

What if everybody had a choice? Using hypothetical choice experiments to analyze the demand for private health insurance

Iris Kesternich*

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Abstract

The introduction of Medicare Part D was the largest single expansion in social insurance in the US since 1965. A growing literature uses data on Part D enrollment and plan choices to study the design of public health insurance. However, these data are limited because only a third of all eligible consumers have made active decisions; the majority was enrolled in a Part D plan by default. In this paper, we analyze data from a hypothetical choice experiment conducted with a sample of the full eligible population and develop a joint model for consumers' revealed and stated choices. Estimation results show that the lessons drawn from Part D depend on whether only active deciders or the full eligible population are considered. In particular, active deciders exhibit a significantly lower willingness to pay for both basic and more extensive coverage. These results suggest that welfare estimates based on the active deciders only will underestimate welfare for the whole potential market.

Keywords: Medicare Part D, hypothetical choice experiments, health insurance

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* University of Munich, Department of Economics, Akademiestr. 1/III, D-80799 Munich. Phone: +49 89 2180 3232, fax: +49 89 2180 2767, e-mail: Iris.Kesternich@lrz.uni-muenchen.de

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1 Introduction

Medicare provides basic health insurance coverage for 43 million elderly and disabled U.S. residents. However, until 2006, prescription drug coverage was not provided by the program, and about a third of the relevant population was without such coverage (Neuman et al. (2007)). In 2006, Medicare Part D was introduced, a highly subsidized market for prescription drug coverage. Part D was the largest single expansion in social insurance in the US since 1965. Lessons from this reform will be crucial, because it is similar in several dimensions to the healthcare reform that has recently been passed in the United States.¹

The introduction of Medicare Part D has already produced a large body of research.² Most existing studies on individual behaviour have restricted their analysis to those consumers who had no prescription drug insurance before Part D. These “active deciders” make up about a third of the relevant population. The majority of consumers were affected by the introduction of Part D, but they did not have to make an active decision to enroll. For example the consumers who were eligible for both, Medicaid and Medicare, were automatically enrolled and randomly assigned to prescription drug plans. Prescription drug coverage through Medicare Advantage Plans or through the (former) employer was mainly converted into Part D coverage.³ We will call these consumers “passive participants” in contrast to the active deciders. The passive participants comprise those consumers who receive prescription drug coverage through their employers, the Veterans Administration, private insurance, Medicare Advantage Plans or Medicaid.

This paper adds a new dimension to the discussion of Medicare Part D by investigating the demand of *all* potential consumers in the relevant age range, not only that of active deciders. Our analysis uses data from a hypothetical choice experiment that was conducted using a random sample of the relevant population. Thus, the whole potential market is

¹First, health insurance will be subsidized, but obtaining health insurance coverage will remain an individual’s free choice. Second, the supply of health insurance will remain in the hand of private companies. Third, the old system, with employers offering coverage for their employees, the Veterans Administration offering coverage for those (formerly) in the military, and public insurance for the elderly, disabled and poor (Medicare for the elderly and disabled, Medicaid for the poor and Shift for children) will remain in place.

²See Duggan and Scott-Morton (2006) and the literature reviewed in section 2.

³More on different consumer groups and how they were affected by Part D in section 2.3

included in the analysis instead of restricting the focus to a small group of consumers. For the active deciders, we can observe their real (or revealed) choices in addition to their hypothetical ones.⁴ Thus, in a second step we can estimate a joint model based on consumers' revealed and stated preferences. We want to draw attention to the fact that hypothetical choice experiments yield conclusions on consumer behaviour beyond what can be learned from observing in the actual market in situations where actual demand is unobserved for a particular group of consumers.

Hypothetical choice experiments are a well-known tool from the fields of marketing and psychology, which in recent years has been used increasingly for demand estimation by economists. They are also frequently used by health economists to elicit consumer preferences regarding health care.⁵ In these experiments, individuals are asked to choose between different commodities whose attributes vary in order to infer the utility associated with these attributes and consumers' willingness-to-pay (WTP). In our data, respondents were asked to choose between insurance contracts that differ in their level of coverage. They were also given the option not to have prescription drug coverage at all. The insurance premiums for these contracts were randomly assigned to the respondents.

For our analysis we use the Retirement Perspectives Survey (RPS), a panel dataset unique in providing a random sample of elderly Americans (and thus covering all groups described above) and containing both respondents' actual decisions regarding Medicare Part D as well as a hypothetical choice experiment. We observe respondents' prescription drug coverage and use before the introduction of Part D in 2005, but also after the introduction in 2006.

We proceed as follows: First, we estimate WTP from respondents' stated choices using a multinomial logit model. In addition to providing data on the whole potential market, hypothetical choice experiments have the advantage of tracing out the demand curve, while coverage and prices observed in the real market will always be jointly determined by both

⁴Figure 1 illustrates the type of decisions that we can observe for the different consumer groups.

⁵For example Scanlon et al. (1997), Becker and Zweifel (2008), and Brau and Bruni (2008). For a literature review on applications of discrete choice experiments in health economics see Ryan and Gerard (2003), Belkar and Fiebig (2004) and Guttman et al. (2009). A detailed description of the design and implementation of hypothetical choice experiments and on related econometric methods can be found in Louviere et al. (2000).

demand and supply. WTP for basic Part D coverage is \$41.80 per month. Consumers WTP for additional coverage is \$24.77 for eliminating the deductible and \$27.75 for gap coverage.

Our results confirm the findings of earlier studies that adverse selection is present in this market. When we control for respondents' prescription drug use in the year before Part D was introduced, we find that WTP for basic Part D coverage of respondents with medium and high prescription drug use is about twice as high for respondents with no prescription drug use, while it is also significantly higher for more extensive coverage.

Hypothetical choice experiments can create variation in product attributes that cannot be observed in real markets. In order to analyze the impact of socio-economic conditions on insurance demand we need to consider sufficiently heterogeneous consumer groups. We find that willingness-to-pay for drug insurance is low for consumers with low income. On the other hand, consumers demand extensive coverage if they are currently in poor health, but also if they are more risk averse. In contrast, considering only the observed choices of the active deciders, neither health nor socio-economic indicators prove significant. A possible reason for this discrepancy is that the active deciders for whom we observe actual choices are too homogeneous.

Next, we distinguish between the active deciders and the passive participants. We show that the passive participants differ in several dimensions from the active deciders. For example, the active deciders take less prescription drugs before the introduction of Part D, and their prescription drug costs are also lower. Further, their income is lower. When we allow WTP to differ for the two consumer groups, we find that the active-deciders exhibit a significantly lower WTP than passive participants. WTP of the passive participants is about one third higher for basic insurance and even about 50 percent higher for more extensive coverage. These differences remain, even if we control for observed differences between active deciders and passive participants. Therefore, drawing inference from just this group of consumers might lead to misleading conclusions - for example, when analyzing the welfare effects of eliminating the coverage gap.

