The Demand for Health Insurance among Uninsured Americans: Results of a Survey Experiment and Implications for Policy*

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Abstract

Most existing work on the demand for health insurance focuses on employees' decisions to enroll in employer-provided plans. Yet any attempt to achieve universal coverage must focus on the uninsured, the vast majority of whom are not offered employer-sponsored insurance. In the summer of 2008, we conducted a survey experiment to assess the willingness to pay for a health plan among a large sample of uninsured Americans. The experiment yields price elasticities of around one, substantially greater than those found in most previous studies. We use these results to estimate coverage expansion under the Affordable Care Act, with and without an individual mandate. We estimate that 35 million uninsured individuals would gain coverage and find limited evidence of adverse selection.

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1 Introduction

Expanding coverage to the roughly 50 million Americans who lack health insurance has long been a key public policy concern, and one that has received enormous attention in recent years.[1] Most notably, the Affordable Care Act of 2010 (ACA) attempts to cover these individuals via a combination of an expansion of Medicaid and subsidies to purchase private insurance on state-run health insurance exchanges, as well as a mandate for most individuals to obtain coverage.[2]

Relying on existing research to predict the effects of such a fundamental reform on the currently uninsured is potentially problematic, because existing work generally focuses on the decision to enroll in employer-sponsored health insurance. The currently uninsured are rarely offered the opportunity to purchase insurance through an employer (Kaiser Family Foundation, 2004), calling into question the utility of existing estimates for understanding insurance demand of this population. Not only are uninsured individuals substantially poorer than the average worker offered employer insurance, but the decision to, say, purchase subsidized insurance from a state exchange might fundamentally differ from the decision to enroll in an employer-sponsored health plan, which takes place in the context of co-workers, an employer and potentially benefits counselors.

To address these concerns, we devised survey questions specifically designed to elicit the expressed willingness to pay among the uninsured for a comprehensive health plan. Existing data on the uninsured are generally limited in part because many respondents must be screened in order to yield a sample of uninsured people large enough to generate precise estimates, given that more than 80 percent of Americans are covered by some form of health insurance. Fortunately, for a two-week period during the summer of 2008, the Gallup Poll included our questions in their ongoing survey of 1,000 individuals a day. We asked respondents whether they would purchase a comprehensive health plan for a given monthly premium, and then lowered the price in several stages for those who initially said they would not purchase it. To the best of our knowledge, our dataset is the first to elicit self-reported willingness-to-pay for health insurance among a large sample of uninsured Americans.

Our results suggest that subsidizing the purchase of insurance plans would significantly reduce the population of the uninsured. For example, we estimate that about sixty percent of the uninsured would voluntarily enroll for an annual premium of $2,000. Under the current specification of subsidies in the ACA, we estimate that between 33 and 35 million uninsured

[1] See `http://www.census.gov/prod/2011pubs/p60-239.pdf` for the most recent Census estimates of the number of uninsured Americans.

[2] The Kaiser Family Foundation summarizes the Act at `http://www.kff.org/healthreform/upload/8061.pdf`.

individuals would gain coverage by 2016 as a result of the law. We also estimate that stripping the individual mandate from the law—the constitutionality of which has been challenged in federal court—would lead to between six and eleven million fewer individuals gaining coverage.

The Gallup data includes extensive information on health status, and thus allow us to gauge the extent of implied adverse selection for a given subsidy schedule. We find, consistent with past literature, that less healthy individuals have lower price elasticities of demand.[3] However, when we calculate the prices individuals would actually face under the ACA subsidy schedule, we find no evidence that less healthy individuals would be more likely to enroll, with or without a mandate. As enrollment is a function of both elasticities and the price points individuals face, other subsidy schedules may well lead to adverse selection; indeed Chandra *et al.* (2011) find that the individual mandate was important in limiting adverse selection under Massachusetts' 2006 health reform, which, as we discuss, mirrors the ACA in important respects. With or without a mandate, we find no evidence that those predicted to take-up private insurance are less healthy than those who are already privately insured, suggesting premiums for the latter group should not increase due to a change in the composition of the private insurance pool.

