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The Interaction of Partial Public Insurance Programs and Residual Private Insurance Markets: Evidence from the U.S. Medicare Program

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ABSTRACT

A ubiquitous form of government intervention in insurance markets is to provide compulsory, but partial, public insurance coverage and to allow voluntary purchases of supplementary insurance on the private market. Yet we know little about the effects of such programs on total insurance coverage and on welfare. A primary concern is that the compulsory public insurance program – designed to counter the effects of adverse selection in the private insurance market – may in fact exacerbate adverse selection pressures in the residual private insurance market. Theoretically, however, these programs may either improve or impair the functioning of the residual private insurance market. To examine this question empirically, I investigate the effect of the U.S. Medicare program – which provides partial public health insurance to individuals aged 65 and over – on the private insurance market for prescription drugs, a benefit not provided by the public program. The results suggest that Medicare does not have substantial spillover effects on residual private insurance markets. In particular, there is no evidence that Medicare is associated with increased adverse selection problems in the residual private health insurance market.

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The standard economic rationale for government intervention in insurance markets is the presence of adverse selection in these markets. Compulsory insurance coverage offers one way to overcome this problem. Indeed, in his seminal article on adverse selection, Akerlof (1970) points to the potential for the U.S. Medicare program – which provides compulsory public health insurance to all individuals over age 65 – to overcome adverse selection problems in private health insurance markets for the elderly and thus to improve welfare.

In practice, the vast majority of compulsory public insurance programs, including the U.S. Medicare program, provide only partial insurance coverage. For example, Medicare pays for only half of all medical expenditures for the elderly, and leaves them exposed to substantial medical expenditure risk. The same is true of public health insurance programs in Canada, Australia and the United Kingdom. Nor is the phenomenon limited to public health insurance programs. Around the world, defined benefit Social Security systems provide only partial annuitization for the elderly. Public disability insurance in both the U.S. and Canada also provides only limited insurance against lost wages and increased medical costs. In all of these instances, individuals have the option of buying supplemental insurance in the private market to "top up" their public insurance coverage.

Yet, to my knowledge, we have no empirical evidence of the consequences of such partial programs for the workings of the private insurance market and hence for total insurance coverage.[1] A primary concern is that these programs – designed to counteract the effects of adverse selection in private insurance markets – may in fact exacerbate adverse selection pressures in the residual private market. The public program could thus produce declines in total insurance coverage for some groups of privately-insured individuals. This deleterious effect on the residual private market could partially or completely counteract any welfare gains from the increased insurance coverage provided through the public program to individuals whose private coverage would have been less than the publicly-provided amount. On the

[1] Some attention has been paid to the case in which individuals must choose between partial public provision and private purchase. See for example Peltzman (1973) for public education or Cutler and Gruber (1996) for publicly provided health insurance for the poor.

other hand, if partial public insurance programs *reduce* adverse selection pressures in residual private insurance markets, the welfare gains from such programs would exceed those stemming directly from the public insurance coverage provided by the program. Theoretically, either effect may obtain.

Partial public insurance may also affect the residual private insurance market through mechanisms other than its effect on selection pressures. On the one hand, the public program may tend to produce declines in private coverage for risks not covered by the public program if individuals mistakenly believe that the partial public program provides comprehensive coverage, or if there are large fixed costs to producing private insurance policies. On the other hand, if much of the moral hazard induced by the private insurance is for services now-covered by the public program, the public program might stimulate increased private insurance coverage by reducing the costs and hence the marginal price of the private insurance.

Given the theoretical ambiguity of the impact of such public insurance programs, this paper addresses the question empirically by examining the effect of the public Medicare program on the private market for prescription drug insurance, a benefit not provided by the public program. Empirical evidence of the effect of partial public insurance programs on residual private insurance markets has important implications not only for the welfare consequences of existing programs, such as Medicare and Social Security, but also for optimal policy design of future public insurance programs. For example, proposals for a Medicare prescription drug benefit almost always involve a less-than-comprehensive benefit and optional supplemental coverage; the desirability of such a program depends in part on how the private market for supplementary drug coverage is likely to function relative to the market for any drug coverage.

I begin in Section two by considering theoretically the various possible mechanisms by which partial public insurance may affect – in either direction – coverage in the residual private market and social welfare. I also discuss ways to distinguish empirically among these mechanisms. Section three presents background information on the Medicare program and on the private insurance market for supplementary coverage.

Section four discusses the empirical approach. I follow a panel of retirees from the Health and Retirement Survey (HRS) over a two-year period to examine the effect of the discrete change in Medicare coverage that occurs when they turn 65 on whether they have private insurance coverage for prescription drugs. To control for any confounding effects that aging or the passage of time may have on the demand and supply of private insurance for prescription drugs, I compare changes in prescription drug coverage for retirees who become covered by Medicare between interviews to changes in prescription drug coverage for two control groups of retirees who do not become covered by Medicare between interviews. One control group consists of retirees originally aged 60-62, who are not covered by Medicare in either interview; the other control group consists of retirees aged 65-67, who are covered by Medicare in both interviews.

Section five presents the results. I find that Medicare coverage is not associated with changes in private insurance coverage for prescription drugs. However, because a partial public insurance program may affect the private insurance market through several different – and potentially offsetting – mechanisms, these aggregate results may mask specific effects of the Medicare program. To investigate more directly whether Medicare is associated with changes in adverse selection pressures in the private market, I examine the effect of Medicare separately for individuals of different health status. I find no evidence that Medicare is associated with increased adverse selection pressure in the supplementary private insurance market, and only weak evidence that it may in fact alleviate adverse selection problems in the residual private market. Additional, more indirect, tests also fail to find compelling evidence for a large role of consumer misinformation, fixed costs of insurance policies, or the moral hazard subsidy of the private insurance by the public program in understanding how the Medicare program affects the residual private insurance market.

The results of this paper therefore suggest that Medicare does not have substantial spillover effects – either positive or negative – on the residual private insurance market. The final section considers the applicability of these findings to the likely effects of other partial public insurance programs.

2. Partial Public Insurance Programs and Residual Private Insurance Markets

The partial public insurance programs that I consider are universal and compulsory. They provide essentially first-dollar coverage (with perhaps some small deductible), but provide less than full insurance against the risk that they cover.[2] They also allow the purchase of voluntary private insurance policies to supplement the compulsory public insurance. This supplementary insurance may either increase the amount of payment in event of a claim and/or provide payment for a service not covered by the public insurance program.

In a model with perfect competition, constant returns to scale, perfect capital markets and symmetric, full information, the introduction of such a program should effect insurance coverage only by mechanically increasing insurance coverage for individuals whose private insurance coverage would otherwise have been less than the publicly-provided amount; the program should have no effect on total insurance coverage for those who would otherwise have private insurance coverage that exceeds the amount provided by the public program. Once we depart from this benchmark neo-classical model, however, it is possible to generate predictions – in either direction – for the effect that partial public insurance programs will have on total insurance coverage. This section explores a number of such departures. I discuss their empirical predictions for the effect of partial public insurance programs on total insurance coverage, as well as their implications for the welfare consequences of introducing such a program.

2.1 The Impact of Public Intervention on Adverse Selection in Private Insurance Markets

Since the economic rationale for compulsory public insurance stems from its potential to overcome private market problems of adverse selection, the effect of partial public insurance on adverse selection in the private residual insurance market is of primary interest. Theoretically, however, the direction of this effect is ambiguous. Broadly speaking, it depends on whether insurance companies are

[2] An alternative form of a partial public insurance program is one that covers catastrophic expenditures above a high deductible and allows private markets to supply "low end" policies. A rich theoretical debate on the efficiency of such plans – with particular attention to moral hazard effects – can be found in Besley (1989), Selden (1993), Blomqvist and Johannson (1997), and Selden (1997).

restricted to linear pricing schedules or whether they can offer exclusive contracts and therefore a convex pricing schedule.[3]

Abel (1986) develops a formal model of the effects of introducing a partial public insurance program in a private insurance market with non-exclusive contracts (i.e. linear pricing). The model – developed in the context of defined benefit social security programs and residual private annuity markets – suggests that the partial insurance provided by the public program exacerbates adverse selection pressures in the residual private market. An implication is that defined benefit social security programs, which provide only partial annuitization, may be partly responsible for the limited size of private annuity markets.[4]

To illustrate the intuition for this result, I develop the implications of a partial public insurance program in a more simple – but also more general – linear pricing model than that of Abel (1986).[5] Individuals, who vary only in terms of their (privately known) risk type (p) of incurring loss (L), face a choice of whether to buy an exogenously-given quantity of insurance (s). Figure 1 shows the cost and value functions graphically. The zero profit condition determines that the equilibrium insurance price is the weighted-average expected payment across buyer types, which is denoted by $C(s, p)$. Let $V(s, p, L)$ denote the value of the insurance to an individual who with probability p will incur a financial loss of L; the single crossing property implies that the value of the insurance package at the common pooling price is increasing in risk type. The intersection of the two curves at p^* determines the equilibrium; all individuals of risk type p^* or higher purchase insurance at price C^*.

