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ABSTRACT

We examine the impact of the expansion of public prescription drug insurance coverage from Medicare Part D on the elderly and find evidence of substantial crowd-out. Using detailed data from the 2002-7 waves of the Medical Expenditure Panel Survey (MEPS), we estimate that the extension of Part D benefits resulted in 80% crowd-out of both prescription drug insurance coverage and prescription drug expenditures of those 65 and older. Part D is associated with only modest reductions in out-of-pocket spending. This suggests that the welfare gain from protecting the elderly from out-of-pocket spending risk through Part D has been small.

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The Medicare Modernization Act of 2003, better known as the legislation that added the Part D prescription drug benefit to the Medicare program, represents the single most significant expansion of public insurance programs in the U.S. in the past 40 years. This program expanded the costs of the Medicare program by over 10% in order to provide, for the first time, prescription drug coverage to enrollees. After some initial difficulties in getting the program running, it has enrolled a sizeable share of elders, and now pays for a large percentage of all prescriptions nationally.

Despite the size of this new program, however, we know very little about its effectiveness. One measure of program effectiveness is its success in providing financial security to the nation's elders. If Part D covered prescription drug spending that was putting older Americans at financial risk previously, then there may be large welfare gains from the associated consumption smoothing. But if Part D simply served to "crowd out" existing insurance arrangements, then the welfare gains may be much smaller.

In this paper, we evaluate the gain in financial protection provided by the Part D program. We do so using the 2002-5 and 2007 waves of the Medical Expenditure Panel Survey (MEPS), before and after the implementation of this program. These rich survey data contain information not only on insurance coverage, but also prescription drug expenditures by source of payment, including out-of-pocket. This allows us to carefully model the impact of the Part D program on the distribution of expenditure risk.

We address three separate questions. First, we examine whether the passage of Part D was associated with increased prescription drug coverage among the elderly, compared to the near-elderly, those just below 65. We find that elderly prescription drug coverage increased by 10 percentage points, a dramatic rise. However, this figure

represents only twenty percent of elders who received public coverage. This suggests that Part D to a large extent crowded out of other forms of prescription drug coverage.

Second, we use the MEPS data to examine the impact of Part D on the prescription drug spending by payment source among the elderly. We find that expenditure rose dramatically among the elderly; our central estimates suggest that there was an overall increase of $400 per year spent on drugs as a result of Part D. Yet total public expenditure on prescription drugs rose by $1900, so that crowd-out was once again on the order of 80%.

Third, we use the MEPS to examine the impact of Part D on the distribution of out-of-pocket prescription drug spending among the elderly. We find that Part D led to only a modest decline in out-of-pocket drug spending, and that this decline was concentrated in the top of the expenditure distribution. There is little evidence that the reduction in out-of-pocket drug spending was offset by increases in other out-of-pocket medical spending. We then follow Feldstein and Gruber (1995) and Finkelstein and McKnight (2008) and compute the certainty equivalent of the increased insurance provided by this program. Although somewhat speculative, our estimates suggest that the welfare gains from the increased insurance provided by Part D were relatively small.

Our paper proceeds as follows. Part I presents some background on Part D, and reviews the small literature that has emerged on this program. Part II discusses our data and empirical strategy. Part III presents our results on prescription drug coverage, while Part IV presents our results on prescription drug expenditures. Part V estimates the welfare gain from the introduction of Part D in terms of reduced out-of-pocket spending risk. There is a brief conclusion.

Part I: Background

The Medicare Part D Program

From 1998 through 2003, one of the most heated topics of public policy debate in the United States was the addition of a prescription drug benefit to the Medicare program. Medicare, which provides universal health insurance coverage to those over age 65 and to those on the federal disability insurance (DI) program, was established in 1965. The original program covered most medical needs for the elderly and disabled, including hospital and doctor costs, but it excluded coverage for prescription drugs. This omission was not perceived as a major one in the early years of the program, but in the 1990s the advancement of prescription-drug treatments for common illnesses among the elderly drew attention to this gap in coverage. Medicare recipients, for example, spent an average of $2,500 each on prescription drugs in 2003, more than twice what the average American spent on all health care in 1965.[1]

The debate in Congress over adding this benefit was a contentious one. Advocates viewed the lack of drug coverage as an unnecessary and unfair "hole" in the supposed universal coverage provided to our nation's elderly and disabled. Opponents saw it as an unwarranted expansion of the government's role in the provision of health insurance. Finally, in 2003, the Bush administration and Congress reached agreement on a far-reaching prescription-drug benefit package at a projected cost to the federal government of $40 billion per year for its first ten years.

[1] Data for prescription drug spending comes from the Congressional Budget Office (2002). Data for average Americans' health spending comes from the "National Health Expenditures" section of the Centers for Medicare and Medicaid Services' *National Health Accounts*.

This new Medicare benefit is delivered by private insurers under contract with the government. Beneficiaries can choose from three types of insurance plans for coverage of their drug expenditures: stand-alone plans, called Medicare Prescription Drug Plans (PDP), that just offer prescription drug benefits; Medicare Advantage (MA) plans, which are plans that provide all Medicare benefits (including prescription drugs) such as HMO, PPO, or private FFS plans; or, beneficiaries could retain their current employer/union plan, as long as coverage is "creditable" or at least as generous as (i.e., actuarially equivalent to) the standard Part D plan, for which the plan sponsor would receive a subsidy from the government, known as the Retiree Drug Subsidy (RDS).

Under Part D, recipients were entitled to basic coverage of prescription drugs by a plan with a structure actuarially equivalent to the following: no coverage of the first $250 in drug costs each year; 75% of costs for the next $2,250 of drug spending (up to $2,500 total); 0% of costs for the next $3,600 of drug spending (up to $5,100 total, the "donut hole"); and 95% of costs above $5,100 of drug spending. Over 90% of beneficiaries in 2006, however, were not enrolled in this standard benefit design, but rather in actuarially equivalent plans with low or no deductibles, flat payments for covered drugs following a tiered system, or some form of coverage in the coverage gap. The main requirement for plans is that they must have equal or greater actuarial value than the standard benefit.[2] The government also placed restrictions on the structure of the formularies that plans could use to determine which prescription medications they would insure. Overall, Part D sponsors have great flexibility in terms of plan design.

[2] Cover Memo for Medicare Part D Benefit Parameters: Annual Adjustments for Standard Benefit in 2007 (CMS)

Enrollment in Part D plans was voluntary for Medicare-eligible citizens, although Medicare recipients not signed up by May 15, 2006, were subject to a financial penalty if they eventually joined the program (to mitigate adverse selection in the choice of joining the program). One group, however, was automatically enrolled: low-income elders who had been receiving their prescription-drug coverage through state Medicaid programs (the "dual eligibles"). These dual eligibles were enrolled in Part D plans by default if they did not choose one on their own. The Part D plans for dual eligibles could charge copayments of only $1 for generics/$3 for name brand drugs for those below the poverty line, and only $2 for generics/$5 for name brand drugs for those above the poverty line, with free coverage above the out-of-pocket threshold of $3600.[3]

Despite reluctance voiced before the legislation passed, there was enormous interest from insurers in participating in the Part D program. By November 2006, 3,032 plans were being offered to potential Part D enrollees. Every county in the nation had at least 27 plans available; the typical county had 48 plans, while some counties featured more than 70 choices, primarily due to high number of MA plans (in particular, in Arizona, California, Florida, New York and Pennsylvania).[4]

Table 1 shows aggregate data on Part D enrollment for selected periods since adoption. In late 2005 and early 2006, enrollment in the program was fraught with

[3] In addition, two other groups receive substantial subsidies – those found eligible for the Low Income Subsidy (LIS) or for the Partial Subsidy by the SSA. To qualify for LIS, beneficiaries must have income less than 135% of the poverty line and resources less than $7,500 per individual or $12,000 per couple. This group received benefits comparable to the dual eligibles with incomes above 100% of the poverty line. To qualify for the Partial Subsidy, beneficiaries must have income at 135%-150% of the poverty line and resources less than $11,500 per individual or $23,000 per couple. This group can enroll in plans with a $50 deductible, a 15% copayment up to the out-of- pocket threshold, and $2/$5 copayments above that point. In addition, premiums are fully paid by the government up to 135% of the poverty line, and then partially subsidized up to 150% of the poverty line.