Last, we can address the most fundamental critique of hypothetical choice experiment - that what people say coincides not necessary with what they do. We can base consumers' hypothetical choices in reality by estimating a joint model from consumers' real and hypo-

thetical choices. In order to combine the two data sources, we have to allow the variance of the unobserved factors to differ between stated and revealed choices.⁶ Our joint model predicts a WTP of \$35.39 for basic coverage, \$16.45 for a zero-deductible and \$20.55 for gap coverage.

The paper is organized as follows: Section 2 describes Medicare Part D, prior research on the active deciders, the institutional setting, the types of insurance plans offered, and consumer groups. Section 3 provides a description of our data and some descriptives. Section 4 contains our econometric results. Section 5 concludes.

2 Medicare Part D

2.1 The market

Since its introduction in 1965, Medicare provides health insurance for elderly and disabled Americans. In 2008, enrollment was at about 45 million.⁷ Individuals are eligible for Medicare if they are U.S. citizens or long-term legal residents of at least 65 years of age and if either they or their spouses have paid Medicare taxes for at least ten years.⁸

Before the introduction of Medicare Part D in 2006, only pharmaceutical treatments administered in a physician's office, in a hospital or other institution were covered by the program. This was a major drawback of Medicare because only some Medicare beneficiaries had prescription drug coverage from some other source, while about 30 percent of Medicare beneficiaries had little or no prescription drug coverage (Neuman et al. (2007)). This had serious negative consequences: First, medical expenditures placed a major financial burden on the elderly.⁹ Second, cost-related non-adherence, i.e. the discontinuation of medication

⁶Compare chapter 2 of Louviere et al. (2000) or chapter 7 of Train (2003) on combining real and hypothetical choice data.

⁷There are several websites which provide information on Medicare: www.cms.hhs.gov, www.medicare.gov and www.statehealthfacts.org.

⁸Further, disabled U.S. citizens or those with end stage renal disease are eligible for the program. However, we concentrate on the elderly beneficiaries here who form the vast majority of over 90 percent of beneficiaries.

⁹According to data from the Medical Expenditure Panel Survey, per-person expenditures among Medicare recipients for prescription drugs were equal to \$1789 in 2003, with more than half of this paid out-of-pocket and just about 8 percent paid for by the Medicare program (Duggan and Scott-

because it is too expensive, was a big concern before the introduction of Part D (Madden et al. (2008)).

Consequently, the aims of Medicare Part D were to make drug insurance coverage affordable for the elderly with low incomes, to provide protection against catastrophic drug costs and to reduce cost-related non-adherence.¹⁰

The key feature of Part D is that the market is administered by the government, but private companies offer their products to consumers choose contracts and carriers. Under Part D, consumers can choose between a standardized basic coverage that is subsidized by the government or contracts that offer more extensive coverage at additional cost. The market is designed to achieve efficient allocation of health care resources by confronting consumers with the full marginal cost of the services they use. Thus, Part D gives important insights into the practicality of Consumer Directed Health Care (CDHC). Further, as with the introduction of Medicare Part D, both contracts and prices available to consumers changed, Medicare Part D can act as a natural experiment of consumer behaviour in real-world decision situations that are characterized by complexity, ambiguity and important consequences.

Under Medicare Part D, the plans insurers can offer are standardized. The standard drug benefit, as defined by the Medicare Prescription Drug Improvement and Modernization Act of 2003, is characterized by four main features:¹¹

1. A \$250 (annual) **deductible** below which the insured have to pay for all costs themselves.
2. An interval of drug spending between \$250 and \$2,250 where the plan covers 75 percent of drug costs.

Morton (2006)). In 2005, about 10 percent of Medicare beneficiaries had catastrophic drug bills of more than \$5600, while the median income in this population was only \$15,700 (McFadden et al. (2008)).

¹⁰There exists a subsidy that recipients whose incomes were at or below 135 percent of the poverty line can apply for (the so-called LIS). Estimations for 2008 show that 12.5 million Medicare beneficiaries are eligible for LIS, with 9.4 million actually receiving it. Certain groups of Medicare recipients are automatically enrolled in the subsidy, for example those on Medicaid (The Henry J. Kaiser Family Foundation (2008)).

¹¹Features of the plan have changed slightly over time. These are the features of the plan in 2006, when our first hypothetical choice experiment was conducted.

3. A **coverage gap** between \$2,250 and \$5,100 where the insured has to bear the full costs.
4. A **catastrophic threshold** of \$5,100 above which the insurance covers 95 percent of all costs.

Companies can either offer the standard plans, or plans that offer more extensive coverage, either by having no deductible or by providing coverage in the coverage gap.

2.2 Prior research on the active deciders

Research on the active deciders has drawn the following lessons about the demand for prescription drug insurance from Medicare Part D:

Abaluck and Gruber (2006) find that elders' decisions depart from optimization under full information: They find that actual premiums are the main driver of consumers' choices, and that too little weight is placed on expected out-of-pocket costs. Further, financial characteristics of a plan (for example, providing gap coverage or no deductible) are valued beyond any impacts on their own financial expenses or risk. They use a dataset of prescription drug claims matched to information on the characteristics of the choice set. The limitation of their data is that they consider only consumers with Part D stand-alone coverage and therefore no consumers who have not reported a claim. In our dataset, about 88 percent of the total population have coverage other than standalone coverage, and about 12.5 percent of the eligible population report no prescription drug claims.

Abaluck and Gruber (2006) estimate a (monthly) WTP of \$25 for full donut hole coverage, \$4.17 for generic donut hole coverage and \$6.67 for going from a deductible of \$250 to a deductible of zero.

Heiss et al. (2006) and Winter et al. (2006) find that, by and large, Medicare Part D has been a success in providing a large percentage of the Medicare eligible population with prescription drug coverage. Enrollment rates were above 90 percent in the first year of Medicare Part D. Those who remained without coverage in 2006 belong to two very different consumer groups: Those in relatively good health and those potentially difficult to reach. Furthermore, the complexity of the market with its many providers and many

different products may have resulted in suboptimal choices, especially among the most vulnerable - those with low income, low educational attainment, poor health or some cognitive impairment. While most consumers have made rational decisions regarding the question whether they should enrol at all, they had some problems in deciding which plan was optimal for them. These findings are based on the Retirement perspectives survey, but take into account the decisions of the active deciders only.