Ignoring its income effects, we can model the introduction of partial public insurance coverage as reducing the amount of exposed risk from L to $L-m$, where m is the amount of publicly-provided

[3] Chiappori (2000) notes that this distinction is a critical distinction more generally among asymmetric information models of insurance markets.
[4] Indeed, Walliser's (2000) simulations based on the Abel model suggest that eliminating Social Security could reduce adverse selection in annuity markets by as much as 35 percent.
[5] This is a modified version of the graphical analysis presented in Cutler and Zeckhauser (2000) in which individuals choose among two types of plans.

coverage.[6] For simplicity, assume $s + m \leq L$. Therefore the cost curve is not affected by the introduction of the public program. However, public provision of m reduces both the value of private insurance and the difference in valuation between individuals of different risk types. As the amount of exposed risk $(L - m)$ decreases, the risk premium decreases and thus the value of private insurance coverage falls. When individuals face a common price for insurance, the single crossing property implies that the value of insurance declines more for higher risk individuals. Figure 1 captures these two effects of introducing the public insurance program: the new value function, denoted by $V(s, p, L - m)$, has a smaller intercept and a flatter slope. As a result, the lowest risk individual previously purchasing insurance (i.e. type p^*) no longer values it at cost, and so drops out of the market. At the new equilibrium the lowest risk type purchasing insurance has increased from p^* to p^m and the equilibrium price from C^* to C^m. These effects reduce the gains in insurance coverage and in welfare from the public insurance program.

Intuitively, the introduction (or expansion) of a partial public insurance program reduces individual exposure to risk and thus reduces the consumer surplus from purchasing private insurance at a given price. Since – when facing a common price for insurance – this consumer surplus is lowest for lowest risk individuals (and zero by definition for the lowest-risk individual who chooses to purchase the insurance), the public program induces some low risk individuals to drop out of the private market, driving up the equilibrium price of insurance and thus prompting further declines in private coverage. In principle, the result could be a complete destruction of the private market. The linear pricing model thus offers the empirical prediction that the introduction of the partial public insurance program should be associated with declines in total insurance coverage for individuals whose private coverage would otherwise have exceeded the amount provided by the public program. These declines should be particularly pronounced among the lowest risk individuals in this group.

[6] Under the assumption of constant absolute risk aversion (CARA), there are no income effects on insurance demand from the introduction of the public program. In the empirical work, I directly test the income effects from the introduction of Medicare and find them to be small.

When insurance companies are capable of enforcing exclusive contracts (i.e. offering a convex pricing schedule), partial public insurance programs can have the opposite effect on the private insurance market. Wilson (1977) provided the striking result that when there is a pooling equilibrium in a private insurance market with adverse selection, the government can always Pareto dominate such an equilibrium by providing partial insurance at the market odds price and allowing the private market to provide supplemental insurance coverage.[7] This result has been cited in support of the welfare-enhancing potential of a variety of partial public insurance programs that allow for private supplementation such as mandatory, non-discriminatory Social Security programs with voluntary private annuity markets (see for example Eckstein et al. 1985) and compulsory partial health insurance coverage with supplementary private markets (see for example Neudeck and Podczeck 1996). Finkelstein (2002) shows that this Pareto improving role for the public insurance program stems from the fact that, the introduction of the public insurance policy relaxes the constraint imposed by the Wilson models that individuals may hold only a single private insurance policy. Individuals may not hold two separate insurance policies: one public and one private. This allows individuals to hold both a pooling policy and a separating policy, thus enhancing efficiency relative to the no-intervention case in which individuals can hold *either* a separating or a pooling policy but not both. A key requirement therefore for the potential for the public policy to be Pareto-improving in this model is the assumption that individuals are restricted to holding only one private insurance policy. Finkelstein (2002) demonstrates that this assumption appears valid for private health insurance markets. Therefore in principle, partial public health insurance programs may produce Pareto improvements as suggested by the Wilson (1977) model. The model produces the empirical prediction that the partial public insurance program should produce increases in total insurance coverage among the highest risk; its effect on total insurance coverage for lower risk individuals who otherwise would have had private insurance coverage is ambiguous.

2.2 Other effects of partial public insurance programs on private insurance markets

[7] Eckstein et al (1985) discuss the full range in the amount of partial public coverage for which this result holds.

Apart from its impact on adverse selection, there are three other venues by which public insurance provision may affect private insurance markets. These too offer testable empirical predictions. First, if individuals mistakenly believe that the public program provides comprehensive coverage, then the introduction of a partial public insurance program may produce declines in total insurance coverage and in welfare for individuals who originally had more private insurance than the amount provided by the public program. This type of misinformation suggests that declines in private insurance coverage should be particularly pronounced among individuals who are least likely to be aware of the limitation of the public program.

Second, if there are fixed costs to insurance policies, than partial public insurance programs can be expected to result in declines in total insurance coverage for some individuals who originally had more private insurance than the amount provided by the public program. By decreasing the amount of exposed risk, the partial public insurance program decreases the willingness to pay the fixed cost for private coverage for the residual risk. This model predicts that declines in private insurance coverage should be particularly pronounced for those with less comprehensive insurance coverage prior to the partial public program and for lower risk individuals.[8] The welfare implications depend on the relative efficiency of public and private provision. If both sectors are equally efficient, the public program produces wasteful duplication of fixed costs. Of course, if the public sector is more efficient, the welfare losses from the duplication of fixed costs could be partially or completely offset.

Third, much of the moral hazard induced by private insurance may be for services covered by the public insurance program. The introduction of the public program should therefore tend to reduce the private of private insurance and thus produce increases in private coverage for residual risks not covered by the public program. The welfare effects of increases in insurance coverage from the moral hazard externality are ambiguous. Pauly (1974) demonstrates that, when individuals are identical, the moral hazard subsidy of the private insurance reduces welfare gains associated with the public program unless

[8] This latter prediction holds both in models of asymmetric information in which the low risk have less insurance than the high risk (see e.g. Rothschild and Stiglitz (1976)) and in models with symmetric information.

those who buy supplementary coverage are assessed an additional premium for the public insurance to reflect the increased use of this insurance induced by the private coverage. However, when heterogeneous agents and adverse selection are added to the model, there may be welfare gains from the moral hazard subsidy since in markets with adverse selection, insurance is priced too high to attract low risk individuals (Marquis 1992). The subsidy may increase the willingness of low risk individuals to pool with high risk individuals, and thus reduce the adverse selection pressures.

3. The Empirical Setting: The U.S. Medicare Program

Since the effects of partial public insurance programs are theoretically ambiguous, I examine them empirically by investigating the consequences of the partial public health insurance provided through the U.S. Medicare system.

3.1 Partial Government-Provided Health Insurance for the Elderly: The U.S. Medicare Program

The U.S. Medicare program provides partial public health insurance coverage to the elderly and to the disabled. This paper focuses on the elderly whose eligibility begins at age 65; this discrete change in eligibility at age 65 provides a mechanism for distinguishing the effects of Medicare from other effects of aging. Almost all individuals aged 65 or older are covered by Medicare.[9] This high coverage rate is not surprising given that Medicare Part A (which primarily covers non-physician inpatient hospital care expenses) is financed through payroll taxes on the employed while Medicare Part B (which primarily covers physician fees for covered services) is heavily subsidized (U.S. House of Representatives 1998).

Although essentially universal among the elderly, Medicare coverage is far from comprehensive. Indeed, Medicare pays for less than half of the health care costs of the elderly (Piacentini and Foley (1992). Gaps in Medicare coverage fit into three main categories. First, there are cost-sharing provisions – annual deductibles and uncapped co-payments – for the health services that Medicare covers. Second, there are certain health services that Medicare covers only partially and/or with severe restrictions, such as care in a skilled nursing facility or home health care. Third, there are health services that Medicare does not cover at all, which are primarily outpatient prescription drugs and long term care.

[9] Author's calculations from the 2000 HRS indicate 97% self-reported coverage.

Of critical importance for the analysis is the fact that Medicare provides substantially less coverage than most private insurance held prior to age 65 (Piacentini and Foley (1992)).[10] In particular, prior to age 65, most (85 percent) of private retiree health insurance policies cover prescription drugs, whereas Medicare does not. By contrast, Medicare is similar to most private health insurance policies in providing little long-term care coverage.

3.2 Private coverage to supplement Medicare

Not surprisingly, therefore, private coverage to supplement Medicare is widespread. About 85 percent of the non-disabled, non-indigent elderly have some private insurance to cover some of the services not covered by Medicare. This "Medigap" coverage is provided through an insurance policy from a current or former employer or union (56%), an insurance policy purchased directly from an insurance company (26%), or a Medicare HMO (16%) which, in exchange for limiting the individual to a network of providers and sometimes for a premium as well, will cover Medicare services and also an expanded benefit package.[11]

4. Empirical approach

4.1 Data and Sample Definition

The data are from the three waves of the HRS (1996, 1998 and 2000) that have information on prescription drug coverage. The HRS is a national, panel data set that began in 1992 with a sample of primary interviewees aged 51-61 and their spouses.