We calculate elasticities of take-up with respect to premium price of around 1.0, significantly larger than those typically found in past studies. There are several reasons why our estimated demand curve may differ from those found in past studies. First, as mentioned earlier, almost all past work is based on individuals' decisions to join employer-provided health plans, a decision few of the uninsured actually face. In fact, our elasticities are quite similar to those found among another group of individuals not offered employer-provided insurance, the self-employed (Gruber and Poterba, 1994).

Second, past studies generally need to impute prices for those who do not have insurance or cannot recall their premium price, which likely downwardly biases estimated price sensitivities. Given that in the current environment, prices can be undefined (e.g., insurance companies can deny coverage to applicants with pre-existing conditions), assuming that each individual faces a finite going price can lead to underestimates of consumer demand as some individuals will be assumed to be turning down an offer when in fact they were denied coverage. We find that uninsured individuals are more likely to have been denied coverage in the past, suggesting that the bias induced by assuming that the going price applies to everyone could be especially important in estimating demand among the currently uninsured.

Finally, even if the researcher can correctly determine the plan's price, plan features (e.g.,

[3]See, for example, Strombom *et al.* (2002), who find that older and sicker individuals appear less sensitive to premium price in their decisions among different health plans.

deductibles, copayments, provider networks) can vary extensively and in ways the researcher cannot always observe. Thus, an individual who chooses not to purchase health insurance at a relatively low price may appear to have low demand, whereas she may in fact be reacting to the low quality of the offered plan. Even some employer plans can initially exclude coverage for a pre-existing condition, so an individual who chooses not to enroll could be viewed by the researcher as having limited demand when she in fact could have very high demand for a more comprehensive insurance plan.

We designed our survey experiment in an attempt to address these and other challenges faced by past studies. First, our sampling frame allows us to gather a large group of uninsured individuals in order to directly elicit their willingness to pay for health insurance. Second, we present individuals with a specific, comprehensive insurance product, so that plan quality does not vary across individuals. Third, we offer hypothetical premiums to respondents and vary them exogenously, so there is no need to impute prices. Finally, our survey experiment permits us to estimate a range for each uninsured individual's willingness to pay for health insurance, which enables a more textured analysis of the characteristics of individuals who would likely take up health insurance under reforms such as the Affordable Care Act than is possible with an aggregate demand elasticity. Overall, our results suggest that using the demand curves estimated in much past work may under-estimate the effect of policies to extend coverage to the uninsured.

Of course, using survey data on people's self-reported decisions in hypothetical choices entails its own set of serious concerns, such as anchoring bias (the tendency of individuals to choose a valuation close to the first price the survey suggests). We make an effort to address anchoring bias by randomly varying the initial prices we offer respondents and find no significant effect of the initial offer on respondents' final valuation. Moreover, our survey differs from contingent valuation (CV) studies, which typically ask respondents to value a public good, such as an environmental project, with which they have little personal experience. We instead ask about a private good that most people would have experience with: given the well-documented "churning" in health-insurance status (see, e.g., Klein *et al.* 2005), many uninsured individuals would have purchased insurance in the recent past. Indeed, past work on take-up decisions for employer-provided insurance has shown that hypothetical-choice surveys and actual field data yield very similar demand elasticities (Royalty and Hagens, 2005). However, other potential biases related to hypothetical valuation are more difficult to address and we later discuss how they might affect our estimates. At a minimum, our simulations of the effects of the ACA provide a benchmark with which to compare the eventual enrollment patterns once the law's provisions are fully implemented and thus will allow researchers to further gauge the utility of using survey data on health insurance demand.

The remainder of the paper is organized as follows. Section 2 reviews past work on the demand for health insurance. Section 3 describes the Gallup Daily Poll as well as the questions we added to it. Section 4 presents data analysis on uninsured individuals' decisions to buy into a subsidized health plan, estimating aggregate price elasticities, predicting individual reservation prices, and testing for the presence of adverse selection. Section 4 also discusses how shortcomings of hypothetical evaluation might bias our estimates. Section 5 uses the results in the previous sections to estimate the effects of the Affordable Care Act. Section 6 offers concluding remarks.

