and non-eligible individuals to show that there was indeed a program effect.

What is not entirely clear from the favorable findings generated by these studies, however, is whether the observed relationship between Medicare Part D coverage and prescription drug use and costs is attributable to potential selection factors that may be confounded for a program effect. To wit, studies examining the factors associated with the initial decision to enroll in Medicare Part D find that Part D enrollees are sicker, are more likely to use prescription drugs, and have higher out-of-pocket spending than those who remain without any prescription drug insurance coverage (Levy & Weir, 2010). Stated differently, the findings suggest selection into Part D that is based almost entirely on health status and use of prescription drugs (Levy & Weir, 2010).

To account for these potential selection factors in the observed relationship between Medicare Part D coverage and prescription drug use, this study uses data from the 2010 and 2012 waves of the Health and Retirement Study (HRS) to first examine the determinants of Medicare Part D enrollment, paying particular attention to the role of functional health status on the enrollment decision. Next, the study assesses whether and to what extent Medicare Part D coverage moderates the effect of health status on prescription drug use and monthly out-of-pocket spending among older adults.

Studies assessing the impact of public programs on health service use are especially important in the current climate of U.S. health care reform, as they provide evidence (or lack thereof) of the extent to which our public policies are effectuating the legislative goals of our new public health care system. With this in mind, the current research extends prior work on the topic by explicitly taking into account possible selection factors that may be interacting with program effects. Moreover, the research uses the most recently available data from a nationally representative sample of older adults, and thus updates prior work that had relied on regional pharmacy chain data. And in lieu of a quasi-experimental design, this research uses multivariate analyses to first identify the ways in which Medicare Part D enrollees are systematically different,

if at all, from non-enrollees, and second, to assess the extent to which the presumed effect of Medicare Part D differs across varying levels of functional health.

The Literature and Conceptual Framework

Most studies that examine the determinants of health service use among older adults are framed around the Andersen Model (1968) which originally describes three sets of factors that predict health service use: predisposing characteristics, enabling resources, and need. Predisposing factors include basic socio-demographic characteristics such as age, gender, race/ethnicity, and marital status. Enabling factors include both personal and community-level resources such as income, health insurance, and the availability of health personnel and facilities. Need refers to both perceived and evaluated need, that is, the individual's perception of care requirements and professional judgment about the individual's health status and his or her need for medical care (Andersen, 1995). In short, the model suggests that people's use of health services is a function of their predisposition to use services, factors which enable or impede use, and their need for care (Andersen, 1995).

A major goal of the Andersen Model, as originally conceived, was to provide measures of access to medical care (Andersen, 1995). Equitable access then, according to Andersen, occurs when demographic and need variables account for most of the variance in utilization (1995). As such, the Andersen Model is a useful framework not only to organize potential explanations for prescription drug use but also to gauge potential inadequacies and inequities in access to prescription drug use.

Of particular interest in this research are factors related to need and enabling resources, and more specifically, functional limitations and Medicare prescription drug insurance coverage. Need is a dimension that has arguably been overlooked in prior research on prescription drug use among older adults, primarily due to the use of quasi-experimental designs that focus specifically on the enabling dimension, i.e., the treatment effects of Medicare prescription drug insurance coverage (Lichtenberg & Sun, 2007; Yin et al., 2008). In the broader context of health service use, however, need, i.e., perceived, diagnosed, and functional health status, represents a

potentially powerful selection factor that may be relevant in the use of health services, including prescription drugs (Hurd & McGarry, 1997). Need is also important to consider since it implicates the issue of equity in access to health services and prescription drugs (Anderson, 1995).

While the dimension of need may have previously taken on a secondary focus to the effect of enabling resources, i.e., prescription drug insurance coverage, in the context of policy studies on prescription drug use, it has nevertheless been recognized as a significant, contributing factor in other relevant contexts (Levy & Weir, 2010). In Levy and Weir (2010), the researchers used data from the 2002 through the 2006 waves of the Health and Retirement Study to estimate a model of Medicare Part D enrollment among those with no prior drug coverage and found that demand for prescription drugs, as measured by the number of diagnosed health conditions, was the most important determinant of the decision to enroll in the program. Stated differently, what this study showed was that Medicare Part D enrollees are sicker than those who do not enroll, thus suggesting that in the realm of access to health insurance, those who may need prescription drugs the most do appear to have access to Medicare prescription drug insurance coverage.