[4] Details on number of plans in a median county obtained from Prescription Drug Plan Formulary and Pharmacy Network Files for 2006, provided by CMS.

problems, but, in the months that followed, the federal government was able to iron out many of the difficulties that had arisen during the initial transition. Moreover, surveys showed that while only roughly 37% of seniors felt they understood the new Medicare program in November 2005, that number had risen to almost 50% by April 2006 (Kaiser Family Foundation, 2006).

As columns 3-5 of the table show, as of June 2006, there were 16.5 million people enrolled in stand-alone PDPs, of which 6.1 million were dual eligible and 10.4 million were not dual eligible. In addition, 6 million people were enrolled in MA plans. Overall, 22.5 million or 53% of the approximately 43 million Medicare beneficiaries were enrolled in a Part D plan. An additional 15.8 million were not enrolled in Part D, but had some form of creditable coverage (columns 7-8). Of these, 6.8 million had employer/union coverage that was subsidized through the Retiree Drug Subsidy (RDS) part of the Medicare Modernization Act. In all, only 4.4 million or roughly 10% of Medicare beneficiaries had no prescription drug coverage as of June, 2006 (column 9).

Since then, Part D enrollment has grown, up from 53% to 59% of Medicare beneficiaries by March, 2009. Most of this growth has come from increased participation in Medicare Advantage drug plans. There has been a noticeable recent decline in creditable employer/union coverage. In 2009, those with employer/union-provided RDS coverage was 6 million, roughly similar to the number in 2006, indicating that much of the recent decline in creditable coverage has come from unsubsidized employers/unions and suggesting some medium-term crowd-out effects.

Other Research on Part D

The small literature that has emerged on the Medicare Part D program has investigated primarily two issues. The first is the determinants, and efficacy, of decisions to enroll in the program and which plan to choose. In Heiss, McFadden, and Winter (2006), a team of researchers surveyed elders to assess whether enrollment intentions in the plan were "rational" given the penalties for delay. They found that 71% of potential enrollees made the appropriate decision (under various assumptions about discount rates, etc.), while 10% of enrollees did not intend to enroll when it would have been in their interests to do have done so, and 19% intended to enroll when it would have been in their interest to have delayed. Their findings are less sanguine, however, for choice of Part D plan. This survey offered individuals a choice of the standard plan described above versus alternatives that provided different levels of insurance coverage (e.g. catastrophic only, complete coverage, etc.), with corresponding actuarially fair premiums. They found that only about 36% of enrollees chose the cost-minimizing plan, and did not place much value on the insurance aspects of more comprehensive plans. They concluded that "consumers are likely to have difficulty choosing among plans to fine-tune their prescription drug coverage, and do not seem to be informed about or attuned to the insurance feature of Part D plans."

Abaluck and Gruber (2009) undertook a more detailed assessment of plan choice with data on the prescription-drug utilization and plan enrollment decisions of a large sample of elders, for whom they have prescription claims records. They estimated a discrete choice model that highlights three key anomalies in plan choices. First, elders dramatically underweighted their expected out-of-pocket costs across plans relative to their premium costs. Second, elders paid attention to plan characteristics, such as donut-

hole coverage, in making plan choices, but only in a general sense and not really as it applies to them. For example, the share of elders who chose donut-hole coverage was largely invariant in the level of prescription-drug spending. Finally, there was very little attention paid to the variance the elders faced in their drug expenditures under different plans. As a result, Abaluck and Gruber found that the vast majority of elders were not making cost-minimizing plan choices.

The second set of articles on Part D evaluates the impacts of the plan on prescription-drug utilization. These studies all suggest large utilization effects, but the magnitudes differ considerably. Lichtenberg and Sun (2007) found that Medicare Part D increased utilization of prescription drugs by the elderly by about 13%, and raised total U.S. prescription drug utilization by almost 5%. Yin et al. (2008) estimated a more modest increase in utilization of 5.9%, with a decline in out-of-pocket expenditures of over 13%. Ketcham and Simon (2008) found a decline in out-of-pocket costs for the elderly of 17%, and an increase of 8% in total prescription-drug spending (from all payment sources). Duggan and Scott-Morton (2008) found a very large increase of over 50% in prescription-drug utilization among the elderly.

We are aware of only two studies that address the issue of how Part D has affected financial security. Lichtenberg and Sun (2007) also investigated the source of payments for prescriptions. They found that for every seven new prescriptions paid for by the government, there was a reduction of five prescriptions paid for by the private sector. This implied a very large "crowd-out" of private insurance by this new program, a topic that we explore further below.

Most relevant for our paper is a recent study by Levy and Weir (2009), who used data from the Health and Retirement Study (HRS) to examine Part D enrollment and a limited form of crowd-out. Their results for enrollment are consistent with our findings below, but their definition of crowd-out differs from ours. They define dropped coverage as crowd-out, whereas our definition is broader, encompassing the provision of public coverage that may overlap with private coverage. In so doing, they neither investigated in any detail the extent to which Part D coverage provides a net increase in insurance coverage, nor the impacts on financial protection of the program. Indeed, as stated in the conclusion to that paper, "A full evaluation of the impact of Part D must include an evaluation of how these changes affect the health and financial security of the elderly as well". Our paper focuses on these financial security implications.

Other Related Literature

Our paper also draws on two other literatures in health economics. The first is the broader literature on the crowd-out of private health coverage by public insurance, mostly focused on expansions of the Medicaid program for low-income families since the mid-1980s. This literature is reviewed in Gruber and Simon (2008). While estimates vary, there is a broad consensus that there was significant crowd-out of private insurance by the Medicaid expansions. Gruber and Simon's estimate, which is at the high end of the literature, suggests that for every 100 persons gaining public coverage, 60 lost private coverage, or a crowd-out rate of 60%.

The second is the literature on the financial protection role of insurance. Our central reference here is Finkelstein and McKnight (2008), who studied the impact of

introducing the Medicare program itself in the mid-1960s on both health and out-of-pocket medical spending. They found few impacts of this program on health, but strikingly large impacts in terms of reducing the risk of out-of-pocket spending. They followed earlier work by Feldstein and Gruber (1995) and undertook a welfare calculation at the end of their paper. That calculation suggested that the reduced financial risk facing elders alone offset more than half of the cost of the Medicare program.

Part II: Data and Empirical Methods

Data

We use the 2002-5 and 2007 waves of the MEPS, which is a nationally representative set of respondents drawn from the National Health Interview Survey (NHIS). The MEPS is a two-year overlapping panel focused on health insurance coverage, health care utilization, and expenditure, and is used to construct data for the National Health Accounts. For each calendar year of the survey, the sample is a combination of individuals in their first year of the panel and individuals in their final year of the panel. Interviews are conducted three times per year (roughly every four months). For our analysis, we use variables measured as of the end of each calendar year (i.e., from the last interview of the year) taken from the Full-Year Consolidated Data Files. We exclude 2006 since that was a transition year between private coverage and public coverage for many, so it is harder to define crowd-out without more precise within-year measures of coverage source.

We begin the empirical analysis by examining the impact of the Part D expansion on prescription-drug coverage from any source. We construct coverage by using data

from two sources in the MEPS. The first source is from information in the health insurance component of the survey, which asks about prescription drug coverage, and, starting with the 2006 wave, includes a question about coverage through Medicare. The second source is the expenditure component of the survey, in which information is provided on prescription-drug expenditures from 12 detailed payment sources: private group and non-group insurance plans, Medicaid, Medicare, Tricare/Champus, VA, out-of-pocket, Worker's Compensation, and other federal, state and local, private, public, and unclassified sources. Because the MEPs does not attempt to reconcile differences in coverage across these three survey components (Agency for Healthcare Research and Quality, 2008a), we measure any coverage as having coverage denoted in either of these two survey sources.

Under the Medicare Modernization Act, all Medicaid-Medicare dual-eligibles were automatically enrolled in Part D. As we do not want to treat any re-labeling of Medicaid beneficiaries as Part D beneficiaries as crowd-out, we define the focal explanatory variable in the empirical analysis as whether the individual has "public" prescription-drug coverage, defined as drug coverage either through Medicare starting in 2006 or Medicaid coverage in any year.