2 Review of Related Literature on Insurance Demand

This section reviews studies on three topics related to our question: employees' price elasticity of demand for employer insurance, medicaid take-up rates, and the experience from the Massachusetts health reform.

2.1 Estimating the price elasticity of employees' health insurance demand

Less than 15 percent of the currently uninsured are offered employer health insurance, but this literature nonetheless provides a useful benchmark for the question we investigate as well as highlights some econometric issues we try to overcome.[4] In general, existing work examines either firm-level data and estimates the share of workers who take up insurance as a function of the premium prices of the plans a firm offers, or individual-level data and estimates take-up decisions as a function of reported or imputed premium prices. These studies have tended to find elasticities between zero and -0.1.[5]

Papers of this type typically face several common challenges in estimating the price elasticity of demand for this population. First, noisy price imputation will lead to measurement error, generally biasing elasticity estimates toward zero. This concern is especially acute with individual-level data, as those who chose not to enroll in a health plan are unlikely to perfectly remember the premium price they were offered. Second, elasticity estimates implicitly assume a homogenous insurance product, when in fact individuals who pay higher premiums may be obtaining more generous health care benefits, again biasing elasticities toward zero.

Some key papers have sought to address these empirical challenges. Gruber and Washington (2005) use the introduction of pre-tax payment of premiums for postal workers (and,

[4]In our data, 65 percent of the uninsured are employed (see Table 1). According to Kaiser Family Foundation (2004), among uninsured *workers*, only twenty percent were offered employer insurance and turned it down, with another twenty percent working in firms that offer insurance to some workers but are themselves ineligible and the rest working in firms that do not offer insurance at all. We thus estimate that $0.65 * .20 = 13$ percent of uninsured adults in our sample were offered employer insurance.

[5]See, e.g., Cutler (2003), Chernew *et al.* (1997) and Blumberg *et al.* (2001).

later, all federal workers) as a source of plausibly exogenous variation in effective premium price and estimate elasticities close to zero. Cutler and Reber (1998) find much larger price elasticities (near -1.0) using a change in Harvard University's employee health plan premiums. As Abraham and Feldman (2010) note, it is interesting that the two studies exploiting natural experiments to estimate the demand for employer insurance yield such markedly different results, but then the samples used—postal workers and Harvard employees—might be very different from each other.

Gruber and Poterba (1994) examine the Tax Reform Act of 1986, which for the first time allowed the self-employed to deduct the cost of their health-insurance premiums. As the benefit of a deduction depends on an individual's federal income tax rate, the reform generated differential effective price changes among the self-employed. Their preferred estimates suggest elasticities around -1. Their study is especially relevant to us as it exploits a natural experiment in a context *outside* of employer-sponsored plans. However, the preferences, constraints, and resources of the uninsured may not mirror those of the self-employed.

2.2 Medicaid take-up literature

A second set of papers examines take-up rates of Medicaid. In general, these papers have found that less than half of those eligible actually enroll.[6] Low take-up rates among those eligible for Medicaid suggest a very limited capacity of even a heavily subsidized plan to extend coverage to the uninsured. However, there are a number of reasons why these estimates may not predict enrollment rates in a setting such as the ACA.

First, the results themselves may be underestimates of the true Medicaid take-up rate as researchers may have only noisy proxies of Medicaid eligibility. As Remler and Glied (2003) note, programs with asset tests often appear to have low take-up rates in part because individuals who appear eligible to the researcher—who often only has data on individuals' pre-tax income levels—are not in fact eligible.[7] Moreover, state-level rules on Medicaid eligibility vary tremendously—including the deductions allowed in calculating assets and income and how long one must be uninsured before gaining eligibility—further complicating researchers' efforts to identify who is eligible for the program. In a similar setting, Daponte *et al.* (1999) find that proxying eligibility with whether an individual meets the income test creates substantial downward bias in estimated take-up rates in the food stamp program: only about half of a sample of households that met the income test met the other requirements in the state of Pennsylvania.

[6] See, e.g., Currie and Gruber (1996) and Card and Shore-Sheppard (2004).