Meanwhile, studies examining the association between enabling resources and the use of prescription drugs have made a strong case for the favorable impact of prescription drug insurance coverage on prescription drug use (Lichtenberg & Sun, 2007; Yin et al., 2008). In one study investigating the effect of the Medicare Part D prescription drug benefit on drug utilization and expenditures (Yin et al., 2008), the researchers estimated prescription utilization and out-of-pocket expenditures attributable to Part D among a sample of persons eligible for the benefit, and found that average monthly drug utilization increased 5.9 percent and out-of-pocket expenditures decreased by 13.1 percent. In another recent study examining the impact of Medicare Part D coverage on prescription drug use by older adults (Lichtenberg & Sun, 2007), the researchers used a difference-in-differences research design and estimated that Medicare Part D reduced user cost among older adults by 18.4 percent and increased prescription drug use by 12.8 percent.

In using quasi-experimental designs, these two studies

follow in the tradition of the RAND Health Insurance Experiment which randomly assigned individuals to health insurance plans that varied in deductibles and co-payments and found that those with the largest cost-sharing had significantly lower health expenditures relative to those with no cost-sharing (Newhouse, 1993). The main difference, however, between the Rand experiment and more recent studies examining the impact of Medicare prescription drug insurance coverage is that the latter studies did not randomly assign sample members into treatment and control conditions, but rather compared elderly to non-elderly (i.e., Part D eligible to non-eligible) individuals.

While comparing eligible to non-eligible persons may be a conventional method of assessing the impact of public programs on health service use (see Cutler & Gruber, 1996; Card & Shore-Sheppard, 2004), in the absence of random assignment, such a comparison may be vulnerable to confounding factors, most notably in the form of selection effects or systematic differences between treatment and comparison groups that may be mistaken for a program effect.

Thus, to account for the possibility that the established relationship between Medicare Part D coverage and prescription drug use among older adults may be due to selection factors, this study first examines the determinants of Medicare Part D enrollment with an eye towards identifying systematic differences between Medicare Part D participants and non-participants. Under the expectation that Medicare Part D participants are indeed sicker than non-participants, the study then assesses whether and to what extent Medicare Part D coverage moderates the effect of health status on prescription drug use and costs. More specifically, the study uses the well-established Katz index of Activities of Daily Living (ADL) to create three separate categories of functional health status to determine whether the effect of Medicare Part coverage differs across these three varying levels of functional health (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963; Katz, Downs, Cash, & Grotz, 1970).

Data and Methods

Data come from the Health and Retirement Study (HRS),

a nationally representative panel study of persons age 50 and over and their spouses. Section N of the HRS survey, in particular, elicits detailed information about respondents' prescription drug insurance coverage, prescription drug use, out-of-pocket expenses, and health conditions requiring the use of prescription drugs, and is thus well-suited for a study estimating the effects of health status and prescription drug insurance coverage on prescription drug use. The full HRS consists of six cohorts representing persons born before 1960 in the U.S., including those born between 1942 and 1947, i.e., the War Baby (WB) cohort.

The sample is drawn from the 2010 and 2012 waves of the HRS to make use of the most recently available data on Medicare Part D coverage. To ensure that all sample members are eligible for enrollment and use of Medicare Part D, the study draws individuals 65 years and over from the 2010 wave who report Medicare coverage in both 2010 and 2012. The HRS includes 8,985 individuals who satisfy these criteria. Baseline data on sample members are collected for 2010, while outcome data (i.e., Part D enrollment, and prescription drug use and out-of-pocket expenses) are collected for 2012. Any sample member with missing baseline or outcome data is dropped from the analysis. Thus, the final sample to be used for the analysis of Part D enrollment includes 8,456 individuals who are eligible to enroll in Medicare Part D, while the sample to be used for the analysis of prescription drug costs includes a subset of 6,316 individuals who report non-zero out-of-pocket spending on prescription drugs.