The basic empirical strategy is to compare private health insurance markets for retirees who are covered by Medicare with those for retirees who are not covered by Medicare. I follow a panel of retirees originally aged 60 to 67 over a two-year period. Retirees who are 63 or 64 in the first interview (the "treatment group") become covered by Medicare between interviews. This discrete change in Medicare coverage at age 65 is used to identify its effects. I compare the changes in private health insurance for

[10] Indeed, estimates suggest that in terms of comprehensiveness of coverage, Medicare ranks in the bottom quartile – and perhaps as low as the bottom decile – of employer plans in medium and large firms. (Conversation with James Mays of the Actuarial Research Corporation. Estimates based on the 1988 BLS Employee Benefits Survey of medium and large firms.)

[11] Author's calculations from the 2000 HRS.

retirees who become covered by Medicare between interviewers to changes for two control groups who are close in age to the treatment group but do not experience any change in Medicare coverage between interviews. The Younger Control Group consists of retirees aged 60-62 in the first interview who are therefore not on Medicare in either interview. The Older Control Group consists of retirees who are 65-67 in the first interview who are therefore covered by Medicare in both interviews. This comparison is designed to isolate the effect of Medicare from other effects of aging and the passage of time on private health insurance markets.

I use the three waves of the HRS panel to form two, two-wave "stacked" panels. Some individuals therefore appear in two separate observations (in differences); indeed, the 2,999 observations (in differences) in the data represent 2,1774 unique retirees.[12] An alternative approach would be to use the data as one "long", three-wave panel and to compare changes in retiree's insurance upon turning 65 to their own changes at other ages. However, since the dependent variable are all binary, the retiree is not a good control for himself as he cannot experience the same change twice in a three-wave panel.[13]

I restrict my sample in three main ways. All restrictions are made based on status at the first interview.[14] First, the sample is limited to retirees, whom I define based on self-reporting of their employment situation.[15] This restriction avoids confounding the effect of Medicare with the effect of retirement. Medicare is the primary payer for retirees with retiree health insurance at age 65 and over and employers can – and do – offer difference health insurance packages to retirees based on Medicare eligibility. They can also charge age-based prices for any health insurance offered, as long as this is

[12] In 1998, two new cohorts representing individuals born between 1924 and 1930 and individuals born between 1942 and 1947 were added to the sample and the entire sample was merged with the AHEAD sample which consists of individuals born before 1924. As a result some of the older individuals are only surveyed in 1998 and 2000 and therefore do not have repeat observations (in differences).

[13] In results not reported here, I ascertained that the main results are not sensitive to this alternative specification.

[14] Throughout this paper I use the term "first interview" to refer to the first observation in time of the two observations on an individual. The observations may either come from the 1996 and 1998 surveys (in which case the "first interview" is the 1996 survey) or they may come from the 1998 and 2000 surveys (in which case the "first interview" is the 1998 survey).

[15] Individuals who report their employment situation as "homemaker" are not included in the sample. This helps to reduce the number of likely spousal dependents in the data. Such spousal dependents – since they become covered by Medicare at a different age than the primary earner – may dampen the relationship between Medicare and changes in private health insurance decisions that occur precisely at age 65. I discuss this issue more in the specification checks below.

actuarially based. Employer contributions to retiree health insurance – like their contributions to employee health insurance – are not taxable income to the individual.[16] Second, I further limit the sample to individuals who do not report themselves as disabled since disabled individuals may be covered by Medicare regardless of age.

Finally, the sample is limited to people who are not covered by military health insurance and are not eligible for Medicaid, the public health insurance program that covers certain classes of poor people. This last restriction must be made with some care as Medicaid eligibility expands at age 65.[17] In order not to confound any effects of Medicare coverage at age 65 with those of expanded Medicaid eligibility at age 65, I limit the sample to retirees who, based on their income and assets, would not meet the criteria for Medicaid eligibility at age 65, regardless of their current age.[18]

4.2 Dependent variables

All of the dependent variables used in this paper are binary measures of private health insurance coverage. The HRS provides information on whether the individual has any private health insurance for acute medical care, whether this private health insurance covers prescription drugs, and whether the individual has any private insurance to cover the costs of long-term care.[19] Information is available on whether the insurance for acute medical care is provided through a current or former employer or not. As is typical of most survey data, there is not however, any measure on the amount of coverage. The data therefore only permit an analysis of the effects of Medicare on the extensive coverage margin. However,

[16] The description of regulations for retiree health insurance before and after age 65 is based on a review of the relevant parts of ERISA, IRA non-discrimination rules, and the ADEA, as well as on conversations with program officials in the offices that oversee these regulations.

[17] In practice, this expansion is not large: Medicaid coverage rises from 6 percent of individuals aged 45 to 64 to 8.9 percent of individuals aged 65 and older (U.S. House of Representatives, 1998).

[18] I choose the income and asset thresholds to exclude individuals who – if they were age 65 – would either by eligible for full Medicaid or for QMBY (which covers Medicare part B premiums and co-payments for part A and part B). I do not exclude individuals who would be eligible for SLMBY, since these individuals only receive a slight income transfer through the payment of the part B premium. In results not reported here, I find that the results are not sensitive to more restrictive income and resource floors to exclude people who would be eligible for SLMBY as well.

[19] Long term care insurance coverage in the HRS is measured by responses to the following question: "Not including government programs, do you now have any insurance which specifically covers any part of personal or medical care in your home or in a nursing home for a year or more?" (question R85)

since the various possible mechanisms by which Medicare may affect prescription drug coverage should have a similar impact on both the extensive and the intensive margin, evidence on the extensive margin is informative in trying to understand whether and how partial public health insurance programs may affect the residual private insurance market.

The primary dependent variable of interest is prescription drug coverage, since this represents the largest measurable gap in Medicare coverage that, prior to age 65, tends to be covered by the same insurance product that covers the services subsequently-covered by Medicare. In contrast, long-term care insurance is most often purchased as a stand-alone product, both before and after age 65. Therefore any effects of Medicare that operate through changing adverse selection pressures should affect the prescription drug insurance market but not the long-term care insurance market.

Understanding the reasons for this bundling of prescription drugs with other health services in the pre-Medicare insurance market is important in thinking about the likely consequences of Medicare coverage both for insurance coverage and for welfare. Economies of scale and scope in the production of insurance policies may play a role. The complementary nature of the health services covered may be a factor; a private policy that covers hospital and doctor services but not prescription drugs may produce inefficiencies in the delivery of health care. Furthermore, insurance companies may not want to leave open the possibility of individuals buying additional supplemental coverage for prescription drugs as the moral hazard effects of this coverage on doctor and hospital services would not have been priced in their partial policy. Finally, bundling prescription drug coverage with other forms of coverage may be a way to reduce adverse selection pressures if the correlation between these risk types is less than 1. This may be particularly important in reducing adverse selection pressures for prescription drugs since the predictability of prescription drug expenditures makes it subject to particularly strong adverse selection pressures.

There are several judgment calls to make in defining prescription drug coverage. Measures of prescription drug coverage can be created using self-reported information on drug coverage and/or self-reported information on whether the individual had any prescription drug *expenses* that were covered by

insurance. In addition, the question pattern in the HRS suggests that there will be systematic under-reporting of drug coverage provided through a Medicare HMO. For reasons discussed in greater detail in Appendix A, I choose to use self-reported measures of drug coverage and to assign drug coverage to all individuals in a Medicare HMO. Appendix A also explores several alternative approaches to measuring prescription drug coverage and shows that the principal findings are not sensitive to the choices made.

4.3 Empirical approach

The basic specification for any one of the three groups of interest – the treatment group, the younger control group, or the older control group – is as follows:

$$\Delta y_i = b_0 + d\Delta X_i + e_i \quad (1)$$

The key parameter of interest is the constant, b_0, which reflects the average change in the dependent variable for the group, after controlling for the effects of changes in other covariates. ΔX controls for changes in household income between interviews.

When I combine the estimates from the treatment and the control groups into one difference-in-differences estimate, I estimate:

$$\Delta y_i = b_0 + d\Delta X_i + g\Delta MEDICARE_i + e_i \quad (2)$$

$\Delta MEDICARE_i$ is an indicator variable that is equal to 1 if the individual is in the treatment group, and thus experienced a change in Medicare status between interviews.

When I estimate equation (1) for the treatment group, b_0 reflects the combined effects of becoming eligible for Medicare and any effects of aging or the passage of time. The identifying assumption in equation (2) is that any effects of aging or the passage of time are the same for retirees aged 60-62 and aged 65-67 as they are for retirees aged 63 and 64. Under this assumption, b_0 now measures the aging and time effects and g measures the effect of a change in Medicare coverage.

I estimate equations (1) and (2) by OLS. I adjust the standard errors for correlation within the error term across observations (in differences) for the same individual. I estimate all regressions using the HRS weights for the first interview.