[7] States have only recently ended Medicaid asset tests for children, and most have kept them in place for parents and other adults (Kaiser Family Foundation, 2009), which may explain the apparently low take-up rates of adults documented by Sommers and Epstein (2010) and others.

Second, the asset and other eligibility tests can make the current Medicaid application arduous and likely deter some eligible individuals from completing the process, whereas under the ACA eligibility for Medicaid and exchange subsidies is purely a function of income and household size. For example, the current Texas Medicaid application is eleven pages long and asks for detailed information on every household member, even those not applying for Medicaid.[8]

Finally, many people covered by the Medicaid expansions studied in the past literature already had other sources of coverage, which likely lowers the take-up rate relative to studying newly eligible uninsured individuals (Currie and Gruber, 1996). For this reason, we estimate price elasticities on a large sample of *uninsured* individuals.

2.3 Take-up of subsidized insurance by the uninsured in Massachusetts

Perhaps a more direct way of estimating take-up of subsidized insurance at the national level is to examine the experience of Massachusetts, which in 2006 implemented a health reform very similar to the ACA. Estimates of take-up vary somewhat, but all suggest that reform has essentially eliminated uninsurance in the state.[9]

Recent papers have taken advantage of price variation created by the Massachusetts reform to estimate price elasticities, though the context has typically been the choice *across plans*, not the choice to take-up insurance at all.[10] These studies have tended to show that consumers are very price-sensitive. Ericson and Starc (2012) use the fact that premium prices can vary sharply as individuals cross five-year age brackets in the Massachusetts Connector (the name given to the private insurance exchange created by the reform) and estimate elasticities substantially greater (in absolute value) than -1.0.[11] Chan and Gruber (2010) use policy-driven changes in the premium prices in the Massachusetts' Commonwealth Care (the state's program for residents with incomes below 300 percent of the poverty line). They

[8]For example, it asks for the Social Security number, race and date of birth of every household member. Questions on assets are so detailed as to cover the value of any "burial space/plot" as well as the make and model of any cars. For each student in the household, the grade, school name, and expected date of graduation are also asked. See `http://www.hhsc.state.tx.us/help/5017_1010-eng.pdf` for the application document.

[9]See "Facts and Figures" at `https://www.mahealthconnector.org/portal/site/connector/menuitem.d7b34e88a23468a2dbef6f47d7468a0c?fiShown=default` for estimates from the Massachusetts Health Connector, the independent state agency charged with helping residents comply with the law. Kaiser offers a summary of the state law and its affects so far on the uninsurance rate at `http://www.kff.org/uninsured/upload/7777-02.pdf`.

[10]Using the Massachusetts reform to estimate take-up elasticities is presumably complicated by the econometrician not knowing the price each respondent faced pre-reform.

[11]Semi-elasticities are reported in the paper, but we obtained elasticities after correspondence with one of the authors.

estimate price elasticities of -0.65, and slightly higher estimates for new enrollees than for continuing enrollees.

While the 2006 Massachusetts reform and the Affordable Care Act are similar, Massachusetts is not representative of the country as a whole in important respects (for example, education levels and pre-reform uninsurance rates). For these reasons, while Massachusetts serves as an important benchmark, we focus on gathering data on a nationally representative sample of uninsured Americans.

3 Data

3.1 The Gallup-Healthways Daily Poll

Every day since January 2008, the Gallup Organization has surveyed about 1,000 individuals age 18 and older as part of the Gallup-Healthways Daily Poll. The interview takes about 15 minutes, with questions ranging from respondents' preferences in upcoming elections to their credit history, as well as basic demographic information. Fortunately for our purposes, the survey includes a number of questions on individuals' health conditions, health behaviors and health insurance coverage.[12]

Gallup takes several steps to draw a representative sample of the population: they use dual-frame random-digit-dial sampling that includes cell phones; they follow a random selection method to choose one respondent within a household; and they provide Spanish-language interviewers for respondents who speak only Spanish. Gallup also provides sample weights to compensate for disproportionalities in selection probabilities and non-response, so that the weighted sample matches the national distribution in terms of age, sex, region, gender, education and race. We utilize the sample weights in all of our analyses.