Key Measures

This research focuses on three main outcomes: Medicare Part D enrollment, prescription drug use, and monthly out-of-pocket expenses incurred in purchasing prescription drugs. Constructing an appropriate measure of Medicare Part D enrollment or coverage can be complicated, because individuals covered under Medicare Advantage may report coverage under Part D as well. With this in mind, there are at least seven different types of prescription drug insurance options that may be examined: Medicare Part D, Medicaid, Medicare Advantage, Medigap, employer coverage, other drug coverage, and no coverage. Medicare Advantage, Medigap, and

other drug coverage are collapsed into one insurance category for analysis.

The key outcome data for this study come from Section N of the 2012 HRS, which contains detailed questions on both public and private health insurance coverage that can be used to construct the prescription drug insurance options outlined above. In the beginning of this section, the HRS asks respondents a series of straightforward questions regarding public health insurance coverage. Individuals are asked whether they signed up for Medicare prescription drug coverage, whether they are currently covered under Medicaid, whether they receive their Medicare benefits through a Health Maintenance Organization (HMO), and whether the HMO covers or provides help with paying for prescription drugs. While the coding for the first two questions would seem straightforward, if a sample member reports that they receive their Medicare benefits through an HMO and that the HMO covers prescription drugs, then the individual is coded as being covered under a Medicare Advantage plan.

With respect to private prescription drug insurance coverage, this later section of the survey asks respondents to identify up to three private insurance plans that provide health insurance coverage, whether the private plan in question helps pay for prescription drugs, and where the respondent purchased the private plan. If a sample member reports that an identified private plan helps pay for prescription drugs and that the individual did not purchase the private plan directly from an insurance company, then the individual is coded as having employer coverage. If the respondent reports that an identified private plan helps pay for prescription drugs and that the individual purchased the private plan directly from an insurance company, then the individual is coded as having Medigap coverage.

Towards the end of Section N, respondents who report taking prescription medications regularly are asked whether the costs of their prescription medications have been completely covered, mostly covered, only partially covered, or not covered at all by insurance. Sample members who are not covered under any of the aforementioned types of prescription drug insurance, but who report that their prescription drugs are at least partially covered are coded as having other drug

coverage. And finally, those individuals not reporting any of the aforementioned types of coverage are coded as having no coverage.

In the second part of the analysis, the two main outcome variables capture whether or not an individual regularly uses prescription drugs and the logarithm of monthly out-of-pocket expenses incurred in purchasing prescription drugs. This focus on utilization and (log) expenses, respectively, is consistent with prior studies on health service utilization that often employ a two-part model—one model to predict the probability or likelihood of any use, and a second model to predict the level of use (Diehr, 1999; also see Hurd & McGarry, 1997). In the sample, 90.9% report that they take prescription drugs regularly and 75.3% report that they incurred monthly out-of-pocket expenses for prescription drugs. Only those reporting out-of-pocket expenses (i.e., the 75.3%) are included in the final analysis of monthly out-of-pocket costs.

Another critical piece of the final analytical model is the measure of functional health status, i.e., the Katz ADL index, which reports the number of difficulties with six activities of daily living (e.g., bathing, eating, dressing, grooming, getting in and out of bed, and using the toilet). Based on this index, this research classifies sample members into three mutually exclusive and exhaustive groups: those with 0 ADL difficulties, those with 1 or 2 ADL difficulties, and those with 3 or more ADL difficulties. The use of the Katz index as a measure of health status is justified in the health and disability policy literature as being less susceptible to measurement and endogeneity problems (see Bound, Schoenbaum, Stinebrickner, & Waidmann, 1999) as well as for its clinical usefulness (see Katz et al., 1970).

This study also incorporates additional relevant factors regarding health needs, economic access, and predisposing characteristics that are aligned with Andersen's conceptual framework outlined above. Also subsumed under the category of health needs are a series of dummy variables indicating whether a doctor diagnosed the respondent as having a particular condition in the 2010 Wave. The eight included conditions are high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric issues, or arthritis in the current

wave. The economic access category includes information on family income (i.e., income less than or equal to 100% of the federal poverty line (FPL); income 101% to 200% of the FPL; and income greater than 200% of the FPL) and education (high school education or GED versus no high school education or GED). Finally, predisposing factors include dummy variables on gender (female versus not female), ethnicity (Hispanic versus not Hispanic), race (Black versus not Black), marital status (married or partnered versus not married or partnered), and a categorical age variable (65 to 74; 75 to 84; and 85 and older).