4.4 Descriptive Statistics

Table 1 provides summary statistics. The middle column shows sample averages for the treatment group. The other two columns show the sample average for the younger and older control groups. The racial, gender, educational and income composition of the three groups is very similar. The proportion in worse health tends to increase with age, which is not surprising. The only other noticeable difference between the groups – apart from than their age – is that the observations from the older control group are disproportionately from following retirees from the 1998 to 2000 survey. This simply reflects the fact that younger retirees "age into" the older control group by the second pair of surveys. In the analysis below I investigate the sensitivity of my findings to this compositional change by looking at whether the estimated effects vary across pairs of adjacent surveys.

5. Results

5.1 Prescription Drug Changes for the whole sample

Table 2 presents evidence of the effect of Medicare on private prescription drug coverage. The first three columns show the estimated change in prescription drug coverage between interviews separately for each of the control groups and for the treatment group. The final column shows the difference-in-difference estimate of the change in prescription drug coverage for those who turn 65 between interviews relative to the change in prescription drug coverage for those in the control groups. In this specification, the coefficient of interest is that on $\Delta MEDICARE$. Under the identifying assumptions, it reflects the effect of becoming covered by Medicare on private prescription drug coverage.

There is little evidence of an aggregate effect of Medicare coverage on prescription drug coverage. Medicare coverage is associated with a statistically insignificant 2 to 3 percentage point (4 to 5 percent) increase in prescription drug coverage. We can reject – at the 95 percent confidence level – an

effect of Medicare on prescription drug coverage that is larger than a 2 percentage point (3 percent) decline or a 7 percentage point (10 percent) increase in prescription drug coverage. This result holds both without the inclusion of covariates (the top panel) and with the inclusion of covariates (the second panel).[20] The result also holds both when the treatment group alone is analyzed and in the difference-in-differences specification; this similarity alleviates concerns that the results hinge critically on the untestable identifying assumption. This similarity in estimates in the treatment group and the difference-in-differences analysis prevails in all of the subsequent analyses.

The aggregate results thus paint a picture of a lack of any net effect of Medicare on the private market for prescription drug insurance. However, it is possible that several of the mechanisms described in section two are at work in opposing directions. The next sections therefore develop more targeted tests of whether Medicare affects the private market through particular mechanisms.

5.2 The effects on adverse selection: prescription drug coverage by health status

To look at the effect of Medicare on adverse selection in the private market for prescription drug coverage, I examine whether Medicare has a differential effect on private insurance coverage for prescription drugs for individuals of different health status. I use two different measures of health status, both based on self-reports at the time of the first interview. Table 3 estimates the effect of Medicare by self-reported health status (poor or fair, good, very good or excellent). Table 4 estimates the effect of Medicare by the number of chronic conditions the retiree reports (zero, one, two, or three or more).[21]

There is no evidence of an increase in adverse selection in the private insurance market associated with Medicare coverage. Table 3 indicates that, to the contrary, Medicare is associated with a 12 to 14 percentage point *increase* in prescription drug coverage among those who report themselves to be highest risk (i.e. in fair or poor health) and no evidence of an effect of Medicare on prescription drug coverage for those who report themselves to be in better health. The estimated effect of Medicare on those in fair or

[20] All subsequent results control for covariates but the results are never sensitive to this control.
[21] Individuals are asked about seven chronic conditions: high blood pressure or hypertension, diabetes or high blood sugar, cancer, chronic lung disease (such as chronic bronchitis or emphysema), heart problems (such as heart attack, coronary heart disease, angina or congestive heart failure), stroke, or arthritis or rheumatism.

poor health is statistically significantly different at the five percent level in both the treatment group and the difference-in-differences specification from the estimated effect of Medicare on those in good health or those in very good or excellent health. This finding is broadly consistent with the predictions of the Wilson (1977) model in which partial public insurance programs can produce increases in insurance coverage for the highest risk and Pareto improvements over the original private market equilibrium.

However, when an alternative definition of health status based on the reported number of chronic conditions is used, Table 4 indicates that there is no evidence of a substantively or statistically significant differential effect of Medicare by health status. In particular, there is no evidence either of Medicare being associated with a disproportionate decrease in drug coverage among the most healthy (predicted by Abel (1986)) or a disproportionate increase in drug coverage among the least healthy (predicted by Wilson (1977)). The results in Tables 3 and 4 therefore present convincing evidence that Medicare does not *exacerbate* adverse selection in the private prescription drug market. There is only weak evidence that Medicare might alleviate these problems.

5.3 Other effects of partial public insurance programs on private insurance markets

While the main focus of the paper is on the effect of Medicare on adverse selection in the residual private insurance market, the data also present some indirect and somewhat weaker tests of other possible effects of Medicare on the residual private insurance market. First, I investigate a possible role for misinformation about the limited nature of the public coverage. I examine whether Medicare is associated with a larger decline in prescription drug coverage among individuals who are less likely to be aware of the lack of prescription drug coverage in the public program. Such individuals includes those with lower educational attainment and those who do not regularly use prescription medicine. The evidence in Table 5 does not support a role for misinformation: the association between Medicare coverage and prescription drug coverage is not substantively or statistically different for retirees of different educational attainment or between retirees who do and do not regularly use prescription medicine.

Another way to look for an effect of consumer misinformation is through the effect of Medicare on the market for long-term care insurance, another benefit not provided through Medicare. Any effect of

Medicare found here is less likely due to other factors such as changes in adverse selection pressures or fixed costs of insurance since, as discussed above, long-term care insurance is – both before and after age 65 – typically sold as a separate product from acute medical coverage. Table 6 presents estimates of the effect of Medicare on coverage for long-term care insurance both for the whole sample and by educational attainment. There is no evidence that long-term care insurance coverage declines when retirees become covered by Medicare, as might be expected if they mistakenly believe that Medicare now covers them for long-term care expenses. To the contrary, there is evidence of a statistically significant 4 percentage point (35 percent) increase in long-term care insurance coverage associated with Medicare coverage. This may be due to the "focusing" event provided by Medicare coverage that causes individuals to rethink their health care needs as elderly individuals. There is no evidence that Medicare is associated with relative declines in long-term care insurance coverage among the less educated.

Second, I test for a role for fixed costs of insurance or a moral hazard subsidy in explaining how partial public insurance programs may affect private markets by examining the effect of Medicare on private insurance coverage that does not cover prescription drugs. The presence of substantial fixed costs to insurance contracts predicts the Medicare should be associated with particularly pronounced declines in less comprehensive insurance packages, such as those that do not cover prescription drugs. Furthermore, these declines should be more pronounced among the most healthy (lowest risk) who, even under symmetric information, would face a more binding participation constraint. By contrast, a large moral hazard subsidy predicts that Medicare coverage should be associated with particularly pronounced increases in private insurance that does not cover prescription drugs; after age 65, such Medigap insurance covers essentially only the cost-sharing provisions (co-payments and deductibles) of Medicare, which are the benefits that receive the largest moral hazard subsidy.

Table 7 therefore analyzes the effect of Medicare on private health insurance that does not cover prescription drugs. There is no evidence of any change – in either direction – in health insurance that does not cover prescription drugs associated with Medicare coverage. Nor is there evidence of relative declines

in this insurance among the most healthy (lowest risk) as would be predicted by a fixed costs story.[22] This mitigates against a large role both of a moral hazard subsidy and fixed costs of insurance policies in affecting how Medicare coverage impacts the residual private market. However, since these two factors exert opposing pressure on prescription drug coverage, I cannot reject the hypothesis that both factors are exerting a large effect in opposite – and offsetting – directions.

5.4 Specification checks

I perform a battery of tests to investigate the robustness of the results reported above. These tests are applied to all of the analyses reported in Tables 2 through 7. A primary concern is that while Medicare coverage applies only to the individual, private insurance is often held jointly by a married couple. Retirees may be affected by Medicare at ages other than 65 if their spouse turns 65 and was the source of the private insurance coverage. Similarly, if a spouse retires between interviews, this may affect insurance coverage for the other member of the couple.[23] To address these concerns, Table 8 reports the estimated effect of Medicare from the difference-in-differences analysis for restricted versions of the sample. The first column replicates results for the whole sample. The second column limits the sample to retirees who, in the first wave, neither cover their spouses nor receive coverage from their spouse. The third column limits the sample to retirees whose spouses are either also retired in the first wave or not in the labor force. Table 8 reports results both for the entire sample and for individuals of different health status. None of the results reported in column 1 is sensitive to any of these restrictions. The same is true for the other results in Tables 2-7 (not shown).

In addition, in results not reported here, I find that the estimated effect of Medicare is not sensitive to allowing the mean change in the dependent variable over time – as measured by b_0 in the difference in difference specification – to vary by gender, race, education, marital status, health status,

[22] Table 8 presents the results for self-reported health status. There is also no evidence of large declines among the least healthy as measured by number of reported chronic conditions (results not shown).
[23] Every individual in the main sample is retired, but the spouse is not necessarily retired.

initial household income, and starting interview (1996 or 1998). Furthermore, the results are not sensitive to restricting the sample to individuals who have all retired by age 60, the youngest age in the sample.