Kling et al. (2009) test whether individuals make rational decisions regarding Part D - an environment with complex choices. They can reject the null hypothesis of choice stability and thus accurately perceived prices. Consumers who are provided with personalized information on how different drug plans affect their out-of-pocket costs make different decisions to consumers who are not provided with such information. The authors conclude that consumers had misperceived the influence of drug costs on prices before the intervention. Their results are based on a group of patients from a particular hospital. This raises the questions in how far their results are generalizable.

Frakt and Pizer (2009) and Lucarelli et al. (2008) use aggregate data for demand estimation using the approach of Berry(1994). Both papers use the prescription drug plan finder to generate a dataset with region-plan pairs of stand-alone Part D plans. Frakt and Pizer (2009) estimate a premium elasticity of demand for the active deciders of (-1.45). Lucarelli et al. (2008) estimate that (monthly) WTP for eliminating the deductible is \$3.83, while WTP for obtaining gap coverage of branded drugs is \$36.92.

Although research on Medicare Part D has already drawn many important conclusions, when analyzing consumer welfare or predicting policy changes, for example the abolition of the coverage gap, it is crucial to make predictions that are valid for the whole population. Therefore, in the following, we describe the features of the supplied plans and the groups of consumers which will be important for the following analysis.

2.3 Groups of consumers

Medicare recipients can belong to different groups regarding their prescription drug coverage: Stand-alone plans, Medicare Advantage plans or private insurance, coverage through

the employer or the Veterans Administration, or coverage through Medicaid. These groups will be described in the following.

Those individuals who had no prescription drug coverage before the introduction of Medicare Part D had to make an active choice to enroll in Medicare Part D - remaining inactive meant choosing to remain uncovered. They could either enroll in Medicare Part D stand-alone plans which cover prescription drugs only, or in Medicare Advantage plans (called Medicare + Choice before) where prescription drug coverage is provided as part of overall health care through HMOs.

Some of these plans had covered prescription drugs already before the introduction of Medicare Part D. With the introduction of Medicare Part D, Medicare Advantage plans were almost forced to offer prescription drug coverage because their enrollees could not take up Medicare Part D without losing their benefits from outpatient and inpatient care (Levy and Weir (ming)). Further, these plans are subsidized more heavily in order to encourage Medicare recipients to seek more extensive coverage (Duggan et al. (2008)).

Thus, Medicare Advantage plan beneficiaries may belong to either of two groups: They may have had prescription drug coverage before, and this coverage was simply converted into Part D coverage, or they may have chosen prescription drug coverage only with the introduction of Part D. In 2006, about 10.4 million of Medicare recipients enrolled in Part D chose stand-alone coverage, while about 6 million received coverage through Medicare Advantage plans, including 1.2 million new enrollees. About half a million of those enrolled in Medicare Advantage plans are recipients of Medicaid (U.S. Department of Health and Human Services (2006)).

The situation is similar for individuals that had private insurance for their prescription drugs before the introduction of Medicare Part D. A special situation holds for Medigap (or Medicare supplemental) health insurances. These are private supplemental health insurance plans that cover medical expenses that are not, or partially not, covered by Medicare. Since 2006, these plans cannot offer prescription drug coverage to new enrollees.

In order not to crowd out prescription drug coverage offered by employers, there are tax-free subsidies to those employers who provide description drug plans that are actu-

arily equivalent to Medicare Part D.¹² In January 2007, there were 6.9 million Medicare recipients whose coverage was subsidized in this way (Duggan and Scott-Morton (2010)). Alternatively, employers could decide to wrap around Medicare drug coverage. Individuals enrolled in these types of plans are counted under Medicare Advantage plans.

Those employees who had prescription drug coverage before the introduction of Medicare Part D simply received a letter from their employer that informed them that their prescription drug coverage was creditable when Medicare Part D was introduced.

Veterans already had prescription drug coverage before the introduction of Medicare Part D. As this is considered creditable coverage, there is no need for Veterans to sign up for Medicare Part D, however, they can do so if they want.¹³ In 2006, about 2 million Medicare beneficiaries received their prescription drug coverage through the Veterans Administration, and about one million Veterans were enrolled in a Part D plan (U.S. Department of Health and Human Services (2006)).

Medicare recipients who are also eligible for Medicaid were automatically enrolled in a prescription drug plan with some option to switch plans afterwards. Medicaid recipients do not pay any premium if they choose a plan with average or below average costs. They further have no deductibles, no coverage gaps, and lower copays (Duggan and Scott-Morton (2010)). In 2006, about 6.1 million Medicare and Medicaid recipients were automatically enrolled in prescription drug plans. Additionally, about half a million Medicare and Medicaid recipients receive prescription drug coverage through Medicare Advantage plans (U.S. Department of Health and Human Services (2006)).

¹²Companies receive 28 percent of covered charges between the deductible and an upper limit of \$5,600 for each Medicare-eligible participant.

¹³In fact, this may be beneficial for some low-income Veterans who are eligible for the Medicare Part D low income subsidy (Rupper et al. (2007)).

3 The data and the discrete choice experiment

3.1 Data

The Retirement Perspectives Survey (RPS) was conducted by Daniel McFadden, Joachim Winter and Florian Heiss in 2005, 2006, 2007 and 2009 in order to elicit information on enrollment decisions, knowledge, and opinions regarding Medicare Part D. The RPS is representative of the US non-institutionalized population in the relevant age group in terms of demographics and socio-economic status. It is based on a panel of individuals maintained by Knowledge Networks, a commercial survey firm. It also collects information on prescription drug use, health conditions, socio-economic status, and household demographic composition.

Heiss et al. (2009a) provides a detailed description of response behaviour, selection issues and the application of sampling weights. Table 1 and Table 2 are taken from Heiss et al. (2009b). Table 1 shows how the sample of respondents and the response rates developed over time. For our analysis, we are only interested in those individuals eligible for Medicare, therefore we restrict the sample to respondents aged 65 and older in 2006. Table 2 shows how the RPS compares to the 2004 Health and Retirement Survey (HRS) in terms of socio-economic characteristics and insurance status. The RPS seems to reasonably mirror the HRS, even more in the weighted samples.

Definitions and descriptive statistics of the variables used can be found in Table 3. Most variables correspond to a question of the survey with the exception of expected drug costs which was created by Winter et al. (2006), based on respondents' prescription drug use and the price they would have paid for them over the counter. The idea is to elicit the expected drug bill for each individual in the case of no insurance.

In 2006, the RPS sample in the relevant age group (aged 65+) consisted of 1,666 respondents. 97 of them had to be excluded from the analysis, because they did not answer the questions on prescription drug insurance coverage.