Using the key variables constructed and prepared for analysis along with the aforementioned health, economic access, and predisposing variables, the analysis begins with a logistic regression model of Medicare Part D enrollment, paying particular attention to the role of health needs. This first model only includes individuals who report no health insurance coverage in 2010, and is used to account for potential selection factors in the previously observed relationship between Medicare Part D coverage and prescription drug use. In the second part of the analysis, a logistic regression model is used to assess the determinants of prescription drug use while an ordinary least squares (OLS) regression is used to assess the determinants of monthly prescription drug expenses. In both the analysis of Medicare Part D enrollment and the analysis of prescription drug use and costs, the sample weights that are provided in the HRS tracker file are used to control for possible design effects.

While the research is fairly well established in asserting that Medicare Part D lowered out-of-pocket expenses and increased prescription drug use at least in the fledgling years of the program, what is less clear is whether the favorable effect of Medicare Part D coverage holds regardless of an individual's health status. Thus, this study uses interaction terms to investigate the possibility that the effect of Medicare prescription drug insurance may not be the same across different levels of functional health.

As such, the expectation is that Medicare Part D coverage should lower monthly out-of-pocket spending on prescription drugs and therefore increase prescription drug use, particularly among older adults with the poorest functional health.

Table 1. Logistic regression coefficients, standard errors, and exp(B) for Medicare Part D enrollment

	Medicare Part D Enrollment	
	B(SE)	Exp(B)
Health Needs		
Functional Limitations		
0 ADLs [Reference]	-	-
1 to 2 ADLs	1.228(.453)***	3.416
3 or more ADLs	-0.134(.891)	0.875
Diagnosed Conditions		
High blood pressure	0.192(.222)	1.211
Diabetes	-0.169(.435)	0.844
Cancer	-0.725(.575)	0.484
Lung disease	-0.080(.416)	0.923
Heart disease	0.647(.279)**	1.910
Stroke	0.117(.416)	1.124
Psychiatric	0.112(.348)	1.118
Arthritis	-0.501(.323)	0.606
Economic Access		
0% to 100% of FPL	0.956(.522)*	2.601
101% to 200% of FPL	-0.385(.452)	0.681
>200% of FPL [Reference]	-	-
High school education or GED	-0.569(.402)	0.566
Predisposing		
Female	0.209(.382)	1.232
Hispanic	0.055(.691)	1.056
Black	0.375(.499)	1.454
Married or partnered	0.307(.409)	1.359
Age		
65 to 74 years [Reference]	-	-
75 to 84 years	-0.049(.409)	0.953
85 years and over	-0.127(.560)	0.881
Constant	-2.131(.622)	0.119
Log Likelihood	-115.966	
Number of observations	367	

Notes: ***Significant at the .01 level; **Significant at the .05 level; *Significant at the .10 level

Conversely, older adults reporting no functional difficulties should have little need for prescription drugs, rendering the impact of Medicare Part D coverage minimal at best.

Results

Table 1 presents logit coefficients, standard errors, and the odds (exp(B)) of Medicare Part D enrollment from a logistic regression model examining the determinants of the enrollment decision. Among the two sets of health-related measures, the model reveals that functional limitations and heart disease are significantly associated with the enrollment decision. More specifically, individuals with 1 to 2 ADL difficulties are more than three times as likely as those with 0 ADL difficulties to enroll in Medicare Part-D, while those with heart disease are nearly twice as likely to enroll in the program relative to those without heart disease, thus lending some credence to the notion that Medicare Part D enrollees may indeed be sicker than non-enrollees.

With respect to the economic access variables, the model reveals that family income as measured by an income-to-poverty ratio is significantly associated with Medicare Part D enrollment. Individuals with family income less than or equal to 100% of federal poverty are more than two and one-half times as likely to enroll in Part D relative to those with family income greater than 200% of poverty. Stated differently, it appears that Medicare Part D enrollees may not only be sicker but also poorer relative to non-enrollees. Meanwhile, none of the predisposing characteristics were found to be significantly associated with Medicare Part D enrollment.