I examine whether the estimated effect of Medicare in equation (2) varies across other observable characteristics of the individual that have not yet been examined. There is no evidence of either substantive or statistically significant differences in the effects of Medicare by characteristics such as gender, race, martial status, size of firm the individual worked in prior to retirement, or year of starting interview. There is however, evidence of statistically significant 11 percentage point increase in prescription drug coverage among the lowest income group in the sample associated with Medicare coverage, and no significant changes in prescription drug coverage among higher income groups associated with Medicare coverage. This is consistent with a positive income effect from the Medicare program. Of course, an anticipated public program has no life-cycle income effects. However, if some individuals face binding liquidity constraints that prevent the purchase of comprehensive insurance coverage and the costs of the public program are not fully born by the current recipients, the public program may stimulate the market for residual private insurance by relaxing the binding liquidity constraint.[24]

To test the relative contribution of various covariates, I re-estimate equation (2) including a full set of interactions between b_0 and covariates and between $\Delta MEDICARE$ covariates.[25] When self-reported health status is used as the measure of health, the finding of a statistically significant increase in prescription drug coverage among the least healthy and no evidence of changes among the healthier remains, and there are no significantly different effects of Medicare by other covariates, including income, When self-reported chronic conditions are used as the measure of health status, there is no evidence of differential effects of Medicare by any covariates, including health and income.

[24] This assumes that the residual private insurance is not sold as a stand-alone product prior to the public program. This is a reasonable assumption in markets such as health insurance where the complementarities between modes of coverage make it inefficient, for example, to sell insurance for drug coverage to individuals who have none or only minimal hospital or doctor's coverage.

[25] The covariates are: self-reported health status and indicator variables for whether the individual is male, whether he is white, his educational attainment category, his income category, marital status, firm size, whether he is a regular drug user, and the interview start date (1996 or 1998).

5.5 Generalizability – the role of Medicare HMOs

In interpreting the results, it is important to note that Medicare coverage is associated with a pronounced shift away from the employer as the primary source of private insurance coverage, predominantly toward coverage through Medicare HMOs, which are not available prior to age 65. Figure 2 shows this graphically both for the treatment group and the control groups; compositional changes in the source of insurance coverage are not observed among the control groups.[26] This raises the possibility that the effect of Medicare might be substantially different if not for the existence of Medicare HMOs for the over-65 population.

One way to examine this is to look for any evidence of an effect of Medicare *within* particular insurance markets. Table 9 investigates this issue by examining changes in prescription drug coverage among people who remain in the same insurance market. The top panel restricts the sample to retirees who have employer-provided coverage in both interviews; this excludes anyone who has private non-group insurance or a Medicare HMO not supplied by an employer in either interview. This allows us to examine changes within the employer-provided market; it also removes the potential to confound the effect of Medicare at age 65 with the effect of the introduction of more stringent regulations in the non-group market (when only 10 standardized plans may be offered). Since some retirees with employer-provided health insurance may receive that coverage after age 65 through a Medicare HMO, the bottom panel further restricts the sample to those who have employer-provided coverage in both rounds and do not report having a Medicare HMO as well. The results indicate no evidence of an effect on Medicare coverage on private prescription drug coverage for individuals who stay within a given insurance market.

Of course, it is possible that changes within insurance markets are influenced by the outside option of the Medicare HMO, which affects the composition of the privately insured. To test this

[26] Interestingly – and surprisingly – this shift away from employer-provided retiree health insurance when Medicare coverage begins does not appear to be driven by reduced employer offering of retiree health insurance with Medicare coverage. For example, of full-time employees who are offered health insurance in small private establishments in 1996, 16 percent are offered retiree covered under age 65 and 15 percent are offered retiree coverage at ages 65 and over (U.S. Department of Labor, 1999a). For full-time employees who are offered health insurance in medium and large private establishments in 1997, these numbers are respectively 42 percent and 38 percent (U.S. Department of Labor, 1999b).

possibility, I examine changes in prescription drug coverage associated with Medicare in the period right before the growth of Medicare HMOs. Unfortunately, there are no panel data for such an analysis, but I am able to look at the effect of Medicare on private prescription drug coverage in a cross-section of the 1989 National Health Interview Survey (NHIS).[27] I limit the sample to retirees age 60-70 and further restrict the sample in the same way as described above for the HRS. I estimate the following regression:

$$y = b_0 + b_1 Age + b_2 Age^2 + b_3 Age^3 + b_4 Age65^+ + b_5 X + e \qquad (3)$$

The dependent variable is a binary measure of drug coverage. X is a matrix of dummies to control for covariates (gender, race, marital status, educational attainment, and health status). I control for age flexibly by allowing for a cubic in age.[28] The primary variable of interest – $Age65^+$ – is an indicator variable for whether the individual is on Medicare.

The primary limitation to this cross-sectional analysis is that the results may be affected by the changing composition of the retirees with age, and particularly at age 65.[29] Nevertheless, the cross-sectional estimates from a time before Medicare HMOs provide a partial test of whether the main results in the paper are primarily driven by the presence of Medicare HMOs. The results – some of which are reported in Table 10 – are similar to the effects of Medicare estimated in the HRS. This suggests that the estimated effects of Medicare in the HRS – both in the aggregate and by particular covariates of interest – are not sensitive to the presence of Medicare HMOs.[30]

7. Conclusion

Compulsory public insurance programs that provide only partial coverage but allow private supplementary insurance are prevalent in many countries for both health-related and mortality-related risks. Theoretically, the effects of such programs on insurance coverage in the residual private market are

[27] The 1989 NHIS is the only NHIS to ask about prescription drug coverage. There are no other large cross-sections from the 1980s that ask about prescription drug coverage.
[28] The results are not sensitive to fully dummying out all ages instead.
[29] When I analyze the HRS data in the cross-section, however, the results are similar to the panel results reported in the paper. This helps to alleviate concerns about substantial bias from changing composition of the sample.
[30] In results not reported here, I also find no evidence in the 1989 NHIS cross-section of an effect of Medicare on coverage for health insurance that does not cover prescription drugs.

ambiguous. Perhaps most strikingly – given that the primary economic rationale for these public programs is to overcome adverse selection pressures in private insurance markets – these programs may in principle exacerbate or ameliorate the adverse selection pressures in the private insurance market for the residual risk. Yet the effect of partial public insurance programs on supplementary insurance markets has received little, if any, empirical attention.

This paper begins to address this void by examining the effects of Medicare coverage on the private insurance market for prescription drug coverage, a benefit not provided by the public program. I follow a panel of retirees in the HRS as they become covered by Medicare. By limiting the sample to retirees, I avoid confounding the effect of the public insurance program on the private market with possible changes in insurance coverage due to retirement. In order to control for any smooth effects of aging or the passage of time on the demand and supply of private insurance for prescription drugs, I compare changes in prescription drug coverage for retirees who become covered by Medicare to the effects between the interviews of the panel to changes for retirees slightly younger and older than those who would covered by Medicare over the two-year period between interviews.

The results indicate that Medicare is not associated with substantial changes in the private market for residual insurance coverage. In particular, I find no evidence for the hypothesis that Medicare is associated with increased adverse selection pressure in the residual private insurance market. Weaker tests also fail to find strong evidence for a role of consumer misinformation, fixed costs of insurance policies, or the moral hazard subsidy in affecting the interaction of Medicare coverage with the residual private insurance market. All of these results speak to the effect of Medicare on the extensive coverage margin. The data do not permit an analysis of the effect of Medicare on the amount of prescription drug coverage among the covered. However, any factors that would be likely to produce decreases in the demand or supply for the intensity of coverage would also be expected to affect the extensive margin; it is therefore unlikely that Medicare is associated with large, unmeasured changes in the amount of prescription drug coverage.

The lack of any increase in adverse selection in the private market for prescription drug coverage associated with Medicare coverage is somewhat surprising given the relative predictability of an individual's prescription drug expenditures compared to general medical expenditures.[31] It may be that increased adverse selection pressures in the residual private insurance market associated with Medicare coverage are offset by the reduced price of the insurance from the large moral hazard subsidy of the private insurance by the public program. This moral hazard subsidy may increase the willingness of low risk types to pool with high risk types, thus preventing the unraveling that might otherwise occur in the residual market. This suggests that the effects of other partial public insurance programs – such as defined benefit Social Security or public Disability Insurance programs – on adverse selection in residual private markets may be greater to the extent that the moral hazard subsidy is smaller. I regard this as a natural extension to investigate in future work.

More generally, in considering the applicability of the findings of the effect of Medicare to the impact of these other partial public insurance programs, three other factors warrant further investigation in future work. First, the effects of a partial public insurance program that begins coverage at age 65 may be different from one that provides coverage at any age. Second, the role of consumer misinformation and income effects in affecting residual private insurance markets depends on the group of affected individuals; the individuals studied here are all elderly, and the lowest-income and asset levels have been excluded to avoid confounding the effect of Medicare eligibility with changes in Medicaid eligibility at age 65. Finally, larger or smaller amounts of public coverage might be expected to have more or less of an impact on the private market.