Table 4 illustrates the differences in means between the active deciders and the passive participants for the variables we will use in our regression analysis. Active deciders are

significantly more often low-income earners. They have significantly less often obtained higher education than high school and they are significantly more often white. In contrast, their SRHS is less often poor or fair. There are no significant differences in mean prescription drug use between active deciders and passive participants, however.

3.2 The RPS hypothetical choice experiment

In the RPS 2006 and 2009, a hypothetical choice experiment was conducted in order to elicit the preferences for prescription drug coverage of all consumers, not just the active deciders.

As the RPS focuses on questions on Medicare Part D and as all respondents in the RPS 2006 have already answered the questionnaire in 2005, we expect respondents to be familiar with questions on insurance and Medicare Part D when taking part in the hypothetical choice experiment.

Consumers were provided with a short introduction, in order to place our hypothetical choice experiment in the context of Part D (telling them for example that the same late enrollment premiums would apply in the experiment as under the Part D regulation). One part of the introduction for the experiment differed depending on which group of consumers was interviewed. The exact wording of the experiment can be found in the appendix of this paper. All respondents were told that they should consider plan choice starting from a situation with no prescription drug coverage at all.

The respondents were given a choice between four alternatives with randomly varying premiums: First, no prescription drug coverage. Second, the basic plan which corresponds exactly to Part D basic coverage. Third, an enhanced plan which is just like the basic plan, but without deductible and fourth, a premier plan which offers gap coverage in addition to having no deductible.

Each respondent was presented with three different hypothetical choice tasks. In the first round, everybody was presented with the same hypothetical prices, and in the second and third round, prices were randomly assigned to the respondents. The upper panel of Table 5 shows the premiums that were assigned to the different types of plans in our

hypothetical choice experiment, and therefore our hypothetical supply prices. For the first choice, premiums were the same for all respondents. These premiums closely resemble the premiums for all plans available in the market as constructed from Heiss et al. (2009a) with the CMS plan finder. Note that the premiums for the plans actually chosen by the active deciders in the RPS, and therefore the prices in market equilibrium, are much lower than supply prices, at least for basic and enhanced coverage. For the second and third choice, premiums were randomly assigned.

4 Econometric results

4.1 Multinomial logit model

Let the (indirect) utility that consumer i obtains from the insurance contract j be

$$U_{ij} = V(a_j, p_j, y_i, s_i, g_i) + e_{ij} \quad (1)$$

where a_j are the attributes of the insurance contract; p_j is the contract's premium; y_i is the income of the insured; s_i are socio-economic conditions; and g_i is a dummy for whether the consumer has been a passive participant ($g_i = 1$) or an active decider ($g_i = 0$). e_{ij} is the error term that contains the impact of all unobservable factors.

The attributes of the insurance contracts are (compare also table 3):

- **Insurance:** The contract provides prescription drug coverage with copayments, the deductible and the coverage gap equal to the Part D standard benefit.
- **No deductible:** The contract does not have the \$250 deductible of the Part D benefit.
- **Gap coverage:** The contract additionally provides coverage in the coverage gap.
- **Premium:** Monthly premium in \$.

We assume that the decision maker will choose the alternative with the highest utility U_{ij} . We estimate a Multinomial Logit Model (MNL)(e.g. McFadden (1976)). In this model,

the e_{ij} are assumed to be random variables are distributed i.i.d. extreme value type I with density function

$$f(e_{ij}) = \exp(-e_{ij}) * \exp(-\exp(-e_{ij})). \quad (2)$$

Our main interest lies in estimating consumers' willingness to pay (WTP) for drug insurance with different levels of coverage. WTP is defined as the amount of premium increase that exactly offsets the increase of an attribute by one unit (or in the discrete case, the amount of premium that exactly offsets being provided with the discrete attribute versus not being provided with it), so that total utility remains unaffected:

$$WTP = -(\beta_{attribute}/\beta_{premium}). \quad (3)$$

We will proceed with our analysis as follows: We will first analyze the hypothetical choices from a random sample of the whole potential market. Next, we will analyze the real choices of the active deciders. Finally, we will estimate a joint model combining both real and hypothetical choices.

4.2 Stated choices

First, we use a hypothetical choice experiment in order to analyze demand of both active deciders and passive participants. Table 6 shows the MNL estimates of consumers' hypothetical choices. Each consumer is asked to answer three hypothetical choice experiments with varying prices. We use standard errors clustered by the individual.

To make our results from different regressions more comparable, table 9 contains the estimates of consumers WTP for selected equations. Our basic regression (1) shows that WTP estimated from the hypothetical choice experiments is \$41.80 for basic, \$66.57 for enhanced (no deductible) and \$94.32 for premium coverage (no deductible and gap coverage).

To investigate whether adverse selection is present in the market we analyze whether WTP depends on expected drug costs in the year before Part D was introduced (regression (2)). No drug costs is the reference category. In fact, we find that WTP differs substantially

by prescription drug costs. WTP for basic Part D coverage is about 30 percent higher for respondents with high and medium prescription drug use than for respondents with no prescription drug use. Thus, adverse selection does seem to play a substantial role in this market.

In regression (3) we additionally take into account the effect of socio-economic conditions. We show that WTP for basic insurance coverage is low for consumers with low income. This provides a rationale for additional subsidies for low-income earners as it exists with LIS in the Part D market. By contrast, consumers demand extensive coverage if their SRHS is poor or fair, but also if they are more risk averse. The former is again a sign of adverse selection.

Next, we distinguish between the active deciders and the passive participants (regressions (4) and (5)). We find that the active-deciders exhibit a significantly lower WTP than passive participants. WTP of the passive participants is about one third higher for basic insurance and even about 50 percent higher for more extensive coverage. Therefore, welfare estimates of the introduction of Medicare Part D based on the active deciders only will significantly underestimate welfare for the whole potential market.

One feature of the MNL is the Independence of Irrelevant Alternatives (IIA) property (Luce (1959)). In the logit model, the choice between two alternatives j and k is *independent of irrelevant alternatives* in the sense that the ratio of the probability of chosen alternative j to the probability of choosing alternative k is independent of all other alternatives and their attributes.