3.2 Our additions to the Gallup Survey

Gallup agreed to add to its daily survey several questions we specifically designed to elicit uninsured individuals' willingness to pay for a health insurance plan. From August 22 to September 8, 2008, Gallup asked everyone who reported being uninsured (1,332 individuals) our questions, which took the following general form: "If you could get a health insurance policy for yourself that is as good as the one that members of Congress have, given your current financial situation, would you buy it for $\$X$ a year, which works out to $\$X/12$ per month?"

One concern with data on hypothetical choices is anchoring bias, the tendency of subjects to insufficiently adjust their response from an arbitrary starting point (Tversky and

[12] A list of the core questions is available at `www.well-beingindex.com/methodology-questions.html`.

Kahneman, 1974). For example, anchoring bias would arise if subjects in our survey claimed they would purchase health insurance at or near the first price suggested because they interpret it as signaling the social desirability of health insurance. To assess the importance of this problem, we randomly assigned the uninsured subjects to one of two questionnaires. Questionnaire A started with an annual premium price of $4,000 and then lowered the price first to $3,000 for those who said no, and then to $2,000 if respondents said no to $3,000 (though subjects were not told that lower prices would follow). Questionnaire B started with a price of $3,000 and then followed with a price of $2,000. Comparing responses across the two questionnaires allows us to test for anchoring bias.[13]

Another central concern with hypothetical valuation is assessing individuals' knowledge of the product they are evaluating. The phrase "as good as members of Congress receive" was meant to signal the comprehensiveness of the health plan in question, though a potential concern is that individuals incorrectly assume that "members of Congress" are provided special, gold-plated health plans, which might drive up our take-up estimates. As a point of fact, however, the description is at least roughly accurate—indeed, the Affordable Care Act creates state exchanges modeled after the Federal Employee Health Benefits Plan, which covers members of Congress. In addition, the Gallup interviewers were provided the following instructions: "If respondent asks what the health insurance plan is like for members of Congress, read: Members of Congress can choose from a variety of health insurance plans. A common choice is Blue Cross/Blue Shield. This insurance requires co-pays and deductibles similar to those paid by many private sector workers. For example, a primary doctor visit requires a $20 co-pay; a day in the hospital requires a $100 deductible; participants can see a doctor in the preferred provider network; some dental coverage is provided, but vision care is not covered." We return to the question of respondents' lack of experience or knowledge of the product in Section 4.4.

4 Results from the Gallup survey

4.1 Raw survey results

Table 1 presents summary statistics by insurance status for subjects in the sample Gallup collected during our 16-day window (we restrict the sample to individuals under 65 as this older group is eligible for Medicare). Though we focus on the uninsured in most of the later analysis, it is useful to consider how much this group differs from the insured and especially

[13] Gallup randomized within each day of the survey and the randomization appears to have been successful. The differences between individuals assigned questionnaire A versus B in the share female, Black, Hispanic, employed, ever denied health care and the mean age, income and BMI are all insignificant at the ten percent level, both individually and jointly. Results available upon request.

from those insured via an employer plan. In general, the uninsured in our data are younger and more likely to be male, consistent with past survey data (see, e.g., Cheong *et al.* 2007). Those with employer insurance have family income 2.25 times that of the uninsured and are nearly twice as likely to be married. Importantly, the uninsured are 2.6 times as likely as those with employer insurance to have been denied health insurance in the past.

Figure 1 shows the share of respondents who say they would enroll in the plan at each price, plotted separately by which questionnaire they answered. Of those randomly assigned to Questionnaire A, 26.9 percent said they would purchase the plan if the annual premium were $4,000 and an additional 11.9 percent said they would once the price was lowered to $3,000, for a total of 37.9 percent. This share is similar to the 34.6 percent of Questionnaire B respondents who agreed to purchase the plan at $3,000, even though in their case $3,000 was the first price presented to them. The two groups diverge more when facing a price of $2,000, with a take-up rate of 59.5 percent for Questionnaire A respondents and 51.7 percent for Questionnaire B. Overall, however, anchoring bias appears minimal. We more rigorously test for anchoring bias in the regression analysis.