A key feature of our analysis is that we move beyond the crowd-out of coverage and also examine the crowd-out of expenditures. To do so, we use data on expenditures by payment source mentioned above. The MEPS constructed these data in a multi-stage process. First, in the interview, respondents were asked about all prescribed medicines, including the name of the medication, frequency of use, dosage, and the name and address of the pharmacy at which the prescription was filled. Second, respondents were

asked permission to release their pharmacy records. For those who consented, the MEPS requested from the pharmacy the date the prescription was filled, the name and dosage of the medication, payments by source, and the national drug code. Finally, MEPS constructed expenditure measures by payment source for each respondent as follows. For those who consented, expenditures are based on the pharmacy records; for those who did not consent, expenditures are based on self-reported expenditures that have been adjusted for outliers and item non-response based on imputations from the pharmacy data (Agency for Healthcare Research and Quality, 2008b). We use these data on expenditures, deflated into 2007 dollars using the all-items Consumer Price Index, in our analysis below.

Empirical Methods

Our basic empirical approach is a difference-in-difference analysis, comparing the prescription-drug insurance coverage and expenditures of those who are Medicare eligible to near-elderly who are not, before versus after 2006. This strategy will identify the impact of Part D as long as there are no other reasons why coverage or expenditures would be changing, relatively, for elders and near-elders at this time.

This identification assumption could be violated in one of two ways. First, there may be underlying differential trends in prescription-drug utilization across these groups, and this change may simply be "riding the trend." We address this concern by illustrating graphically that coverage and drug expenditures were moving closely for both groups before this change. Second, there may have been some other shock over this time period that caused a relative shift in insurance coverage or drug expenditures. While this

alternative is impossible to rule out completely, it seems highly unlikely given the magnitude of the Part D change. For example, the change in prescription-drug coverage we see for those 65-69 between 2005 and 2007 is more than three times the largest change that we saw over any other two year period since 2000.

We define the near-elderly as those aged 60-64, although our findings are not materially different if we broaden this group to include those in their fifties. In addition, we exclude from our analysis those under 65 who are eligible for Medicare through DI. We employ two age definitions for Medicare-eligible individuals: 65-70 year olds, and all individuals 65 and older. The former is a group closest in age to the comparison group of 60-64 years and provides for the cleanest analysis of the adoption of Part D as a quasi-experiment. The latter definition yields results for all Medicare beneficiaries and allows us to make statements about program-wide effects.

Table 2 gives basic descriptive statistics on our outcomes and measure of public prescription-drug coverage by time period for each of these age groups. The sample mean public coverage rate and expenditure after Part D are 68.9% and $1,280, respectively. When adjusted by the MEPS sampling weights, these means imply 25.8 million persons receiving public coverage and aggregate program expenditure of $43.5B in 2007. These are quite close to the aggregate numbers on Part D tabulated administratively by the Centers for Medicare and Medicaid Services (CMS).

Caveats

There are two important issues with our definitions of public coverage and expenditure. The first is the proper treatment of prescription-drug coverage through

Medicare HMOs. Before the implementation of Part D in 2006, many, but not all, individuals enrolled in Medicare HMO plans received prescription-drug coverage. Such coverage was a mix of private and public coverage. On the one hand, these extra benefits were like Medigap coverage—individuals were paying more to get extra benefits—and, hence, were a form of private coverage. On the other hand, the cost to the individuals of this type of coverage was artificially low because the government was cross-subsidizing risk, just as in Part D.[5] Overall, it is unclear whether such coverage should be labeled private or public. In the analysis, we treat this source of coverage as private in the pre-Part D period (2002-5), but public after Part D was instituted (2007). Most of our findings are similar when we treat Medicare HMO coverage as public coverage in the pre-Part D period. We note where there are differences.

The second is that the Medicare Modernization Act that created Part D gives subsidies to employers/unions to keep coverage under the RDS program. Therefore, the federal government is also promoting "private" coverage under our definition, blurring distinctions between public and private. Unfortunately, the MEPS data do not indicate if employer/union coverage is subsidized under the RDS program.

Consequently, in the empirical analysis below, we present two sets of estimates. The first are reduced-form estimates, which are the regression-based counterparts to our difference-in-difference analysis and measure program-wide effects, i.e., the net impact of Part D of prescription drug coverage and expenditures as it operates through all channels, including stand-alone PDP, MA drug plans, and RDS subsidized employer/union coverage. The second are traditional IV estimates of crowd-out based on

[5] Of course, the same could be said for Medigap plan holders as well, since it is well known that Medigap is artificially cheap because the costs of the moral hazard it induces are borne by the Medicare program (e.g. Chandra et al., forthcoming).

our definition of public coverage given above, where we implicitly treat employer/union coverage, even if subsidized under the RDS program, as private coverage. Because private coverage likely would have been lower in the absence of the RDS program, our measured crowd-out is likely to be an underestimate of true crowd-out from the Part D expansion.

Part III: Insurance Coverage Results

Graphical Evidence

We begin our analysis by showing the evidence on prescription-drug insurance coverage over time for older Americans. Figure 1 shows the age profile of coverage from any source for 50-80 year olds from the MEPS for before Part D (2002-2005) and after (2007), respectively, as measured on the left-hand axis. Before Part D, prescription drug coverage rates from any source were constant until age 65, before dropping by about five percentage points. After Part D, the age profile is similar through the early 60s (although noisier since we only have one year of post-Part D data) before diverging sharply at age 65. This is a remarkable shift in only one or two years.

Against the vertical axis on the right-hand side, the graph also illustrates the age profile of public coverage in 2007, where, again, "public" means either through Medicare or Medicaid. The public coverage rate was roughly 15% for those under age 65. Public coverage then rose to 80% for those 65 and older. This age-related increase in public coverage is much larger than the total shift in insurance coverage (a gap between the before and after lines of roughly 15 percentage points), and suggests that there was significant crowd-out of existing coverage by the Part D expansion.

To formalize this graphical evidence, Table 3 shows data on prescription-drug coverage by age group and time periods. In the first row, there is a very large increase in prescription drug coverage for those 65-70 years old of 13.7 percentage points, with only a moderate corresponding increase of about 3.4 percentage points for 60-64 year olds. The difference-in-difference estimate in the fourth row indicates that Part D was associated with a 10.3 percentage point rise in prescription-drug coverage among the elderly.

The bottom panel undertakes a corresponding difference-in-difference calculation for public coverage. Here we find a rise of over 50% for age 65-70, with no change for the younger group. These estimates of a 50% rise in public coverage yet only a 10% rise in total coverage imply quite large crowd-out of other insurance sources by Part D, on the order of 80%

Regression Evidence

Table 4 presents estimates from the following econometric specification:

$$D_{it}^{AnyCoverage} = \alpha + \beta D_{it}^{PublicCoverage} + \gamma \kappa_{it} + u_{it}, \quad (1)$$

where the dependent variable, $D^{AnyCoverage}$, takes on a value of one if the individual had prescription-drug coverage from any source and zero otherwise; the focal explanatory variable is $D^{PublicCoverage}$, which takes on a value of one if the individual had public coverage; κ is a vector of control variables that includes a full set of dummy variables for single year of age and calendar year, respectively; and u is a disturbance term. In (1), β measures the extent to which public coverage raises private coverage, and, therefore, $1-\beta$ measures crowd-out. Because take-up of public prescription-drug insurance is

likely endogenous, we estimate the parameters in (1) by instrumental variable regression, using $D_i^{Age\geq 65} \times D_t^{Year=2007}$ as the instrument, where $D_i^{Age\geq 65}$ is a dummy variable that is one if the individual is 65 or older and zero otherwise, and $D_t^{Year=2007}$ is a dummy variable that is one if the calendar year is 2007 (after Part D) and zero otherwise. Because the sample includes person-year observations on individuals from the same families and Medicare eligibility is primarily determined by age, we cluster the standard errors by household and age group (under 65, 65 and over).

Panel A of the table presents results for 60-70 year olds; panel B for all those 60 and older. Within each panel, three sets of estimates are presented: the reduced-form, first-stage, and IV estimates, respectively. The reduced-form is essentially a regression-based version of the difference-in-difference analysis in panel A of Table 3. The first-stage similarly is a regression-based version of the difference-in-difference analysis in panel B of Table 3.

Column 1 of Table 4 shows the estimation results from with no additional control variables (other than the age and time dummies) in κ. In panel A, the first-stage results show that there is a 51.3% rise in public insurance coverage for those over 65-70 from 2002-5 to 2007, with a corresponding rise of 10.3% in total prescription drug coverage. Putting the two together, the IV estimate in the third row shows that for each 100 persons covered by public insurance, 20.1 persons gained insurance coverage. This implies very large crowd-out of eighty percent: that is, only one fifth of those who signed up for Part

D gained insurance coverage by doing so, while four fifths moved over from another source of coverage.[6] Panel B shows similar results for all elderly.