The test of the IIA property we will use in this paper is based on the test developed in Hausman and McFadden (1984).¹⁴ We cannot perform the standard Hausman/ McFadden IIA test, because the assumption that the MNL estimator is efficient under the null hypothesis is violated with clustered standard errors. We instead implement Stata's seem-

¹⁴The idea is to estimate the model twice: Once with the full set of alternatives, and once with a subset of alternatives (where IIA is assumed to hold). The parameter estimates of the full sample are consistent and efficient under the null hypothesis that IIA holds, but inconsistent if it fails. The parameter estimates from the restricted sample are consistent, but inefficient under IIA, and consistent even if IIA fails. Therefore, a standard Hausman specification test can be used. If the variance-weighted difference of the two estimates is too large compared with the critical values of a χ^2 distribution, then the null hypothesis of IIA is rejected.

ingly unrelated estimation (suest) version of the Hausman test (StataCorp (2007)). We assume that it is most likely that the IIA assumption will be violated for the no coverage alternative. The p-value for the rejection of the IIA assumption is at 8.3 percent, so we cannot reject IIA at either the 1 or 5 percent level, but at the 10 percent level, we can. Thus, for a first analysis, we stick with the MNL model and the IIA assumption.

4.3 Revealed choices

Table 7 shows the MNL estimates of the real market decisions of the active deciders. WTP estimated from the decisions of the active deciders is insignificant for prescription drug insurance per se (compare table 9). Consumers are willing to pay \$5,19 for coverage without deductible and an additional \$8.30 for gap coverage.

These estimates seem unreasonably low. This might be due to four reasons: First, in this regression we do not trace out the demand curve, but we observe market equilibria which are also determined by supply. Insignificant WTP for certain product attributes might be due to the fact that there is a high correlation between attributes and prices. Second, 101 of our 469 active deciders are consumers who decide to remain without prescription drug coverage. For this group, WTP should be indeed below the lowest observed supply price. Third, WTP for insurance, whether basic or more extensive, is either negative or insignificant for consumers who expect not to need any prescription drugs and therefore have zero expected costs. Only consumers with high drug costs exhibit significant and positive WTP. Fourth, we observe more product attributes in the real market than in the hypothetical market. For example, gap coverage it is either provided for generics only or for both generics and brand-name drugs (see regression (3)). In fact, WTP for gap coverage for generics only is not significant, while it is \$25.78 if both generics and brand-name drugs are covered. Further, consumers' WTP is lower for plans with drug tiers and higher for plans with a mail-order option, and WTP decreases for each top 100 drug that is either uncovered or only covered after authorization (See regression (4)).

4.4 Joint model of stated and revealed choices

Combining stated and revealed preference models allows us first, to make use of the whole potential market, second, to create variation in attributes through the hypothetical choice experiments and third, to base respondents' decisions in reality by using the real choices of the active deciders. There are some methodological issues concerning stated and revealed preference models in the context of logit models (see Train (2003), chapter 7, and Louviere et al. (2000), chapter 8).

Estimating discrete choice models requires some type of normalization because utility is a cardinal variable. In the case of the logit model, the variance is normalized to $\pi^2/6$. Thus, the estimated β s are estimates of the “real” β s, divided by λ which is defined by the (unknown) variance σ^2 of the unobserved factors:

$$\sigma^2 = \frac{\lambda^2 \pi^2}{6}. \quad (4)$$

In other words, the “true” β s cannot be identified separately from σ^2 , and when we compare the coefficients from two data sources, we will never know whether differences result from differences in the true parameters or the variance of unobserved factors.

While the coefficients in respondents' utility functions should be the same in both types of data, unobserved factors will differ in stated and revealed preference situations. We would expect that the real choices of respondents are affected by many more unobserved factors than their stated choices.¹⁵

Therefore, when estimating a joint model of the stated and revealed preferences, we want to allow for different scale factors λ^{SP} and λ^{RP} (Morikawa (1989) and Louviere et al. (2000)), assuming that the true utility parameters are the same for the two data sets. As the scale factors are unobserved and can never be identified within one source of data, it is the convention to normalize λ^{RP} to unity such that λ^{SP} represents the stated preference

¹⁵For the real choices, these might include unobserved attributes of both the alternatives or the decision maker and measurement error, while for the stated choices, there might be unobserved attributes of the decision maker, factors that are specific to the experimental design and variables that are relevant for the choice situation, but that have not been included in the experiment (Bhat and Castelar (2002)).

relative to the revealed preference scale factor.

One possibility to jointly estimate both the model parameters and the (relative) scale factor is using a nested logit model (Bradley and Daly (1992), Hensher and Bradley (1993) and Louviere et al. (2000)). The nested logit model generalizes the MNL by relaxing the IIA assumption. In particular, alternatives are grouped into subsets or nests, and the variances of the error terms (and therefore the scale factors) are allowed to vary across nests. Therefore, artificially creating two nests for each decision makes, one that contains the alternatives from the stated and one that contains the alternatives from the revealed preferences, allows estimating both the β s and the relative scale parameters.

We restrict the scale parameter of the real choices to be one. Stata does not report the scale parameter itself, but the dissimilarity parameter $\tau = 1/\lambda$. First, note that the estimate of the hypothetical relative to the real dissimilarity parameter is equal to 0.72. As we can reject the hypothesis that it is equal to unity (unity lies outside of the confidence interval), we can reject that the scale parameters and therefore the unobserved variances in our real and hypothetical choices are equal.

$$\frac{1/\lambda_{SP}}{1/\lambda_{RP}} = \lambda_{RP}/\lambda_{SP} = 0.72, \quad (5)$$

and

$$\frac{\sigma_{SP}^2}{\sigma_{RP}^2} = \left[\frac{1/\lambda_{SP}}{1/\lambda_{RP}} \right]^2 = 0.72^2 \approx 0.52. \quad (6)$$

Therefore, the variance of the hypothetical data is about 52 percent of the variance of the real preference data.

Estimated WTP from the combined choices is at \$35.39 for the Part D standard plan, \$51.84 for enhanced and \$72.39 for premium coverage.

Combining real and stated preference data can help researchers to make more reasonable prediction on how consumer welfare has been affected by a policy change. Further, we can include consumer groups in our analysis whose actual choices cannot be observed, but who have still been affected by the reform. This is especially important when we want to take into account the effect of socio-economic characteristics on demand, because taking the

whole market into consideration, we observe much more variation in these characteristics. Both makes our results more generalizable in order to predict the effect of policy changes in other markets.

5 Conclusion

This paper has contributed to the discussion about Medicare Part D by using a hypothetical choice experiment. Thus, the whole potential market has been included in the analysis by contrast to previous papers which restricted the focus to a small group of consumers whose actual choices we can observe, the so-called active deciders.

As we observe actual choices for one group of consumers, we have estimated a joint model using both real and hypothetical choices, thereby making use of the strengths and mitigating the weaknesses of both type of data. The estimates of WTP of the joint model seem to be most realistic regarding the prices we actually observe in the market.

We have found that willingness-to-pay for drug insurance is low for consumers with either low expected drug costs or low income. By contrast, consumers demand extensive coverage if they are currently in poor health, expect high future drug costs, but also if they are risk averse. With the exception of drug costs, none of these variables prove significant when using the actual decisions of the active deciders only, because this group is too homogeneous in their characteristics.