Table 2 presents logit coefficients, standard errors, and the odds of prescription drug use, as well as ordinary least squares (OLS) estimates and standard errors of the logarithm of monthly out-of-pocket drug expenses. The models examine the extent to which the effect of Medicare prescription drug insurance coverage on prescription drug use and costs differs across functional health status, and finds that among individuals with 0 ADL difficulties, stand-alone Part D coverage is significantly associated with 4.29 times greater odds of prescription drug use. Among those with 1 to 2 ADL difficulties, stand-alone Part D coverage is significantly

associated with nearly 6 times greater odds of prescription drug use. Interestingly, stand-alone Part D coverage is not significantly associated with prescription drug use among those with 3 or more ADL difficulties. This may be due to the financing structure built into the Part D program, that is, the co-insurance payments and coverage gaps (i.e., the donut hole) that incentivize enrollees to either minimize annual drug costs or claim catastrophic needs.

Table 2a. Logistic and OLS Regression Coefficients and Standard Errors for Rx Drug Use and (log) Out-of-pocket Expenses

	Logistic Regression of Rx Drug Use		OLS Regression of (Log) Out-of-Pocket Expenses
	B(SE)	Exp(B)	B(SE)
Health Needs			
Functional Limitations and Prescription Drug Insurance			
0 ADLs | Employer	1.289(.252)***	3.627	-0.015(.130)
0 ADLs | Medicaid	1.098(.443)**	2.997	-0.674(.188)***
0 ADLs | Stand-Alone Part D	1.456(.265)***	4.290	0.167(.132)
0 ADLs | Medicare Adv/Medigap/Other	1.234(.247)***	3.437	-0.089(.130)
1 – 2 ADLs | Employer	1.427(.518)***	4.166	0.139(.170)
1 – 2 ADLs | Medicaid	1.437(.825)*	4.208	-0.479(.262)*
1 – 2 ADLs | Stand-Alone Part D	1.779(.667)***	5.923	0.276(.176)
1 – 2 ADLs | Medicare Adv/Medigap/Other	1.531(.460)***	4.621	0.202(.165)
⩾ 3 ADLs | Employer	1.585(1.015)	4.878	0.210(.251)
⩾ 3 ADLs | Medicaid	2.805(1.540)*	16.529	-0.387(.294)
⩾ 3 ADLs | Stand-Alone Part D	1.367(.998)	3.924	0.513(.267)*
⩾ 3 ADLs | Medicare Adv/Medigap/Other	2.808(1.179)**	16.576	0.456(.220)**
Diagnosed Conditions			
High blood pressure	1.831(.154)**	6.243	0.114(.040)***
Diabetes	1.418(.285)**	4.129	0.199(.042)***
Cancer	0.268(.168)	1.308	-0.043(.052)
Lung disease	0.391(.227)*	1.478	0.158(.053)***
Heart disease	1.385(.231)***	3.994	0.198(.039)***
Stroke	0.844(.429)**	2.325	0.167(.066)**
Psychiatric	0.479(.190)**	1.614	0.104(.041)**
Arthritis	0.060(.114)	1.062	0.060(.039)

Notes: ***Significant at the .01 level; **Significant at the .05 level; *Significant at the .10 level

Moreover, individuals diagnosed with high blood pressure, diabetes, heart disease, and stroke are more than twice as likely to use prescription drugs relative to those without these conditions. With respect to predisposing factors, females and married or partnered individuals are significantly more likely to use prescription drugs. Surprisingly, none of the economic access factors were found to be significantly associated with prescription drug use.

Table 2b. Logistic and OLS Regression Coefficients and Standard Errors for Rx Drug Use and (log) Out-of-pocket Expenses

	Logistic Regression of Rx Drug Use		OLS Regression of (Log) Out-of-Pocket Expenses
	B(SE)	Exp(B)	B(SE)
Economic Access			
Family Income			
0% to 100% of FPL	-0.166(.302)	.847	-0.167(.108)
101% to 200% of FPL	-0.006(.187)	.994	-0.044(.061)
>200% of FPL [Reference]	-	-	
High school education or GED	0.262(.198)	1.299	-0.009(.068)
Predisposing			
Female	0.375(.145)***	1.454	0.021(.050)
Hispanic	-0.086(.329)	.918	0.028(.116)
Black	-0.322(.284)	.725	0.101(.097)
Married or partnered	0.262(.154)*	1.300	0.133(.053)**
Age			
65 to 74 years [Reference]	-	-	
75 to 84 years	0.144(.158)	1.155	0.061(.052)
85 years and over	0.396(.272)	1.485	-0.038(.081)
Constant	-1.125(.329)	.325	3.247(.154)
Log Likelihood	-732.069		-
R Square	-		0.076
Number of observations	8456		6316