The remaining columns of Table 4 assess the sensitivity of this result to additional controls in the regression. We add to κ, sequentially and cumulatively, demographic controls in the form of dummy variables for marital status (married, divorced/separated, widowed), race/ethnicity (black, Hispanic, other), education (high school, some college, college degree or higher), and gender (female); dummies for census region; measures of self-reported health status (excellent, very good, good, fair); and dummy variables for household income quintiles (2^{nd}, 3^{rd}, 4^{th}, and 5^{th} quintiles).[7] None of these additional covariates have any meaningful impact on the key results, which is consistent with the notion that there are no other underlying changes between elderly and non-elderly over this period which might confound our analysis.

We show the results of an additional specification test in Figure 2, which plots the difference-in-difference estimates from a set of pseudo-experiments, which treat each single year of age as the Part D age-eligibility cut-off and uses data from 2 years of age below and above to calculate the difference-in-differences. If we are identifying the true impact of Part D, the difference-in-difference impact should only appear around age 65, the true age-eligibility cut-off, and not around other ages, especially those more than 2 years apart from 65. This is clear in the figure, in which the impact peaks around age 65.

[6] If coverage through a Medicare HMO prior to 2006 is treated as public coverage in the pre-period, then the IV estimate rises to 0.301, suggesting 70% crowd-out.

[7] The omitted group is than never married, non-Hispanic white, male, with less than a high school education and household income in the bottom quintile. In principle, self-reported health status could be endogenous with respect to the law change, but, in practice, there is little correlation between the instrument and the dummy variables for self-reported health status, as evidenced in a comparison of the results in columns 4 and 5 in Table 4.

Table 5 extends this analysis in both samples to selected subgroups of the elderly population. Doing so, we uncover some interesting heterogeneity. First, we find that crowd-out is much larger for those who are working than for those who are not. Second, we find substantially higher crowd-out for the most educated and highest income groups in our sample. Both of these findings are consistent with the notion that crowd-out will be highest in the populations with the broadest ex-ante level of private coverage. The first finding may also suggest that the RDS program did not do much to combat crowd-out of employer coverage, but more work is needed to confirm that conclusion.

Part IV: Expenditure Results

In this section, we extend our analysis to examine the impact of Part D on prescription-drug spending. This analysis is interesting for two different reasons. First, this allows us to extend our crowd-out analysis in a direction not pursued in the previous literature: to look more specifically at the *dollar reduction* in spending covered by private insurance relative to the *dollar increase* in public spending. The crowd-out in dollar terms will be identical to the crowd-out in coverage terms only if (a) those who have private coverage but switch to public coverage do not change their spending, and (b) those who switch from uninsured to public coverage increase their spending to the ex-ante average of those with private coverage who switch to public coverage. Therefore, the relationship of crowd-out in dollar terms and crowd-out in coverage terms will depend critically on the generosity of public coverage relative to the private coverage of switchers.

Of course, the welfare implications of this comparison are difficult, because we do not know which type of coverage is closer to optimal insurance. If individuals who are crowded out of private coverage were dramatically under-insured ex ante by the private sector, and appropriately insured ex post by the government, then crowd-out should be smaller in dollar terms than in coverage terms—this would represent a welfare improvement. Unfortunately, however, the exact same conclusion holds if individuals were appropriately insured ex ante and *over*-insured ex post.

The second advantage of using the spending data is that it allows us to directly address the extent to which public insurance programs increase the financial protection of the elderly. Those elderly who were uninsured ex ante are clearly gaining financial protection from Part D, as are elderly who had large out-of-pocket spending burdens despite being insured privately. As Finkelstein and McKnight (2008) emphasize, for evaluating the welfare implications of a program such as Part D, it is critical to consider the overall reduction in out-of-pocket spending risk.

Theoretically, such a calculation requires data on the longitudinal risk facing each individual. In practice, we have instead the cross-sectional distribution of spending on prescription drugs. So, in our calculations, we use this cross-sectional distribution as a proxy for the theoretically appropriate measure. The bias from doing so is unclear. On the one hand, this will overstate the risk facing individuals, because we are ignoring private information that individuals have about their own spending distribution. On the other hand, this will understate the risk facing individuals, because we are measuring only realized spending, not spending risk. This relates to our previous discussion. If individuals were holding off on necessary prescriptions because of limited coverage, and

they fill those prescriptions now that they have coverage, then there is an "access" gain that increases welfare beyond any reduced out-of-pocket spending. On the other hand, if individuals were spending appropriately before, and now over-spend on prescription drugs, then the reduction in out-of-pocket spending is the right risk measure.

Aggregate Evidence

We begin with Figure 3, which shows aggregate public and private prescription drug expenditure (for individuals of all ages), respectively, in billions of 2007 dollars, taken from the National Health Expenditure Accounts compiled by CMS. Prior to 2006, the rate of growth of both was positive, but slowing. Between 2005 and 2006, private expenditure fell 4.2%, while public expenditure rose 29.6%. In particular, out-of-pocket spending fell 7%. Therefore, the aggregate data in this figure suggest a potentially large role for crowd-out.

Regression Evidence

Next, we move to a regression model for the elderly only. Given the similarity of our previous estimates for 60-70 year olds and for the full sample over age 60, we focus on the full sample for the rest of our analysis.

Panel A of Table 6 shows reduced-form and IV estimates, respectively, of the parameters of the following model:

$$X_{it}^{Public} = \alpha + \beta D_{it}^{PublicCoverage} + \gamma \kappa_{it} + u_{it}, \quad (2)$$

where the dependent variable, X^{Public}, is public expenditure on prescription drugs. The reduced-form estimate shows the overall impact of Part D through all channels. We do not repeat the first stage regressions, which are the same as in Table 4.

We find that public spending through Medicare and Medicaid was $1000 higher for those over age 65 relative to those 60-64 after the adoption of Part D. In addition, the IV estimates indicate that public prescription-drug expenditures rose by $1900 per person gaining public coverage. This is an enormous increase, about 100% of the mean spending on prescription drugs in the pre-period. Once again, this estimate is not sensitive to the various specifications we use across columns (1)-(5).

We have explored the source of this sizeable increase in prescription drug utilization in our MEPS data. We find that there is little change in the odds that individuals fill a prescription; our IV estimate is just under a 2% rise in the odds of filling a prescription, and it is not significant. On the other hand, the number of prescriptions filled per enrollee goes up astronomically, by 3 scrips per new enrollee, or 11% of the pre-period mean for those over age 65.

In panel B, we give the IV estimate from an isomorphic specification,

$$X_{it}^{Total} = \alpha + \beta D_{it}^{PublicCoverage} + \gamma \kappa_{it} + u_{it}, \quad (3)$$

where the dependent variable is total drug expenditure paid through all sources. In (3), β measures the extent to which public coverage increases total expenditure. Our estimates suggest that total prescription-drug spending only rises by about $400, as shown in the first row of panel B. The final row of the panel shows IV estimates from a related specification,

$$X_{it}^{Total} = \theta + \delta X_{it}^{Public} + \varphi \kappa_{it} + \varepsilon_{it}, \quad (4)$$

that directly measures expenditure crowd-out. In (4), δ measures the extent to which a one-dollar increase in public prescription-drug expenditure raises total expenditure, and, therefore, $1-\delta$ measures expenditure crowd-out. The estimates of δ suggest that each dollar of public expenditure raises total expenditure by roughly 20 cents, or that there is about 80% crowd-out. This is strikingly similar to the coverage crowd-out estimate above.

The remaining panels of Tables 6 show expenditure crowd-out estimates by source of payment. About five-eighths of our estimated expenditure crowd-out is due to reduced privately insured prescription-drug spending, which falls by over 50 cents for every dollar increase in public spending. The remainder is due to reduced out-of-pocket spending by the elderly of $545 per person publicly covered, or about 30 cents per public dollar spent.

Part V: Estimating the Welfare Gain from the Reduction in Out-of-Pocket Spending

The IV estimates in Tables 6 suggest a fairly small reduction in out-of-pocket spending in dollar terms due to Part D. However, as is well known, the distribution of out-of-pocket spending is right-skewed, so that a mean estimator might not be well-suited to assess the impact of Part D on out-of-pocket spending.