[31] On the relative predictability of prescription drug expenditures compared to hospital or physician expenditures, see Ettner (1997) and Pauly and Zeng (2002). As Pauly and Zeng (2002) note, insurance for expenditures that are more predictable should be more subject to adverse selection both because individuals know more about their risk type and because the reduction in uncertainty about future expenditures reduces the consumer surplus from insurance.

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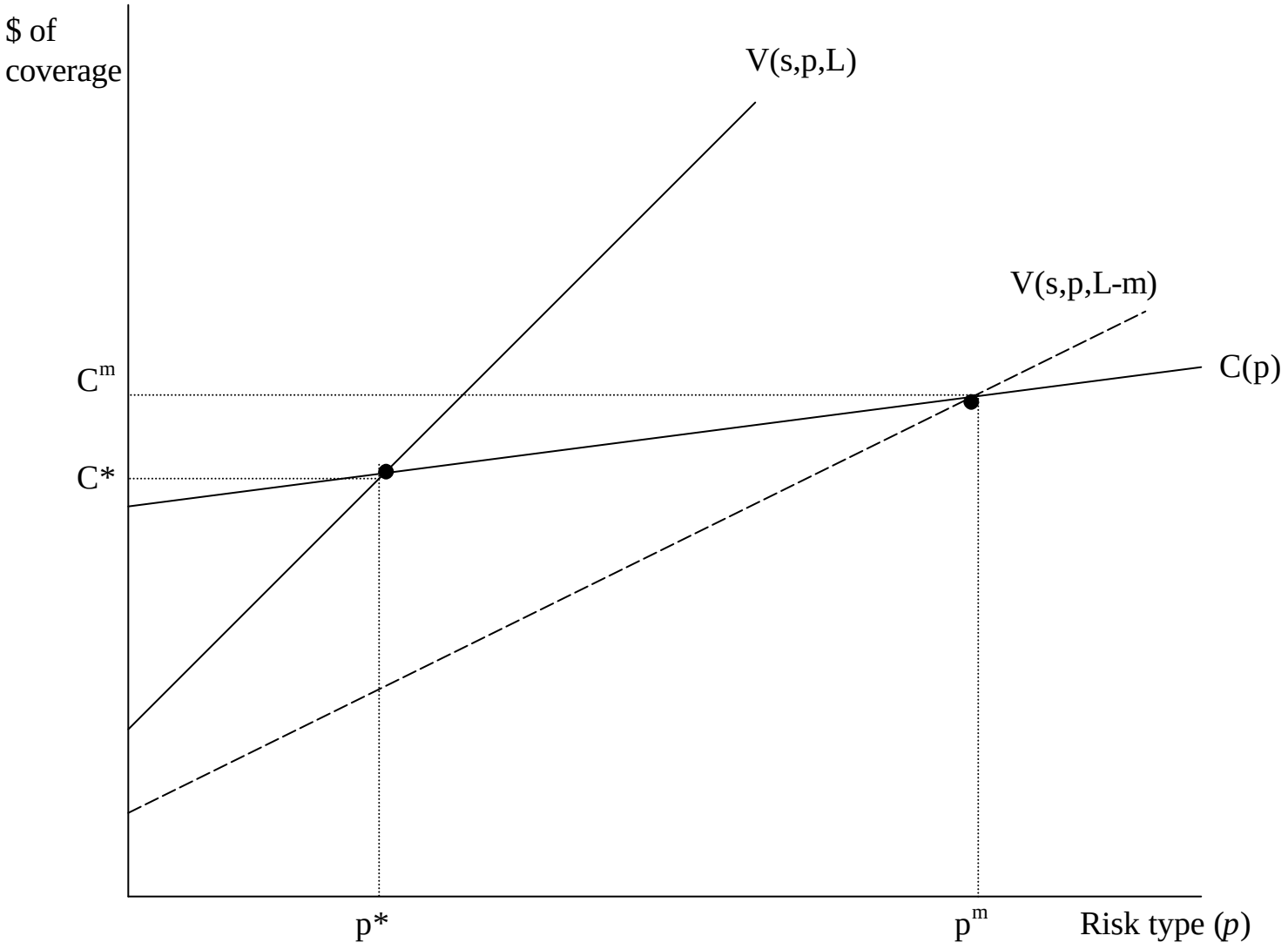

Figure 1: Partial Public Insurance Coverage Can Increase Private Market Adverse Selection

Table 1: Sample Statistics

	Younger Control Group: Retirees under Age 65 in both interviews	Treatment Group: Retirees who turn 65 between Interviews	Older Control Group: Retirees Aged 65 and Older in Both Interviews
Average Age, First Wave	61.3	63.5	65.9
Percent from 1996-1998 Surveys	0.51	0.53	0.32
Percent Male	0.51	0.49	0.56
Percent White	0.91	0.90	0.90
Median Household Income in First Wave ($)	37,573	33,512	32,568
Educational Attainment in First Wave			
Less Than High School	0.20	0.22	0.24
High School Grad	0.38	0.40	0.34
Some College	0.17	0.19	0.19
College Grad +	0.25	0.19	0.23
Self-Reported Health in First Wave			
Fair or Poor	0.15	0.18	0.21
Good	0.31	0.31	0.34
Very Good or Excellent	0.54	0.50	0.44
N (in differences)	860	841	1,278

All means are weighted.

Table 2: Effect of Medicare on Private Prescription Drug Coverage

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
Whole Sample, without covariates				
b_0	-0.030**	**0.021**	0.007	-0.008
	(0.014)	**(0.020)**	(0.012)	(0.009)
$\Delta MEDICARE$				**0.028**
	------	------	-------	**(0.024)**
Mean Dep Var (Wave 1)	0.785	0.696	0.694	0.720
N (in differences)	854	825	1,245	2,924
Whole sample, with covariates				
b_0	-0.031**	**0.019**	0.007	-0.008
	(0.014)	**(0.020)**	(0.012)	(0.009)
$\Delta MEDICARE$				**0.027**
	------	------	-------	**(0.024)**
Mean Dep Var (Wave 1)	0.785	0.695	0.693	0.719
N (in differences)	850	820	1,241	2,911

Notes: The first three columns present the results of estimating Equation (1). The fourth column presents the results from estimating Equation (2). The dependent variable is changes in private insurance coverage for prescription drugs. Estimation is by OLS. Standard errors are adjusted for heteroscedasticity and for correlation within the error term across observations (in differences) for the same individual. ***, **, * denote significance at the 1 percent, 5 percent, and 10 percent levels respectively.

Table 3: Effect of Medicare on Private Prescription Drug Coverage, By Self Reported Health Status

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
Health = Fair or Poor				
b_0	-0.057 (0.039)	**0.120***** **(0.048)**	-0.016 (0.025)	-0.025 (0.021)
$\Delta MEDICARE$	------	------	-------	**0.140***** **(0.054)**
Mean Dep Var (Wave 1)	0.705	0.542	0.700	0.658
N (in differences)	141	160	267	568
Health = Good				
b_0	-0.037 (0.024)	**-0.005** **(0.036)**	0.003 (0.022)	-0.011 (0.016)
$\Delta MEDICARE$	------	------	-------	**0.004** **(0.041)**
Mean Dep Var (Wave 1)	0.776	0.730	0.677	0.718
N (in differences)	274	270	420	974
Health = Very Good or Excellent				
b_0	-0.026 (0.020)	**0.0004** **(0.028)**	0.019 (0.017)	-0.00006 (0.013)
$\Delta MEDICARE$	------	------	-------	**-0.0001** **(0.033)**
Mean Dep Var (Wave 1)	0.812	0.729	0.702	0.744
N (in differences)	435	390	543	1368

Notes: See notes to Table 2. Health status is defined based on self-reported health status in first interview. All results include controls for covariates.

Table 4: Effect of Medicare on Priv. Prescrip. Drug Coverage, By Number of Chronic Conditions

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
3 or more chronic conditions				
b_0	-0.086***	**-0.0005**	-0.017	-0.037*
	(0.032)	**(0.052)**	(0.026)	(0.021)
$\Delta MEDICARE$				**0.039**
	------	------	-------	**(0.058)**
Mean Dep Var (Wave 1)	0.844	0.690	0.699	0.728
N (in differences)	127	152	277	556
2 chronic conditions				
b_0	-0.066***	**-0.021**	0.073***	0.022
	(0.024)	**(0.038)**	(0.021)	(0.016)
$\Delta MEDICARE$				**-0.044**
	------	------	-------	**(0.045)**
Mean Dep Var (Wave 1)	0.808	0.732	0.647	0.713
N	237	227	374	838
1 chronic condition				
b_0	-0.028	**0.045**	-0.035	-0.032**
	(0.024)	**(0.032)**	(0.021)	(0.016)
$\Delta MEDICARE$				**0.078****
	------	------	-------	**(0.037)**
Mean Dep Var (Wave 1)	0.762	0.676	0.729	0.722
N	282	297	393	972
No chronic conditions				
b_0	0.035	**0.056**	0.009	0.022
	(0.034)	**(0.049)**	(0.027)	(0.022)
$\Delta MEDICARE$				**0.031**
	------	------	-------	**(0.055)**
Mean Dep Var (Wave 1)	0.749	0.685	0.688	0.710
N	199	141	189	529

Notes: See notes to Table 2. The number of chronic conditions is based on the number reported in the first interview. Individuals are asked about seven chronic conditions: high blood pressure or hypertension, diabetes or high blood sugar, cancer, chronic lung disease (such as chronic bronchitis or emphysema), heart problems (such as heart attack, coronary heart disease, angina or congestive heart failure), stroke, or arthritis or rheumatism. All results control for covariates.