Notes: ***Significant at the .01 level; **Significant at the .05 level; *Significant at the .10 level

In the final OLS regression, the findings reveal that, surprisingly, Medicare prescription drug insurance coverage bears little relation to out-of-pocket spending on prescription drugs. While Medicaid coverage appears to be significantly associated with lower out-of-pocket spending for

individuals with either 0 or 1 to 2 ADL difficulties, stand-alone Part D coverage is found to be significantly associated with greater out-of-pocket spending on prescription drugs among individuals with 3 or more ADL difficulties. Thus, while prior studies have linked Medicare Part D coverage to lower prescription drug costs, and therefore, to increases in prescription drug use, these findings suggest a rather glaring disconnect in the effect of Medicare Part D coverage on prescription drug use and costs.

Moreover and as one might expect, individuals diagnosed with high blood pressure, diabetes, lung disease, heart disease, stroke, and psychiatric conditions incur greater monthly out-of-pocket expenses for prescription drugs relative to those without such conditions. More specifically, monthly out-of-pocket expenses are in the range of 10.4% to 19.9% greater for those with the aforementioned diagnosed conditions.

With respect to predisposing factors, out-of-pocket expenses are 13.3% higher for individuals who are married or partnered. And, as was the case for prescription drug use, none of the economic access factors were found to be significantly associated with the level of out-of-pocket spending.

Discussion

This research first examined the determinants of Medicare Part D enrollment with the expectation that Medicare Part D participants have poorer functional health relative to nonparticipants. The research then assessed whether and to what extent Medicare Part D coverage moderates the impact of functional health status on prescription drug use and costs. While prior studies have used quasi-experimental designs comparing Medicare eligible- to non-eligible (i.e., younger than age 65) individuals to assess the impact of Medicare Part D coverage on prescription drug use and costs, this research relied on multivariate regression analyses to assess the impact of Medicare Part D coverage within a sample of Part D eligible older adults and across varying levels of functional health.

As such, logistic regression analyses first revealed that Medicare Part D participants are systematically different from nonparticipants in a number of important ways. As prior studies have shown (Levy & Weir, 2010), individuals who enroll

in Medicare Part D indeed have poorer (functional) health relative to nonparticipants, and thus, have greater demand for prescription drugs. The analyses also revealed that Medicare Part D participants tend to have the lowest income levels according to federal poverty standards. That is, Medicare Part D participants likely use their Medicaid prescription drug insurance coverage to help pay for their Part D program benefits. In short, Medicare Part D participants are sicker and poorer relative to nonparticipants. Stated differently, health and income represent potentially powerful selection factors in any observed relationship between Medicare Part D coverage and prescription drug use which may remain unaccounted for in research designs that do not allow for random assignment into treatment and control conditions for practical or ethical reasons.

Taking into consideration these prominent selection factors and functional health status in particular, logistic and OLS regressions revealed that the effect of Medicare Part D coverage on prescription drug use and costs is not as unambiguous as previously believed. Clearly, Medicare Part D coverage is significantly associated with prescription drug use and costs, but in a manner that likely reflects the financing structure of the Medicare Part D program. For those with few health limitations, Medicare Part D coverage appears to have a negligible impact in lowering costs, and yet, enrollees are still more likely to use prescription drugs. For those with the most health limitations, Medicare Part D coverage is significantly associated with greater out-of-pocket spending on prescription drugs, and hence, such enrollees are not significantly more likely to use prescription drugs. Stated differently, while prior studies have compared Medicare eligible- to non-eligible individuals to find that Medicare Part D coverage significantly lowers out-of-pocket costs, and therefore, increases prescription drug use, this study compared Medicare Part D enrollees to age-eligible non-enrollees to generate findings that imply that the presumed effect of Medicare Part D coverage on prescription drug use may be spurious.

While the findings may seem somewhat counterintuitive, they are arguably consistent with the Medicare Part D financing structure and the coverage gaps that are inherent in the program. That is, individuals with the fewest health needs

may be incentivized to minimize their prescription drug use due to the deductibles and a significant coverage gap for annual prescription drug costs that reach moderate levels (i.e., the "doughnut hole"), while individuals with the most health needs may be incentivized to claim catastrophic benefits, particularly if their annual prescription drug costs fall within the doughnut hole.