Therefore, in Table 7, we move to quantile estimation to better assess the impact of Part D. The table shows the change in expenditure at every tenth quantile of the distribution of out-of-pocket spending associated with Part D expansion, by contrasting the change for those over 65 with those under (this is akin to the exercise of Finkelstein

and McKnight, 2008)). Formally, these are estimates of ρ from the following reduced-form specification:

$$X_{it}^{OOP} = \omega + \rho D_i^{Age\geq 65} \times D_t^{Year=2007} + \xi \kappa_{it} + \nu_{it}, \quad (5)$$

where the dependent variable is out-of-pocket prescription-drug spending. We find that there is a monotonically increasing reduction in out-of-pocket spending for those over age 65, relative to those below age 65. These differential estimated effects are significant from the 20th percentile onward. Even at the 90th percentile, however, they are still only a minority of pre-Part D out of pocket spending.

Figure 4 extends this analysis to a richer description of the spending risk using quantile estimation. In particular, the solid line in the figure represents the estimates of β, the impact of public coverage on out-of-pocket expenditure, for those 60 and older from the following econometric specification:

$$X_{it}^{OOP} = \alpha + \beta D_{it}^{PublicCoverage} + \gamma \kappa_{it} + u_{it}, \quad (6)$$

in which the parameters are estimated for each quantile of the out-of-pocket spending distribution using the instrumental variable quantile regression (IVQR) estimator of Chernozhukov and Hansen (2005), using $D_i^{Age\geq 65} \times D_t^{Year=2007}$ as the instrument, and κ contains the richest set of controls from column 5 of Table 6. The dashed lines in the figure show the boundaries of the 95% confidence intervals based on 99 block-bootstrapped (by household and $D^{Age\geq 65}$) replications.[8]

Public coverage has a very small effect at the low quantiles, but it grows consistently with baseline spending. At the median the impact is a reduction of $164 in

[8] The estimates for the first five quantiles are centered around and not different from zero, but are very imprecisely estimated and have wide confidence bands. For the purposes of exposition, they are not shown in the figure, but are available upon request.

out of pocket spending; at the 90th quantile it has grown to $907. But this is still a fairly modest reduction relative to the $2500 baseline value for out of pocket spending.

To assess the importance of these reductions in out-of-pocket spending from an insurance perspective, we follow Feldstein and Gruber (1995) and Finkelstein and McKnight (2008) and calculate the change in the risk premium associated with out-of-pocket spending as a measure of the welfare gain from the expansion of public prescription-drug coverage through Part D. Specifically, we assume the individual gets utility from consumption defined by the per-period budget constraint,

$$C = Y - X^{OOP}, \tag{7}$$

as income, *Y*, net of out-of-pocket expenditure, X^{OOP}, where the latter is a random variable. Hence, the individual's expected utility is

$$\int U(Y - X^{OOP}) f(X^{OOP}) dX^{oop}, \tag{8}$$

where *f* is the probability density function of the out-of-pocket expenditure. The risk premium, π, associated with out-of-pocket spending then is defined as

$$U(Y - \pi) = \int U(Y - X^{OOP}) f(X^{OOP}) dX^{oop}, \tag{9}$$

and measures the amount a risk-averse individual would be willing to pay to insure against random variation in out-of-pocket spending. We calculate the change in the risk premium associated with the adoption of Part D,

$$\Delta\pi = \pi^{WithPartD} - \pi^{WithoutPartD}. \tag{10}$$

This change will be negative if Part D reduces the risk premium and protects the elderly from out-of-pocket prescription-drug spending risk; the absolute value of this change measures the welfare gain from Part D.

Of course, the introduction of Part D will shift the mean level of out-of-pocket spending as well as its risks. The shift in the mean is simply a transfer from the government to the insured, and so should not enter these risk calculations. We, therefore, subtract the mean reduction in out-of-pocket spending to obtain the risk premium. Similarly, we do not include in these calculations the premiums that individuals pay under either their private insurance or Part D. For most of the sample, these premiums will be small relative to income and, therefore, will not enter the risk calculations.

We measure (10) as follows. First, we use the IVQR estimates of the parameters in (6) to calculate for each individual (*i*) in the sample the conditional (on that individual's characteristics, κ) quantiles (superscript *j*) of the out-of-pocket spending distribution with Part D,

$$\hat{X}_i^{OOPWithPartD,j} = \hat{\alpha}^j + \hat{\beta}^j + \hat{\gamma}^j \kappa_i , \tag{11}$$

and without Part D,

$$\hat{X}_i^{OOPWithoutPartD,j} = \hat{\alpha}^j + \hat{\gamma}^j \kappa_i , \tag{12}$$

respectively, for $i = 1,...,N$ and $j = 1,...,99$. Second, we use the fact that the conditional quantiles are the inverse of the conditional cumulative distribution function of out-of-pocket expenditure, so that we can recover the estimated distribution of out-of-pocket spending. Because there are 99 quantile estimates, to guarantee that the sum of the probabilities is one, we set conditional out-of-pocket spending to zero at the very bottom of the distribution, *j*=0, i.e., $\hat{X}_i^{OOPWithPartD,0} = 0$. This gives us 100 points (of equal probability of occurrence) in the out-of-pocket spending distribution for each person. Third, we draw with replacement 99 times from each person's distribution. Fourth, we directly calculate the risk premium under Part D for each individual by solving

$$U(Y-\pi_i^{WithPartD}) = \frac{1}{99}\cdot\sum_{d=1}^{99} U(Y-\hat{X}_i^{OOPWithPartD,d}-\hat{\beta}^{OOP}), \quad (13)$$

where *d* indexes the draw from the distribution, and $\hat{\beta}^{OOP}$ is the IV estimate from (6) that adjusts for the change in the mean of the out-of-pocket expenditure distribution from Part D. In a similar fashion, we calculate the risk premium without Part D by solving

$$U(Y-\pi_i^{WithoutPartD}) = \frac{1}{99}\cdot\sum_{d=1}^{99} U(Y-\hat{X}_i^{OOPWithoutPartD,d}). \quad (14)$$

In calculating (10), we follow Finkelstein and McKnight (2008) and truncate predicted out-of-pocket spending from below at zero and from above at 80% of income. We report the calculations only for those in our sample who actually took up Part D.

Table 8 shows selected statistics on the distribution of the change in the risk premium (welfare gain) associated with Part D for selected levels of risk aversion assuming a constant relative risk aversion (CRRA) utility function using the estimates in Figure 4 for all individuals 60 and older. For a typical estimated CRRA of 3, the mean reduction in the risk premium, or welfare gain, for those who took up Part D is $184. The median is comparable, and the 95th percentile is $395. The other rows of the table recalculate the change in risk premium for CRRA of 1 (log utility) and 5, respectively. The risk premiums are fairly similar for a CRRA of 1, and much higher for a CRRA of 5.

Implications

Overall, our results suggest that the risk-reduction gain was likely small from the introduction of Part D benefits. But what matters is not the absolute value of this gain but its size relative to the inefficiencies of the program for all elderly. There are two sources of inefficiency for Part D. The first is the deadweight loss (DWL) of raising the $44.8

billion in net expenditures for Part D in 2007. At a typical estimate of 30 cents of DWL per dollar of revenue raised, and with 31.2 million program recipients, this implies a DWL of $430/recipient, or more than twice the mean welfare gain from reduced out-of-pocket spending risk.

The second is the moral hazard cost of excess medical consumption due to Part D, which is much harder to evaluate. An upper bound estimate of this cost is the increase in expenditure on prescription drugs per recipient, $400. This is an upper bound for two reasons. First, some of this increase may not reflect moral hazard but rather income or "access" effects from insurance (Nyman, 1999). There is no compelling evidence that allows us to distinguish these effects, but given the relatively modest sums at risk here compared to income this seems unlikely to explain much of the response.

Second, there may be offset effects to other sources of medical spending as drug spending increases. Indeed, a study of the introduction of Part D by Zhang et al. (2009) found that the costs of increased drug expenditure were fully offset by reduced spending in other areas. This would suggest no aggregate moral hazard effects from the Part D program.

We can investigate this question as well with our MEPS data, and we do so in Table 9. Each cell in this table shows the IV coefficient on public insurance prescription drug expenditures in our richest model from Table 6, akin to the coefficient of 0.213 in the fifth row of column 5. There are five rows for total of all spending, public medical spending (Medicare and Medicaid), private medical spending in total, private spending by insurers, and private spending out of pocket. In other words, the first row is decomposed into the second and third rows, and the third row is decomposed into the

fourth and fifth rows. And we divide medical spending into eight categories: inpatient hospital, outpatient hospital, office-based care, emergency room, home health care, dental care, other medical spending, and prescription drugs.