Table 5: Effects of Medicare on Prescription Drug Coverage: Evidence of Misinformation

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
EDUCATIONAL ATTAINMENT				
Less than High School				
b_0	-0.028	**0.050**	0.014	-0.001
	(0.032)	**(0.043)**	(0.024)	(0.019)
$\Delta MEDICARE$				**0.049**
	------	-------	-------	**(0.049)**
Mean Dep Var (Wave 1)	0.588	0.566	0.608	0.592
N (in differences)	179	188	310	677
High School Graduate				
b_0	-0.041*	**-0.010**	0.031	0.0007
	(0.023)	**(0.033)**	(0.022)	(0.016)
$\Delta MEDICARE$				**-0.006**
	------	------	-------	**(0.040)**
Mean Dep Var (Wave 1)	0.815	0.693	0.681	0.724
N (in differences)	323	321	417	1,061
Some College or More				
b_0	-0.023	**0.027**	-0.022	-0.023*
	(0.022)	**(0.033)**	(0.017)	(0.013)
$\Delta MEDICARE$				**0.049**
	------	------	-------	**(0.038)**
Mean Dep Var (Wave 1)	0.857	0.761	0.755	0.786
N (in differences)	345	304	494	1,143
REGULARLY USE PRESCRIPTION MEDICINE?				
Yes, regularly use prescription medicine				
b_0	-0.057***	**-0.010**	0.002	-0.020*
	(0.017)	**(0.023)**	(0.013)	(0.010)
$\Delta MEDICARE$				**0.011**
	------	------	-------	**(0.028)**
Mean Dep Var (Wave 1)	0.830	0.735	0.712	0.749
N (in differences)	579	571	921	2,071
No, do not regularly use prescription medicine				
b_0	0.021	**0.083****	0.020	0.022
	(0.026)	**(0.039)**	(0.026)	(0.018)
$\Delta MEDICARE$				**0.058**
	------	------	-------	**(0.046)**
Mean Dep Var (Wave 1)	0.694	0.607	0.639	0.647
N (in differences)	271	249	320	840

Notes: See notes to Table 2. All categories are defined based on status in first interview. All results control for covariates.

Table 6: Effect of Medicare on Private Insurance Coverage for Long-Term Care

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
Whole Sample				
b_0	-0.005 (0.013)	**-0.036**** **(0.015)**	-0.006 (0.009)	-0.006 (0.007)
$\Delta MEDICARE$	------	------	------	**0.041**** **(0.017)**
Mean Dep Var (Wave 1)	0.127	0.110	0.144	0.130
N (in differences)	816	798	1,230	2,844
Less than High School				
b_0	-0.015 (0.033)	**0.036** **(0.022)**	-0.024 (0.018)	-0.025 (0.016)
$\Delta MEDICARE$	------	------	------	**0.056*** **(0.030)**
Mean Dep Var (Wave 1)	0.087	0.044	0.091	0.077
N (in differences)	173	186	310	669
High School Graduate				
b_0	-0.023 (0.019)	**0.011** **(0.022)**	0.008 (0.015)	-0.005 (0.012)
$\Delta MEDICARE$	------	------	------	**0.018** **(0.027)**
Mean Dep Var (Wave 1)	0.130	0.103	0.102	0.111
N (in differences)	311	309	408	1,028
Some College or More				
b_0	0.015 (0.020)	**0.061**** **(0.026)**	-0.006 (0.015)	0.002 (0.012)
$\Delta MEDICARE$	------	------	------	**0.059*** **(0.031)**
Mean Dep Var (Wave 1)	0.146	0.151	0.209	0.176
N (in differences)	329	296	490	1,115

Notes: See notes to Table 2. The dependent variable is changes in private long-term care insurance coverage. Educational attainment is based on reports in the first interview. All regressions control for covariates.

Table 7: Effect of Medicare on Health Insurance That Does Not Cover Prescription Drugs

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
Whole Sample				
b_0	0.009	**0.006**	0.017	0.014*
	(0.013)	**(0.018)**	(0.010)	(0.008)
Δ*MEDICARE*				**-0.007**
	------	------	-------	**(0.021)**
Mean Dep Var (Wave 1)	0.109	0.154	0.180	0.152
N (in differences)	850	820	1,241	2,911
Health = Fair or Poor				
b_0	-0.002	**-0.074****	0.034	0.016
	(0.033)	**(0.035)**	(0.022)	(0.018)
Δ*MEDICARE*				**-0.090****
	------	------	-------	**(0.041)**
Mean Dep Var (Wave 1)	0.112	0.154	0.161	0.148
N	141	160	267	568
Health = Good				
b_0	0.025	**0.042**	0.020	0.022
	(0.022)	**(0.029)**	(0.019)	(0.014)
Δ*MEDICARE*				**0.020**
	------	------	-------	**(0.034)**
Mean Dep Var (Wave 1)	0.086	0.125	0.174	0.137
N	274	270	430	974
Health = Very Good or Excellent				
b_0	0.008	**0.011**	0.007	0.007
	(0.018)	**(0.026)**	(0.016)	(0.012)
Δ*MEDICARE*				**0.005**
	------	------	-------	**(0.031)**
Mean Dep Var (Wave 1)	0.120	0.172	0.193	0.164
N	435	390	543	1,368

See Notes to Table 3. The dependent variable is changes in coverage for health insurance that does not cover prescription drugs. All results control for covariates.

Table 8: SPECIFICATION CHECKS: Effect of Medicare on Private Prescription Drug Coverage

Sample	Original Result (No restrictions on sample)	Retirees who neither cover their spouse nor receive coverage from their spouse	Retirees whose spouses are either also retired or not in the labor force
	(1)	(2)	(3)
Whole Sample	0.027 (0.024) [N=2,911]	0.034 (0.029) [N=1,902]	0.033 (0.026) [N=2,401]
Health = Fair or Poor	0.140*** (0.054) [N=568]	0.152** (0.064) [N=390]	0.158*** (0.056) [N=469]
Health = Good	0.004 (0.041) [N=974]	0.039 (0.053) [N=625]	-0.009 (0.045) [N=825]
Health = Very Good or Excellent	-0.0001 (0.033) [N=1,368]	-0.015 (0.041) [N=886]	0.010 (0.036) [N=1,106]
3 or more chronic conditions	0.039 (0.058) [N=556]	0.017 (0.064) [N=359]	0.075 (0.061) [N=459]
2 chronic conditions	-0.044 (0.045) [N=838]	-0.024 (0.054) [N=555]	-0.063 (0.049) [N=686]
1 chronic condition	0.078** (0.037) [N=972]	0.067 (0.049) [N=622]	0.086 (0.039) [N=808]
No chronic conditions	0.031 (0.055) [N=529]	0.082 (0.067) [N=355]	0.038 (0.063) [N=437]

Notes: All cells report the coefficient on $\Delta MEDICARE$ from estimation of equation (2) on the sample described. All regressions control for covariates.