Further, demand for prescription drugs differs significantly between the active deciders and other consumer groups who have also been affected by the reform. WTP of the passive participants is significantly higher than those of the active deciders. Therefore, welfare estimates of the introduction of Medicare Part D taking into account the active deciders only might be too low.

So far, hypothetical choice experiments have mainly been used to create variation in product attributes. We want to draw attention to the fact that they can be used to elicit the demand of consumer groups whose choices cannot be observed in the actual market. This becomes important when making predictions about the impacts of policy changes, especially when we want to analyze how demand is affected by consumers' socio-economic

conditions.

As lessons from the introduction of Medicare Part D will be crucial both for deciding whether to introduce universal health care in the USA and for the design of social insurance programs in other countries, analyzing how consumers behave in this market is highly policy relevant. There has been substantial debate on the question whether the U.S. government should have engaged itself further in individuals' health care decision, both in a regulatory and a financial way. Therefore, researchers have been interested how consumers' welfare has been affected by the introduction of Medicare Part D. In particular, it is important to find out whether the most vulnerable groups of consumers have been reached by the reform. Our findings can help to make the findings from the literature more generalizable to other populations and markets, because we do not restrict our focus on a small group of consumers.

6 Appendix

6.1 Figures and Tables

Figure 1: Decision tree of consumer groups

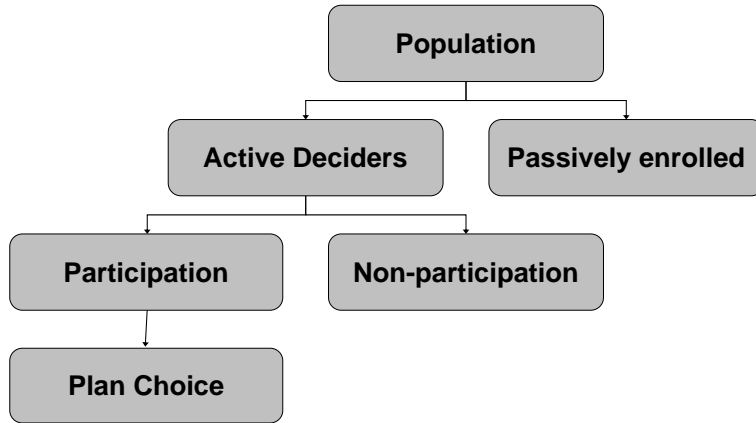


Figure 2: Consumer groups in the RPS

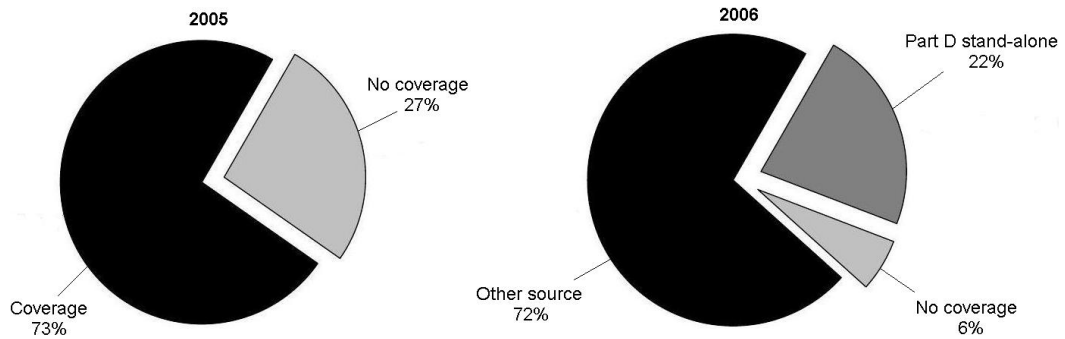


Table 1: Sample selection criteria and response rates, RPS 2005-2009

Age selection rule	RPS 2005	RPS 2006	RPS 2007				RPS 2009				
	50+	63+*	64+				64+				
			sub-samples				sub-samples				
Completed RPS 2005		yes**	yes	yes	no		yes	yes	no	no	
Completed RPS 2006			yes	no	no		yes	no	no	no	
Completed RPS 2007							yes	yes	yes	no	
KN members contacted	5879	2598	1704	217	1250	3171	1151	127	789	364	2430
Completed interviews	4738	2137	1526	165	1020	2711	783	77	534	207	1601
Response rate***	80.6%	82.3%	89.6%	76.0%	81.6%	85.5%	68.0%	60.6%	67.7%	56.9%	65.9%

Notes:

* In addition, RPS 2005 respondents younger than 63 years were contacted for RPS 2006 if they said that they are on Medicare.

** Completion of RPS 2005 was required for this subsample.

*** The response rate is defined as the number of completed interviews as a proportion of the number of KN Panel members contacted.

Table 2: Descriptive statistics, HRS 2006 and RPS 2006

		HRS 2006		RPS 2006	
		unweighed	weighed	unweighed	weighed
Gender	Female	57.3%	56.8%	55.8%	57.2%
	Male	42.7%	43.2%	44.2%	42.8%
Race	White	83.5%	89.3%	87.6%	83.3%
	Non-white	16.5%	10.7%	12.4%	16.7%
Age	61 – 70	35.8%	33.7%	39.3%	35.9%
	71 – 80	40.3%	41.6%	46.9%	47.9%
	81 – 90	20.4%	22.0%	12.9%	15.1%
	>90	3.5%	2.7%	0.9%	1.1%
Education	Less than HS	31.5%	28.3%	12.9%	26.1%
	High school	32.6%	33.4%	41.5%	36.5%
	More than HS	36.0%	38.4%	45.6%	37.5%
Income	<\$20K	33.2%	31.2%	23.4%	28.9%
	\$20K – \$60K	46.2%	46.9%	58.2%	52.6%
	>\$60K	20.6%	21.9%	18.4%	18.5%
SRHS	excellent	8.5%	9.1%	6.1%	5.6%
	very good	26.3%	27.5%	32.2%	27.8%
	good	31.6%	32.4%	39.5%	41.8%
	fair	23.3%	22.2%	18.1%	19.8%
	poor	10.3%	8.8%	4.0%	4.9%
Number of observations		11399		1666	