For total medical spending (the first row), the estimates in Table 12 are consistent with Zhang et al.'s conclusion that Part D did not raise total medical spending, but the estimates are very imprecise. We find that there are increases in spending on prescription drugs (as seen in Table 6) and on inpatient and outpatient hospital spending. However, there are sizeable reductions in office-based spending and home-health care (although only the latter is significant), and smaller reductions in spending in the other categories. On net, we find that total medical spending fell, but the estimate is highly insignificant; given our standard errors we cannot rule out a very large increase in total medical spending.

The next two rows (panels B and C) show an interesting decomposition of these spending effects into public and private payers. For public payers, the offset is much smaller; on net, reductions in other spending only offset about ten cents of each dollar of increased drug spending. For private payers, however, there is not only the sizeable reduction in prescription drug spending noted earlier, but also an additional sizeable drop in other spending as well (although once again our estimates are very imprecise, with only the reduction in office-based case being significant). Thus, the general conclusion that Part D represented a large shift from private to public payers for prescription drugs extends as well to the broader set of medical spending categories.

The next two rows (panels D and E) show that almost all of the offsetting reduction in other spending accrued to insurers. Out of pocket spending on other medical

care did not much change; the reduction in total out of pocket spending is similar to the reduction in prescription drug spending.

These findings suggest two conclusions (subject to the imprecision of the estimates in Table 9). First, the moral hazard cost of the Part D program may have been small in aggregate. Second, the small insurance gains provided by the program are not augmented by reductions in out-of-pocket spending risk in other areas; the estimated welfare gains above would apply to total medical spending as well as prescription drug spending.

Part VI: Conclusion

We examine the impact of the expansion of public prescription drug insurance coverage on the elderly and find evidence of substantial crowd-out. In particular, there is an estimated 80% crowd-out of both prescription drug coverage and expenditures. Part D is associated with relatively small reductions in out-of-pocket spending, suggesting that the welfare gain from protecting the elderly from out-of-pocket spending risk through Part D has been small. But we also conclude that there appears to be little net impact on total medical spending, so that the (non-revenue) efficiency costs of the program may have been fairly low as well.

There are a number of caveats to these findings. On the one hand, the stylized welfare calculations may overstate the gains from the introduction of Part D if there are other consumption-smoothing mechanisms available to the elderly, such as private income transfers, own savings, or uncompensated medical care. On the other hand, the gains from Part D may be understated because the calculations were based on an annual,

rather than lifetime, measure of expenditure risk. In particular, there is some evidence that lifetime medical spending risk is greater than annual risk, because out-of-pocket expenditures are highly persistent over time (Feenberg and Skinner, 1994; French and Jones, 2004).

Finally, the welfare calculations were predicated on the assumption that individuals do not value any improvements in health associated with increased prescription drug spending, either out-of pocket or from other sources. Yet one of our most important findings was that there was an enormous increase in public drug spending, focused on the intensive margin. To the extent there are associated health gains and they are valued, our estimates will understate the true gains from the introduction of Part D. While an analysis of any gains in health from Part D is beyond the scope of the current paper, this is clearly an avenue for future research.

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Table 1.
Aggregate Data on Medicare Part D Enrollment in Millions for Selected Periods Since Adoption, and as a Percent of all Medicare Beneficiaries in Parentheses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Enrolled in a Part D Plan					Not Enrolled in Part D		
	Medicare Beneficiaries		Stand-Alone Prescription Drug Plan (PDP)			Medicare Advantage Drug Plan	Creditable Coverage		
Month/Year	Total	Total	Total	Non-Dual Eligibles	Dual Eligibles	Total	Employer or Union	Other	No Coverage
June, 2006	43.0	22.5	16.5	10.4	6.1	6.0	10.4	5.4	4.4
		(53%)	(38%)	(24%)	(14%)	(14%)	(24%)	(13%)	(10%)
June, 2007	44.0	23.9	17.3	11.0	6.3	6.7	10.3	4.9	4.0
		(54%)	(41%)	(26%)	(15%)	(16%)	(24%)	(11%)	(9%)
February, 2008	44.2	25.4	17.4	11.2	6.2	8.0	10.2	4.0	4.6
		(57%)	(39%)	(25%)	(14%)	(18%)	(23%)	(9%)	(10%)
March, 2009	45.2	26.7	17.5	11.2	6.3	9.2	7.9	6.2	4.5
		(59%)	(39%)	(25%)	(14%)	(20%)	(18%)	(14%)	(10%)

Note: Taken from Kaiser Family Foundation's *Medicare Fact Sheet: The Medicare Prescription Drug Benefit* (various months). Column 3 includes employer/union only direct contract PDPs, which incorporate or wrap around public coverage. Column 7 includes employer/union plans for retired workers that do and do not receive the Retiree Drug Subsidy (RDS) under Part D, as well as TRICARE and FEHBP coverage. Column 8 includes coverage from state pharmacy assistance programs (SPAP), Indian Health Service, Veterans Affairs (VA), Medigap, multiple sources of creditable coverage, employer/union plans for active workers, and other sources.

Table 2.
Selected Sample Means by Age Group and Time Period, in the 2002-5 and 2007 MEPS, Standard Deviations in Parentheses

Variable	(1) Ages 65-70 Before Part D	(2) Ages 65-70 After Part D	(3) Ages 60-64 Before Part D	(4) Ages 60-64 After Part D	(5) Ages 65 and Older Before Part D	(6) Ages 65 and Older After Part D
Dummy if Any Prescription Drug Coverage	0.722	0.859	0.750	0.784	0.777	0.870
Dummy if Public Coverage	0.148	0.657	0.080	0.076	0.441	0.689
Dummy if Private Coverage	0.595	0.449	0.676	0.723	0.555	0.415
Dummy if Public and Private Coverage	0.022	0.248	0.005	0.015	0.226	0.233
Dummy if Only Private Coverage	0.573	0.201	0.670	0.708	0.329	0.181
Dummy if Only Public Coverage	0.126	0.409	0.074	0.061	0.216	0.456
Total Prescription Drug Expenditure ($2007)	1734 (2284)	2093 (3647)	1379 (2238)	1443 (2195)	2251 (2956)	2178 (3385)
Out-of-Pocket Prescription Drug Expenditure ($2007)	806 (1258)	538 (1256)	533 (1004)	458 (841)	118 (1520)	581 (1060)
Public Prescription Drug Expenditure ($2007)	293 (1278)	1247 (2929)	180 (944)	140 (811)	529 (1489)	1280 (2691)
Private Plan Prescription Drug Expenditure ($2007)	635 (1297)	309 (947)	666 (1648)	845 (1618)	603 (2134)	318 (1062)
Total Medical Expenditure ($2007)	7402 (13,605)	7308 (11,972)	5428 (11,593)	6056 (15,902)	8739 (14,983)	9184 (15,711)
Sample Size	5015	1231	4759	1237	12,262	3470

Note: Authors'calculations from the 2002-5 and 2007 MEPS for each of the table's groups. Standard deviations for continuous variables in parentheses.

Table 3.
Difference-in-Difference Estimates of Medicare Part D Law Change on Prescription Drug Coverage from Any Source by Age Group in the 2002-2005 and 2007 MEPS, Standard Errors in Parentheses

Group/Year	(1) After Part D	(2) Before Part D	(3) Time difference for groups
	A. Any Coverage		
Age 65-70	0.859	0.722	0.137
	(0.0106)	(0.00798)	(0.0132)
Age 60-64	0.784	0.750	0.0342
	(0.0124)	(0.00795)	(0.0147)
Difference-in-difference			0.103
			(0.0198)
	B. Public Coverage		
Age 65-70	0.657	0.148	0.509
	(0.0144)	(0.00647)	(0.0158)
Age 60-64	0.0760	0.0796	-0.00365
	(0.00781)	(0.00499)	(0.00927)
Difference-in-difference			0.513
			(0.0183)

Note: Each cell gives the coverage rate among 60-70 year olds for prescription drug coverage from any source for each of the table's groups. Standard errors clustered by household and age group (under 65, and 65 and older) are shown in parentheses

Table 4.
Parameter Estimates of the Crowd-Out Effect of Public Prescription Drug Coverage of the Elderly in the 2002-2005 and 2007 MEPS, Standard Errors in Parentheses