Future research on prescription drug use among older adults might consider examining the impact of Medicare Part D coverage not only across varying levels of functional health but across varying levels of income. As shown above, Medicare Part D participants are not only sicker than nonparticipants but they also exhibit lower levels of income. Hence, it would be interesting to consider how selection factors other than health impact the use of prescription drugs and associated costs. Future research could also entertain the possibility of incorporating policy-relevant cutoffs in terms of annual (total) prescription drug costs if such data becomes available. This would be with an eye towards improving upon previously developed measures of the demand for prescription drugs (see Levy & Weir, 2009). In addition, with the implementation of the Affordable Care Act (ACA) provisions that gradually close the existing coverage gaps in prescription drug use and spending, it becomes almost imperative that this study is revisited after full implementation of ACA to see whether the differential impacts of Medicare Part D coverage across varying levels of functional health still hold.

While increasing access to prescription drug insurance coverage was not necessarily one of the prominent goals of the recent health care reform, implicit in the goal of expanding access to health insurance coverage more broadly among previously uninsured individuals is that this greater access to health insurance will necessarily lead to greater access to health service use in its various forms. Thus, the findings generated by this research provide evidence that while older adults across the health spectrum seem to be benefiting from greater access to prescription drugs, this greater access is probably not attributable to the lowering of prescription drug costs vis-à-vis the Medicare prescription drug benefit program, as prior research on prescription drug use has assumed to be the case. Hence, policy advocates who champion greater access to

health insurance and care should note that current advocacy efforts in this realm may be best directed at ensuring that the existing coverage gaps in government-sponsored prescription drug plans are indeed continually addressed.

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Appendix: Baseline Characteristics of Sample Members by Prescription Drug Insurance Coverage and Prescription Drug Use

Table A1 below describes the baseline characteristics of sample members by type of prescription drug insurance coverage in 2010. The columns represent five different prescription drug insurance options reported in the study. With respect to the number of functional limitations, sample members who report Stand-Alone Part D coverage are not different from those without prescription drug insurance coverage. While they appear to be no different in terms of their functional health, they are more likely to be diagnosed with high blood pressure (76% v. 60%), diabetes (28% v. 17%), cancer (21% v. 17%), lung disease (15% v. 10%), heart disease (36% v. 29%), psychiatric conditions (19% v. 15%), and arthritis (79% v. 65%) relative to those without coverage.

With respect to the economic access variables, sample members with Part D coverage are different from those without prescription drug insurance coverage both in terms of family income and educational attainment. They are less likely to be poor (7% vs. 10%) and more likely to have a high school education or GED (81% vs. 77%) relative to those without coverage.

As for predisposing characteristics, sample members with Part D coverage are less likely to be Hispanic and Black, and more likely to be female and married or partnered as compared to those without coverage. They are also generally younger relative to those without coverage.

Table A2 below describes the baseline characteristics of sample members by prescription drug use in 2012. Sample members who report regularly using prescription drugs are reported under one column, while those who report not using prescription drugs regularly are reported under a separate column. Among

sample members with 0 ADL difficulties, those who regularly use prescription drugs are more likely to be covered under stand-alone Part D relative to those who do not use prescription drugs (21% v. 18%). Among sample members with 1 to 2 ADL difficulties, only 3% of those who regularly use prescription drugs have stand-alone Part D coverage as compared to 1% for those who do not use prescription drugs. Among sample members with 3 or more ADL difficulties, there is no apparent difference in stand-alone Part D coverage between those who regularly use prescription drugs relative to those who do not use prescription drugs.

Moreover, sample members who regularly use prescription drugs are more likely to be diagnosed with high blood pressure (79% v. 25%), diabetes (31% v. 6%), cancer (21% v. 17%), lung disease (15% v. 7%), heart disease (38% v. 9%), stroke (11% v. 2%), psychiatric conditions (21% v. 8%), and arthritis (79% v. 64%) relative to those who do not use prescription drugs. They are also somewhat more likely to be female, Black, and married or partnered as compared to those who do not use prescription drugs.