Figure 2: Changes in Sources of Insurance Coverage for Indivdiuals who Become Covered by Medicare Between Waves of the Panel

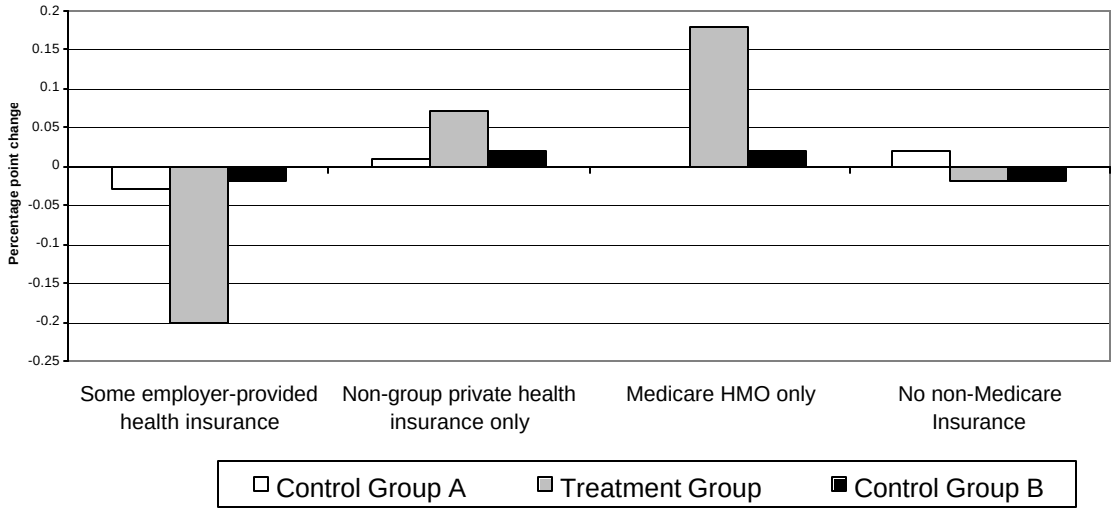

Table 9: Changes in Private Drug Coverage for retirees who stay within markets

	Younger Control Group: Retirees Under 65 in Both Interviews	**Treatment Group:** Retirees who turn 65 between Interviews	Older Control Group: Retirees 65 and Over in Both Interviews	**Difference-in-Differences Estimate**
Retirees who have employer-provided insurance in both interviews				
b_0	-0.030*	**0.020**	-0.007	-0.020*
	(0.016)	**(0.025)**	(0.016)	(0.011)
$\Delta MEDICARE$				**0.040**
	------	------	------	**(0.031)**
Mean Dep Var (Wave 1)	0.926	0.886	0.896	0.905
N (in differences)	582	371	507	1,460
Retirees who have employer-provided insurance in both interviews and do not also report a Medicare HMO				
b_0	-0.030*	**-0.020**	0.012	-0.014
	(0.016)	**(0.026)**	(0.018)	(0.012)
$\Delta MEDICARE$				**-0.006**
	------	------	------	**(0.031)**
Mean Dep Var (Wave 1)	0.926	0.907	0.884	
N (in differences)	582	308	389	1,279

Notes: See notes to Table 2.

Table 10: Effect of Medicare on Prescription Drug Coverage: 1989 National Health Interview Survey Data

	Without Covariates	With Covariates	Self-Reported Health Status			Limitations to Daily Activities			Educational Attainment		
			Fair or Poor	Good	Very Good or Excellent	Major	Minor	None	Less than High School	High School Graduate	Some college or more
Age	4.20	4.79	0.438	11.5	1.45	1.28	2.69	2.70	6.16	2.56	6.16
	(4.92)	(4.77)	(8.96)	(8.35)	(7.67)	(12.70)	(9.88)	(6.15)	(7.59)	(7.87)	(9.72)
Age Squared	-0.063	-0.073	0.007	-0.176	-0.022	-0.015	-0.044	-0.041	-0.093	-0.039	-0.095
	(0.076)	(0.074)	(0.138)	(0.129)	(0.119)	(0.197)	(0.152)	(0.095)	(0.117)	(0.121)	(0.150)
Age Cubed	0.0003	0.0004	-0.00004	0.0009	0.0001	0.00006	0.0002	0.0002	0.0005	0.0002	0.0005
	(0.0004)	(0.0004)	(0.0007)	(0.0007)	(0.0006)	(0.001)	(0.0008)	(0.0005)	(0.0006)	(0.0006)	(0.0008)
Age 65+	**-0.028**	**-0.036**	**-0.024**	**-0.010**	**-0.070**	**-0.047**	**-0.052**	**-0.037**	**-0.021**	**-0.093**	**0.030**
	(0.037)	**(0.036)**	**(0.068)**	**(0.065)**	**(0.056)**	**(0.086)**	**(0.078)**	**(0.046)**	**(0.057)**	**(0.059)**	**(0.074)**
N	5,784	5,699	1,574	1,863	2,262	1,065	1,274	3,415	2,193	2,224	1,282

Notes: Results report estimation of equation (3) using the 1989 NHIS cross-section. All regressions control for covariates. See text for further details.

Appendix A: Measuring prescription drug coverage in the HRS

Two issues arise in measuring prescription drug coverage in the HRS. First, the form of the survey questions suggests that the HRS will tend to systematically miss drug coverage from individuals who get this coverage through a Medicare HMO, especially if this Medicare HMO is not provided through an employer.

To elicit information on drug coverage, the HRS inquires about private prescription drug coverage for those who are covered by employer-provided health insurance (question R27), those who are covered by Medicare and have non-group private health insurance (question R46e), and those who are not covered by Medicare and are covered by non-group private health insurance (question R55f). However, individuals in a Medicare HMO (i.e. respond affirmatively to question R11), are not asked if they have prescription drug coverage through the Medicare HMO.

Data from the 1996 MCBS indicates that almost all (95%) of individuals in a Medicare HMO have drug coverage. Among those in the HRS who report having both a Medicare HMO and employer coverage, 91% report drug coverage. However, the survey will miss people who have Medicare HMOs that are not provided through an employer; this is about 13% of the sample that is over age 65. I adjust the HRS data to reflect this mis-measurement: I assign all individuals in a Medicare HMO drug coverage.

Second, information about drug coverage is available not only based on the self-reported answers to questions about drug coverage described above, but also based on information about covered expenses. For those who report regularly taking prescription medications, the HRS asks whether these costs are covered at all, partly, or not all by health insurance (question E21).

Since Medicare does not cover prescription drugs and individuals eligible for Medicaid are excluded from the sample, answers to question E21 present another way to measure whether individuals have private insurance that covers prescription drugs. In principle, utilization of both measures might be desirable. However, a measure based on reimbursements presents two difficulties. First, for individuals who do not report regularly using prescription drugs (about 30 percent of my sample), this measure yields no information on drug coverage. Since individuals who do and do not regularly use prescription drugs may differ in other ways, use of this measure could bias the measure of drug coverage. Second, this measure may underreport coverage for individuals who have prescription drug coverage but face a high deductible and therefore have not had any covered expenses in a given period. I therefore define drug coverage based on self-reported measures.

The definition of drug coverage used in the paper is therefore that individuals are coded as having prescription drug coverage if they either report coverage for prescription drugs or are in a Medicare HMO.

<u>Sensitivity of results to definition of prescription drug coverage</u>:

To ascertain whether the main results in the paper were sensitive to the precise definition of prescription drug coverage, I examined the sensitivity of the findings to several alternative definitions of prescription drug coverage:

- Individuals are defined as having drug coverage if they report drug coverage; they are coded as a 0.9 for drug coverage if they do not report drug coverage but are in a Medicare HMO
- Individuals are defined as having drug coverage if they report drug coverage or if they are in a Medicare HMO but do not also report having employer-provided health insurance coverage.
- Individuals are defined as having drug coverage if they either report having drug coverage, are in a Medicare HMO, or report some prescription drug expenses covered by insurance.

Table A1 reports the results for estimates of the effect of Medicare for the entire sample and for the sub-samples based on self-reported health status for these different definitions of drug coverage. The results are not sensitive to these alternative definitions.

Table A1: Effect of Medicare on Drug Coverage Using Alternative Definitions of Drug Coverage

	Definition used in paper: Report drug coverage or coverage by Medicare HMO	Report drug coverage or .9 if have Medicare HMO	Report drug coverage or, in a Medicare HMO and not also covered by employer	Definition used in paper, or report some prescription expenses covered by insurance
Whole Sample				
b_0	-0.008 (0.009)	-0.010 (0.009)	-0.012 (0.009)	0.007 (0.008)
$\Delta MEDICARE$	**0.027** **(0.024)**	**0.0005** **(0.023)**	**0.029** **(0.024)**	**0.027** **(0.022)**
Mean Dep Var (Wave 1)	0.719	0.708	0.717	0.804
N (in differences)	2,911	2,911	2,911	2,933
Health = Fair or Poor				
b_0	-0.025 (0.021)	-0.025 (0.020)	-0.019 (0.021)	0.003 (0.019)
$\Delta MEDICARE$	**0.140***** **(0.054)**	**0.115**** **(0.052)**	**0.134***** **(0.055)**	**0.097***** **(0.039)**
Mean Dep Var (Wave 1)	0.658	0.645	0.651	0.810
N (in differences)	568	568	568	575
Health = Good				
b_0	-0.011 (0.016)	-0.013 (0.016)	-0.021 (0.017)	0.008 (0.014)
$\Delta MEDICARE$	**0.004** **(0.041)**	**-0.018** **(0.040)**	**0.011** **(0.041)**	**-0.014** **(0.033)**
Mean Dep Var (Wave 1)	0.718	0.707	0.716	0.811
N (in differences)	974	974	974	985
Health = Very Good or Excellent				
b_0	-0.00006 (0.013)	-0.001 (0.013)	-0.004 (0.013)	0.007 (0.011)
$\Delta MEDICARE$	**-0.0001** **(0.033)**	**-0.029** **(0.033)**	**0.002** **(0.033)**	**0.028** **(0.030)**
Mean Dep Var (Wave 1)	0.744	0.732	0.743	0.797
N	1,368	1,368	1,368	1,372

Note: All estimates are based on Equation (2). Columns reflect different definitions of drug coverage. See Table 3 for more information.