Explanatory Variable	(1)	(2)	(3)	(4)	(5)
			A. 60-70 Year Olds		
Reduced-Form Estimates					
Dummy if 65 or older ×	0.103	0.106	0.107	0.107	0.109
Dummy if Post-Law-Change	(0.0198)	(0.0194)	(0.0193)	(0.0193)	(0.0192)
First-Stage Estimates					
Dummy if 65 or older ×	0.513	0.509	0.510	0.512	0.509
Dummy if Post-Law-Change	(0.0183)	(0.0179)	(0.0179)	(0.0177)	(0.0176)
IV Estimates					
Dummy if Public Coverage	0.201	0.208	0.209	0.210	0.215
	(0.0368)	(0.0358)	(0.0357)	(0.0355)	(0.0353)
			B. 60 and Older		
Reduced-Form Estimates					
Dummy if 65 or older ×	0.123	0.124	0.125	0.124	0.124
Dummy if Post-Law-Change	(0.0167)	(0.0163)	(0.0163)	(0.0163)	(0.0161)
First-Stage Estimates					
Dummy if 65 or older ×	0.538	0.531	0.532	0.532	0.533
Dummy if Post-Law-Change	(0.0133)	(0.0130)	(0.0130)	(0.0128)	(0.0126)
IV Estimates					
Dummy if Public Coverage	0.229	0.234	0.235	0.234	0.234
	(0.0301)	(0.0293)	(0.0292)	(0.0292)	(0.0286)
Additional Controls					
Demographics	No	Yes	Yes	Yes	Yes
Census Division	No	No	Yes	Yes	Yes
Self-Reported Health Status	No	No	No	Yes	Yes
Income Quintiles	No	No	No	No	Yes

Note: The dependent variable is a dummy that takes on a value of one if the individual had prescription drug coverage from any source and zero otherwise. The table shows the crowd-out parameter estimates of Medicare Part D on prescription drug coverage based on the MEPS samples described in the text. Standard errors clustered by household and age group (under 65, and 65 and older) are shown in parentheses.

Table 5.
Additional Reduced-Form and Instrumental-Variable Parameter Estimates of the Crowd-Out Effect of Public Prescription-Drug Coverage of the Elderly, for Selected Subsamples in the 2002-5 and 2007 MEPS, Standard Errors in Parentheses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Subsample							
Explanatory Variable	Working	Not Working	Married	Not Married	High School or Less	More than High School	Bottom 4 Income Quintiles	Top Income Quintile
	A. 60-70 Year Olds							
Reduced-Form Estimates								
Dummy if 65 or older ×	0.0795	0.137	0.111	0.110	0.139	0.0770	0.119	0.0765
Dummy if Post-Law-Change	(0.0303)	(0.0270)	(0.0233)	(0.0338)	(0.0264)	(0.0271)	(0.0226)	(0.0332)
IV Estimates								
Dummy if Public Coverage	0.156	0.269	0.197	0.266	0.292	0.135	0.240	0.132
	(0.0569)	(0.0487)	(0.0390)	(0.0743)	(0.0507)	(0.0458)	(0.0424)	(0.0551)
Sample Size	4828	7392	8008	4212	7481	4739	9801	2419
	B. 60 and Older							
Reduced-Form Estimates								
Dummy if 65 or older ×	0.111	0.141	0.120	0.125	0.143	0.114	0.119	0.139
Dummy if Post-Law-Change	(0.0260)	(0.0241)	(0.0198)	(0.0287)	(0.0229)	(0.0224)	(0.0209)	(0.0238)
IV Estimates								
Dummy if Public Coverage	0.204	0.267	0.208	0.258	0.283	0.193	0.232	0.226
	(0.0458)	(0.0427)	(0.0327)	(0.0552)	(0.0420)	(0.0368)	(0.0384)	(0.0381)
Sample Size	5796	18696	13573	10919	16154	8338	19646	4846

Note: The dependent variable is a dummy that takes on a value of one if the individual had prescription drug coverage from any source and zero otherwise. The table shows the crowd-out parameter estimates of public coverage on overall prescription-drug coverage based on the 2002-5 and 2007 MEPS. Standard errors clustered by household and age group (under 65, and 65 and older) are shown in parentheses.

Table 6.
Reduced-Form and IV Parameter Estimates of the Effect of Public Coverage and Expenditure on Elderly Prescription Drug Expenditure by Source, for those 60 and Older, in the 2002-2005 and 2007 MEPS, Standard Errors in Parentheses

	(1)	(2)	(3)	(4)	(5)
Explanatory Variable					
Reduced-Form Estimates		*A. Public Prescription Drug Expenditure*			
Dummy if 65 or older ×	1022	1015	1015	1015	1019
Dummy if Post-Law-Change	(56.41)	(56.02)	(56.05)	(55.06)	(54.80)
IV Estimates					
Dummy if Public Coverage	1900	1911	1909	1910	1911
	(95.13)	(96.62)	(96.53)	(95.72)	(95.51)
Reduced-Form Estimates		*B. Total Prescription Drug Expenditure*			
Dummy if 65 or older ×	213.7	225.4	217.9	217.0	216.6
Dummy if Post-Law-Change	(98.66)	(98.59)	(98.75)	(94.46)	(94.51)
IV Estimates					
Dummy if Public Coverage	397.4	424.7	409.8	408.2	406.4
	(182.2)	(184.3)	(184.3)	(176.6)	(176.2)
Public Prescription-Drug	0.209	0.222	0.215	0.214	0.213
Expenditure	(0.0902)	(0.0904)	(0.0907)	(0.0868)	(0.0866)
Reduced-Form Estimates		*C. Private Group and Non-Group Plan Prescription Drug Expenditure*			
Dummy if 65 or older ×	-515.3	-512.1	-515.3	-515.7	-518.5
Dummy if Post-Law-Change	(60.68)	(60.11)	(60.17)	(59.11)	(59.03)
IV Estimates					
Dummy if Public Coverage	-958.1	-964.7	-968.9	-970.3	-972.9
	(111.9)	(113.1)	(113.0)	(110.4)	(110.1)
Public Prescription-Drug	-0.504	-0.505	-0.508	-0.508	-0.509
Expenditure	(0.0645)	(0.0648)	(0.0649)	(0.0630)	(0.0628)
Reduced-Form Estimates		*D. Out-of-Pocket Prescription Drug Expenditure*			
Dummy if 65 or older ×	-293.0	-277.1	-281.9	-282.3	-283.3
Dummy if Post-Law-Change	(38.34)	(38.49)	(38.50)	(37.73)	(37.71)
IV Estimates					
Dummy if Public Coverage	-544.8	-522.1	-530.1	-531.1	-531.6
	(72.20)	(73.21)	(73.16)	(71.36)	(71.21)
Public Prescription-Drug	-0.287	-0.273	-0.278	-0.278	-0.278
Expenditure	(0.0421)	(0.0422)	(0.0423)	(0.0410)	(0.0409)
Additional Controls					
Demographics	No	Yes	Yes	Yes	Yes
Census Division	No	No	Yes	Yes	Yes
Self-Reported Health Status	No	No	No	Yes	Yes
Income Quintiles	No	No	No	No	Yes

Note: The dependent variable is real annual personal prescription drug expenditure from the MEPS. The table shows parameter estimates of Medicare Part D on prescription drug expenditure based on a sample of 25,886 person-year observations on ages 60 and older from the 2002-2006 MEPS. Standard errors clustered by household and age group (under 65, and 65 and older) are shown in parentheses.

Table 7.
Simple Estimates of the Impact of Medicare Part D at Selected Quantiles of the Distribution of Household Out-of-Pocket Prescription Drug Expenditure, Age 60 and Older in the 2002-2005 and 2007 MEPS, Standard Errors in Parentheses

Quantile	(1) Age 65 and Older Before Part D	(2) Age 65 and Older After Part D	(3) Age 60-64 Before Part D	(4) Age 60-64 After Part D	(5) Differential Effect of being 65 and Older After Part D
10th	1	0	0	0	-1
	(1)	(1)	(0)	(0)	(2)
20th	73	45	5	5	-28
	(4)	(3)	(3)	(3)	(6)
30th	170	105	46	40	-59
	(5)	(6)	(4)	(6)	(11)
40th	290	174	115	102	-103
	(7)	(7)	(7)	(10)	(14)
50th	453	267	210	188	-164
	(10)	(10)	(10)	(13)	(20)
60th	679	395	340	290	-235
	(14)	(15)	(11)	(18)	(28)
70th	990	568	505	446	-363
	(19)	(17)	(14)	(25)	(38)
80th	1,492	846	765	648	-529
	(26)	(27)	(24)	(34)	(55)
90th	2,494	1,415	1,350	1,178	-907
	(55)	(49)	(54)	(70)	(117)

Note: For each quantile shown, each cell gives the real out-of-pocket prescription drug expenditure among those 60 and older in the 2002-2005 and 2007 MEPS for each of the table's groups. Block-bootstrapped standard errors by household and age group (under 65, and 65 and older) based on 199 replications are shown in parentheses.