Table A1. Sample Characteristics by Prescription Drug Insurance Coverage in 2010

	Prescription Drug Insurance Coverage					
	Employer	Medicaid	Stand-Alone Part D	Medicare Advantage/ Medigap/ Other	None	Total
Health Needs						
Functional Limitations						
0 ADLs	0.84	0.60	0.83	0.81	0.83	0.81
1 to 2 ADLs	0.12	0.23	0.12	0.14	0.13	0.14
3 or more ADLs	0.04	0.17	0.05	0.05	0.05	0.05
Diagnosed Conditions						
High blood pressure	0.73	0.87	0.76	0.72	0.60	0.74
Diabetes	0.28	0.42	0.28	0.27	0.17	0.29
Cancer	0.23	0.16	0.21	0.21	0.17	0.21
Lung disease	0.15	0.21	0.15	0.13	0.10	0.15
Heart disease	0.35	0.45	0.36	0.35	0.29	0.36
Stroke	0.11	0.17	0.10	0.09	0.09	0.10
Psychiatric	0.20	0.35	0.19	0.19	0.15	0.20
Arthritis	0.77	0.82	0.79	0.77	0.65	0.77
Economic Access						
Family Income						
0% to 100% of FPL	0.04	0.43	0.07	0.07	0.10	0.09
101% to 200% of FPL	0.15	0.35	0.25	0.26	0.29	0.23
>200% of FPL	0.81	0.22	0.68	0.67	0.60	0.68
High school education or GED	0.88	0.40	0.81	0.78	0.77	0.79
Predisposing						
Female	0.54	0.69	0.63	0.58	0.54	0.59
Hispanic	0.04	0.33	0.05	0.10	0.07	0.09
Black	0.12	0.33	0.10	0.12	0.13	0.13
Married or partnered	0.68	0.31	0.60	0.62	0.55	0.60
Age						
65 to 74 years	0.52	0.48	0.53	0.52	0.49	0.52
75 to 84 years	0.38	0.38	0.37	0.36	0.34	0.37
85 years and over	0.10	0.14	0.10	0.12	0.17	0.11
Number of observations	2581	652	2105	2751	367	8456

Table A2. Sample Characteristics by Prescription Drug Use in 2012

	Prescription Drug Use		
	Rx Drug Use	No Rx Drug Use	Total
Health Needs			
Functional Limitations & Prescription Drug Insurance			
0 ADLs | Employer	0.26	0.25	0.26
0 ADLs | Medicaid	0.05	0.04	0.05
0 ADLs | Stand-Alone Part D	0.21	0.18	0.21
0 ADLs | Medicare Adv/Medigap/Other	0.26	0.30	0.26
1 – 2 ADLs | Employer	0.04	0.02	0.04
1 – 2 ADLs | Medicaid	0.02	0.01	0.02
1 – 2 ADLs | Stand-Alone Part D	0.03	0.01	0.03
1 – 2 ADLs | Medicare Adv/Medigap/Other	0.05	0.03	0.05
⩾ 3 ADLs | Employer	0.01	0.01	0.01
⩾ 3 ADLs | Medicaid	0.01	0.00	0.01
⩾ 3 ADLs | Stand-Alone Part D	0.01	0.01	0.01
⩾ 3 ADLs | Medicare Adv/Medigap/Other	0.02	0.01	0.02
Diagnosed Conditions			
High blood pressure	0.79	0.25	0.74
Diabetes	0.31	0.06	0.29
Cancer	0.21	0.17	0.21
Lung disease	0.15	0.07	0.15
Heart disease	0.38	0.09	0.36
Stroke	0.11	0.02	0.10
Psychiatric	0.21	0.08	0.20
Arthritis	0.79	0.64	0.77
Economic Access			
Family Income			
0% to 100% of FPL	0.09	0.08	0.09
101% to 200% of FPL	0.23	0.21	0.23
>200% of FPL	0.68	0.70	0.68
High school education or GED	0.79	0.79	0.79
Predisposing			
Female	0.59	0.56	0.59
Hispanic	0.09	0.08	0.09
Black	0.13	0.11	0.13
Married or partnered	0.61	0.59	0.60
Age			
65 to 74 years	0.51	0.56	0.52
75 to 84 years	0.37	0.08	0.37
85 years and over	0.12	0.11	0.11
Number of observations	7750	706	8456