Table 3: Variable description and descriptive statistics

	Definition	Mean	Std. dev.	N
Dependent variables				
(fraction of 1 s)				
Hypothetical choices *				
Attributes of plans chosen by RPS respondents				
Insurance	= 1 if Part D standard plan insurance	0.85	0.35	1525
No deductible	= 1 if Insurance without deductible	0.68	0.47	1525
Gap coverage	= 1 if Insurance with gap coverage	0.36	0.48	1525
Premium	Please refer to table 4			
Real choices				
Attributes of plans chosen by RPS respondents				
Insurance	= 1 if Part D standard plan insurance	0.79	0.41	470
No deductible	= 1 if Plan offers benefits without the \$250 deductible of the standard plan	0.49	0.50	470
Gap coverage (generics)	= 1 if Generic drugs covered in the coverage gap of the standard plan	0.07	0.26	470
Gap coverage (brand-name drugs)	= 1 if In addition to generics, brand-name drugs also covered in the coverage gap	0.03	0.18	470
Independent variables				
Groups of consumers				
Passive participants	= 1 if prescription drug coverage already before the introduction of Part D	0.73	0.44	1562
Socioeconomic variables				
Low income	= 1 if total household income < \$20,000 in the year 2006	0.23	0.42	1569
Higher education	= 1 if some college or bachelor's degree or higher	0.46	0.50	1569
Age	Age of respondent in 2006	73.38	6.18	1569
White	= 1 if white	0.88	0.33	1569
Male	= 1 if male	0.44	0.50	1569
Health and prescription drug spending				
Self-rated health 2006	Survey question: "How would you describe your current health?", suggested answers			
SRH poor or fair	= 1 if SRH poor or fair	0.22	0.41	1569
Drug costs	Total drugcosts, constructed from RPS 2005, rescaled using the MCBS population data	2554.30	3118.45	1569
Number of prescription drugs	Survey question: "How many prescription drugs did you use last month?"	4.00	4.81	1558

	Definition	Mean	Std. dev.	N
Risk aversion		(fraction of 1 s)		
Risk aversion	Survey question: "Suppose you are planning a vacation that costs \$2,000 up front. There is a five percent chance that something will come up, and you will be unable to go. Your travel agent offers you insurance that will refund your \$2,000 if you can't go. What is the maximum amount you would pay for insurance that would refund the cost, as just described?" Outlier correction: all individuals whose WTP exceeds \$1000 are regarded as outlier → 37 obs. set to missing	93.50	93.36	1532
Risk-averse	= 1 if WTP for an insurance was higher than than the expected value (\$100)	0.28	0.45	1532

Table 4: Means of variables by consumer group

	Active deciders (All)	Active deciders (No coverage)	Passive participants (reference group)
Observations	414	76	1148
Socioeconomic characteristics			
Age	73.22	72.91	72.70
Female	0.58	0.65	0.55
White	0.93 ***	0.95 **	0.86
Higher education	0.41 **	0.36 **	0.48
Low income	0.32 ***	0.33 **	0.22
Health and prescription drug spending			
SRHS poor or fair	0.19 *	0.18	0.23
Drug costs	2372.86	1620.74 ***	2614.60
Risk aversion			
Risk-averse	0.26	0.23	0.28

* denotes $p < .1$, ** denotes $p < .05$, and *** denotes $p < .01$ for a two-sided t-test

Table 5: Market shares and premiums of prescription drug plans in hypothetical and real choices in 2006

Monthly premia in \$					
Hypothetical market		Basic	Enhanced	Premium	
First choice	Fixed premium	30.79	37.88	50.33	
Second and third choice	Lowest premium	15.39	18.94	25.16	
	Highest premium	40.02	49.25	65.43	
Real market		Basic	Enhanced	Generics	Generics and Brand
All available plans (Average premia)		30.75	37.92	48.13	61.88
Plans actually chosen in the RPS (Average)		17.00	26.60	46.10	60.80
Market shares in percent					
Hypothetical Market		Basic	Enhanced	Premium	
First choice	All respondents	20.0	31.9	48.2	
	Only those with Part D	22.4	31.6	46.0	
Prediction (Price available plans)	All respondents	20.4	37.8	41.8	
	Only those with Part D	26.7	41.9	31.4	
Prediction (Price chosen plans)	All respondents	20.1	32.0	45.7 *	
	Only those with Part D	24.8	37.0	38.1 *	
Prediction (Price available plans)	All respondents	22.8	31.8	45.4 *	
	Only those with Part D	30.9	38.8	30.3 *	
Real Market				Generics	Generics and Brand
All available plans 2006		34.0	50.6	12.9	2.5
Plans actually chosen in the RPS		36.3	54.3	4.8	4.6

* Price is the weighted sum of generics and generics and brand coverage, with the weights given by the market shares

Source: The prices and market shares of supplied plans are taken from Heiss, McFadden, Winter (2009)

Table 6: Multinomial logit analysis of hypothetical choices

	(1)	(2)	(3)	(4)	(5)
Plan attributes					
Reference group: no coverage					
Premium	-0.0263***	-0.0286***	-0.0298***	-0.0301***	-0.0311***
Insurance	1.100***	1.233***	1.487***	0.913***	1.256***
No deductible	0.652***	0.766***	0.618***	0.561***	0.459**
Gap coverage	0.730***	0.435***	0.384***	0.435***	0.200
Real coverage					
Reference group: active deciders					
Passive x insurance				0.456***	0.413**
Passive x no deductible				0.249*	0.230
Passive x gap coverage				0.324***	0.262**
2005 drug costs					
Reference group: medium drug costs					
No costs x insurance		-0.571***	-0.604***		-0.581***
No costs x no deductible		-0.603***	-0.593***		-0.580***
No costs x gap coverage		0.186	0.185		0.200
High costs x insurance		0.149	0.195		0.193
High costs x no deductible		0.102	0.174		0.170
High costs x gap coverage		0.472***	0.406***		0.400***
Socio-economic variables					
Female x insurance			-0.123		-0.107
Female x no deductible			0.160		0.167
Female x gap coverage			-0.112		-0.110
Low income x insurance			-0.223		-0.197
Low income x no deductible			-0.245*		-0.227
Low income x gap coverage			-0.239*		-0.219*
Higher education x insurance			-0.116		-0.144
Higher education x no deductible			0.0652		0.0532
Higher education x gap coverage			0.136		0.122
SHRS poor/fair x insurance			-0.116		-0.151
SHRS poor/fair x no deductible			-0.170		-0.182
SHRS poor/fair x gap coverage			0.381***		0.371***
Age > 75 x insurance			-0.0322		-0.0352
Age > 75 x no deductible			0.116		0.118
Age > 75 x gap coverage			-0.111		-0.108
Risk averse x insurance			0.100		0.114
Risk averse x no deductible			0.223		0.228
Risk averse x gap coverage			0.333***		0.334***
Observations	6262	4604	4531	4604	4531

* denotes p<.1, ** denotes p<.05, and *** denotes p<.01 for a two-sided t-test (clustering by respondent)