Table 8.
Estimates of the Change in Risk Premium for those who Took up Medicare Part D for 60-70 Year Olds, in 2007 Dollars, for Selected Measures of Risk Aversion

Coefficient of Relative Risk Aversion	(1) Mean	(2) 25th Percentile	(3) Median	(4) 75th Percentile	(5) 90th Percentile	(6) 95th Percentile
A. Based on IVQR Estimates from the Age 60 and Older Full Sample						
1	-108	-73	-106	-141	-176	-198
3	-184	-107	-185	-240	-329	-395
5	-306	-131	-219	-401	-651	-829

Note: Risk-premium calculations are based on the IVQR estimates shown in Figure 4 and described in the text.

Table 9:
IV Estimates of Impact of Public Prescription Drug Expenditure on Public, Non-Public, and Total Medical Spending by Type of Payor and Category of Spending, Clustered Standard Errors in Parentheses

Explanatory Variable	(1) Inpatient	(2) Outpatient	(3) Office-Based	(4) Emergency Room	(5) Home Health	(6) Dental	(7) Other Medical	(8) Prescription Drugs	(9) Total
				A. All Payors					
Public Prescription Drug Expenditure	0.168	0.0249	-0.258	-0.0325	-0.153	-0.0259	-0.0220	0.213	-0.124
	(0.447)	(0.0576)	(0.170)	(0.0298)	(0.0787)	(0.0411)	(0.0225)	(0.0866)	(0.549)
				B. Public Payors (Medicare and Medicaid)					
Public Prescription Drug Expenditure	-0.0899	0.0379	0.0848	0.000527	-0.137	0.0131	-0.0172	1.000	0.892
	(0.388)	(0.0444)	(0.0651)	(0.0115)	(0.0639)	(0.00550)	(0.0105)	(0.000)	(0.426)
				C. Non-Public Payors					
Public Prescription Drug Expenditure	0.258	-0.0130	-0.342	-0.0331	-0.0159	-0.0390	-0.00480	-0.786	-1.017
	(0.220)	(0.0516)	(0.150)	(0.0271)	(0.0376)	(0.0404)	(0.0196)	(0.0865)	(0.333)
				D. Private Group and Non-Group Plans					
Public Prescription Drug Expenditure	0.252	-0.0145	-0.347	-0.0340	0.00748	-0.0182	-0.0200	-0.509	-0.724
	(0.216)	(0.0498)	(0.146)	(0.0247)	(0.0327)	(0.0193)	(0.0131)	(0.0628)	(0.311)
				E. Out-of-Pocket					
Public Prescription Drug Expenditure	0.00640	0.00147	0.00425	0.000884	-0.0234	-0.0208	0.0153	-0.277	-0.293
	(0.0177)	(0.00946)	(0.0219)	(0.00686)	(0.0160)	(0.0299)	(0.0138)	(0.0409)	(0.0692)

Note: Estimates are for the richest specification in Table 6, which is column 5 of that table. Panel *C* is the sum of panels *D* and *E*.

Figure 1. Age Profile of Prescription Drug Coverage
Before and After the Enactment of Part D

Figure 2. Age-Based Pseudo-Difference-in-Difference Estimates and 95% CI of Part D on Personal Drug Coverage by Four-Year Age Groups

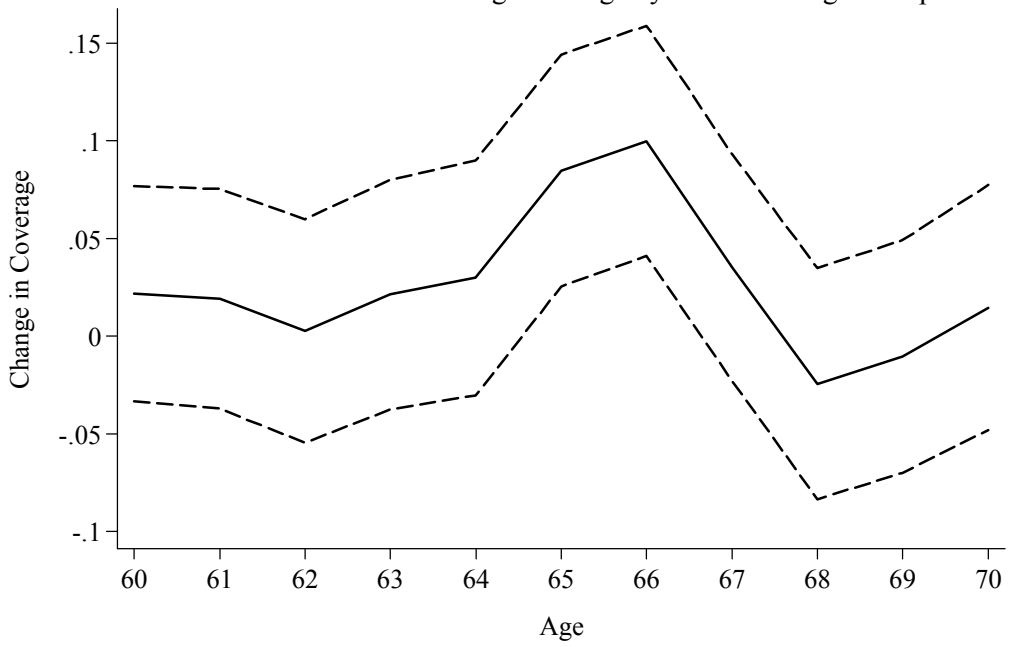

Figure 3. National Prescription Drug Expenditure

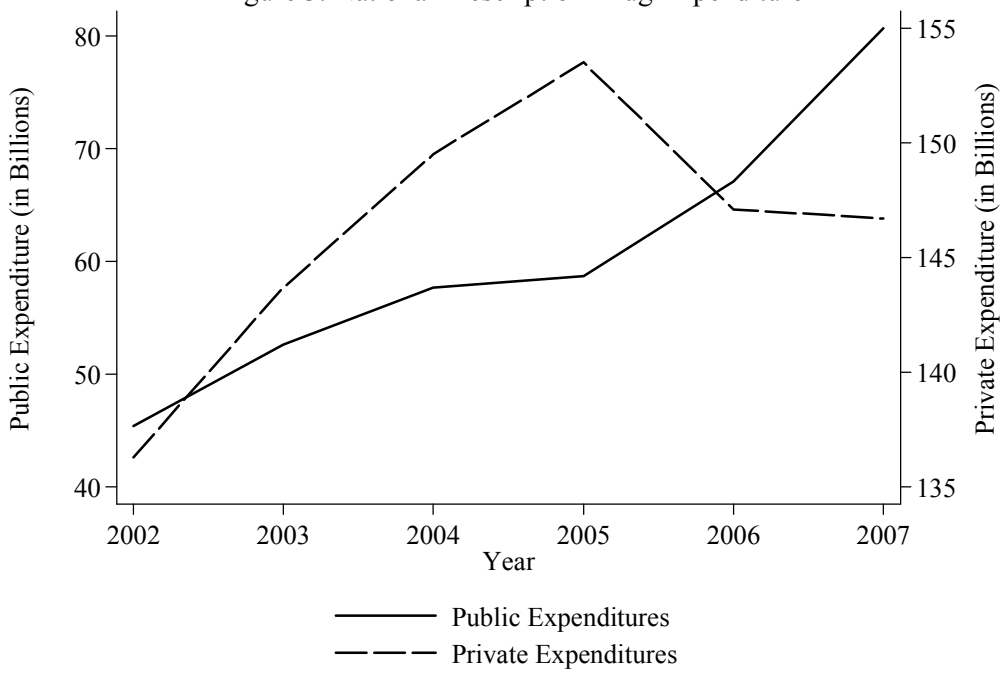

Figure 4. IVQR Estimates of Impact of Public Coverage on Out-of-Pocket Drug Expenditure for Ages 60 and Older in 2002-2005 and 2007