Table 7: Multinomial logit analysis of revealed choices

	(6)	(7)	(8)	(9)	(10)
Plan attributes					
Premium	-0.094***	-0.095***	-0.094***	-0.098***	-0.079***
Insurance	0.085	0.060	-0.102	0.178	0.356
No deductible	0.487***	0.743***	0.808***	0.494***	0.896***
Gap coverage	0.779***	0.234	0.664		
Gap coverage (generics)				0.305	0.158
Gap coverage (brand-name drugs)				2.519***	1.785***
Drug tiers					
Mailorder					-0.668***
Top 100 drugs uncovered					0.567*
Top 100 drugs with authorization					-0.089***
Interactions					
No costs x insurance		-1.323***	-1.248***		
No costs x no deductible		-0.724*	-0.990**		
No costs x gap coverage		-21.610***	-12.320***		
High costs x insurance		1.110***	0.967**		
High costs x no deductible		-0.424*	-0.248		
High costs x gap coverage		1.121***	1.152***		
Demographics					
Age > 75 x insurance			0.115		
Age > 75 x no deductible			0.178		
Age > 75 x gap coverage			0.067		
Female x insurance			-0.345		
Female x no deductible			0.023		
Female x gap coverage			-0.529		
Low income x insurance			0.456		
Low income x no deductible			-0.255		
Low income x gap coverage			-0.637		
Higher education x insurance			0.361		
Higher education x no deductible			0.006		
Higher education x gap coverage			-0.248		
SHRS poor/fair x insurance			0.036		
SHRS poor/fair x no deductible			-0.489		
SHRS poor/fair x gap coverage			0.267		
Risk averse x insurance			0.301		
Risk averse x no deductible			-0.109		
Risk averse x gap coverage			0.087		
Observations	469	469	469	469	469

* denotes $p < .1$, ** denotes $p < .05$, and *** denotes $p < .01$ for a two-sided t-test.

Table 8: Nested logit analysis of combined stated and revealed choices

	Coefficient	SD	95% Confidence interval
Plan attributes			
Premium	-0.034***	0.004	[-0.043, -0.026]
Insurance	1.208***	0.152	[0.911, 1.505]
No deductible	0.561***	0.065	[0.435, 0.688]
Gap coverage	0.701***	0.084	[0.536, 0.866]
Dissimilarity parameters			
$\tau_{\text{hypothetical}}$	0.720	0.079	[0.566, 0.875]
τ_{real}	1		
LR test for IIA ($\tau = 1$): $\chi^2(1)=11.64$		Prob> $\chi^2=0.0006$	
Log likelihood = -9766.1763			
Wald $\chi^2(4)=93.73$		Prob> $\chi^2=0.0000$	

* denotes $p < .1$, ** denotes $p < .05$, and *** denotes $p < .01$ for a two-sided t-test.

Table 9: Willingness-to-pay for insurance attributes by consumer group

	Insurance	No deductible	Gap coverage	Regression
Hypothetical choices				
Basic MNL	41.80***	24.77***	27.75***	(1)
No drug costs	21.17**	-4.20	12.67*	(2)
Medium drug costs	39.52***	15.50**	6.87	
High drug costs	43.56***	20.24***	20.62***	
Passive	44.00***	28.29***	26.25***	(4)
Active	29.00***	18.98***	14.51***	
Passive	48.39***	21.69***	22.16***	(5)
Active	34.41***	12.65**	12.53**	
Real choices				
Basic MNL	0.91	5.19***	8.30***	(6)
Combined model				
Nested logit	35.39***	16.45***	20.55***	

* denotes $p < .1$, ** denotes $p < .05$, and *** denotes $p < .01$ for a two-sided t-test.

6.2 The RPS Hypothetical Choice Experiments

In 2006, the introduction for individuals without prescription drug coverage was:

“At the end of this year, you will be able to make new choices about your prescription drug coverage for the next year.”

The introduction for those with Part D plans (whether stand-alone or HMO/ Medicare+Choice) was:

“At the end of this year, you will be able to make new choices about your prescription drug coverage for the next year. You may stay in your current plan, you may switch to another plan, or you may even elect to unsubscribe and not select any plan.”

The introduction for those covered through their employer or union, the Veteran’s Administration, private insurance or some other source was:

“Even though you have prescription drug insurance from other sources, we would like to know what your choices would be if the only coverage you could get would be through a Part D plan.”

The second part of the introduction was then the same for everybody:

“We are now going to show you some plans that have realistic features and premiums. We are interested in what plan you would choose if these were your only options. Specifically, on each of the following pages we will show you three plans that differ in coverage and premiums.

On each page, please report which of these options is the most attractive and which is the least attractive. You will always have the option to choose none of these three plans and thus have no prescription drug coverage (but then you would have to pay higher premiums if you enroll later, according to current Medicare Part D regulations.”

In 2009, the first part of the introduction was the same for every respondent:

“Since 2006, Part D of Medicare provides coverage for prescription drugs of older Americans. Plans under Part D are also known as Medicare Rx plans. Once you are eligible for Medicare, you can enroll in one of the new prescription drug plans under Medicare Part D. You have told us earlier that you are enrolled in such a plan.”

The only difference in the introduction for those who had reported that they had stand-

alone plans and all others was the following phrase: “You have told us earlier that you are enrolled in such a plan” for those with stand-alone coverage and “You have told us earlier that you are not enrolled in such a plan - either because you have coverage from other sources or because you decided not to enroll in a Medicare RX plan” for all others. The second part of the introduction was then again equal to the introduction above.

The actual choice task was as follows:

“Please consider a situation in which you would have no prescription drug coverage from any other source. Imagine that these were the only three description drug plans that you could choose from. You can also choose not to have coverage at all.”

- **Basic Plan premium: \$ PBi** *This plan covers all prescription drugs you currently use and most of what you might need in the future. It has a deductible of \$250, pays 75 percent of costs above \$250 up to \$2250, provides no additional benefit until costs reach \$5100, and pays 95 percent of costs above that level.*
- **Enhanced Plan premium: \$ PEi** *This plan is equivalent to the Basic Plan but has no deductible. This means that the 75 percent coverage begins at the first dollar you spend on description drugs, up to \$2250. Like the Basic Plan, there are no additional benefits until costs reach \$5100. The Enhanced Plan pays 95 percent of costs above that level.*
- **Premier plan premium: \$ PPi** *This plan is equivalent to the Enhanced Plan, but it does not impose a coverage gap between \$2250 and \$5100. So it pays 75 percent of all costs up to \$5100 and for 95 percent above that amount.*
- **No prescription drug insurance at all**

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