We calculate arc elasticities between each pair of ($\textit{take-up rate}, \textit{price}$) points in Figure 1 by dividing the percent change in take-up by the percent change in price, where each change is calculated relative to its mid-point. To avoid cluttering the figure, we generally focus on those elasticities based on price variation within the same survey treatment as opposed to comparing across surveys, though include all other elasticities in the notes to the table. The five take-up rates generate eight arc elasticities, all clustered closely around 1.0, and considerably larger than those found in most past work. Of particular interest is the elasticity estimate based on the take-up rate at $4,000 from Questionnaire A and $3,000 from Questionnaire B, the first prices presented by each of the surveys. If anchoring bias were driving individuals' responses, then this comparison should yield minimal differences in take-up and thus a substantially reduced elasticity, but the resulting elasticity of 0.87 is only slightly below the elasticities generated from within-questionnaire price variation.

4.2 Regression results

The Gallup data allow us to estimate the following equation:

$$Takeup_{ij} = \beta Price_{ij} + \gamma X_i + \varepsilon_{ij}. \tag{1}$$

where individuals are indexed by i, prices by j, $Takeup_{ij}$ is an indicator variable for whether individual i says she would purchase the health plan at price j, $Price_{ij}$ is the premium price (rescaled so that its coefficient represents the percentage-point change in take-up associated with a $1000 increase in premium price), X_i is a vector of individual characteristics, and ε_{ij} is an error term. We cluster standard errors at the individual level to account for the fact that each individual has two (Questionnaire B) or three (Questionnaire A) price observations. We down-weight the latter group so that individuals are not given greater weight merely because they were randomized into Questionnaire A (though this re-weighting leaves the results essentially unchanged).[14]

Col. (1) of Table 2 shows the results from an OLS estimation of this equation without covariates. The coefficient equals -0.152, consistent with the roughly 30-percentage-point drop in take-up between \$2,000 to \$4,000 depicted in Figure 1. Cols. (2) and (3) show that the result is robust to including basic controls—col. (3) includes these controls and col. (2) re-estimates the col. (1) specification on the col. (3) sample. These results suggest that price is uncorrelated with our control variables, as would be expected under random assignment.

Cols. (4) and (5) show that the coefficient estimate is robust to using a probit specification or adding individual fixed effects, respectively. Col. (6) replicates the specification in col. (3) but uses only observations arising from the first price-point offered each respondent—that is, Questionnaire A respondents' response to a \$4,000 premium are compared to Questionnaire B respondents' response to a \$3,000 premium. Compared to the previous columns, the point-estimate is slightly smaller in magnitude, consistent with the arc elasticity between these two points in Figure 1 also being slightly smaller in magnitude than other price-point comparisons, but the result is still highly significant despite the substantially smaller sample size.[15]

Some of the covariates reported in Table 2 are worth noting. Blacks are more likely to say they would purchase the plan. So are higher-income individuals, not surprising given that price is in absolute dollars as opposed to a share of individual income. Notably, the dummy variable indicating that the subject answered Questionnaire A (which initially offers the chance to purchase the plan at \$4,000) is positive. This result is not surprising given that in Figure 1 take-up rates for Questionnaire A are everywhere to the left of those for Questionnaire B. However, the coefficient does not approach statistical significance (p-value > 0.6) and is small in magnitude, suggesting limited anchoring bias.

In Table 3, we report elasticities for several subsamples, based on the fixed-effects speci-

[14]As noted earlier, all results employ Gallup's sample weights. As such, for these regressions, the weights are merely scaled by two-thirds for individuals in Questionnaire A.

[15]We also examined whether including multiple price observations for each person leads to incorrect inference. While clustering at the person level should in principle adjust standard errors correctly, we take a more conservative approach by randomly choosing one price observation per person and then estimating the col. (1) specification on this smaller ($n = 1,184$) sample. Repeating this estimation 1000 times yields a mean coefficient value of -0.151 with a standard error of 0.021 (implying a t-statistic greater than seven). Therefore, even after throwing out a significant amount of information we find highly precise point estimates.

fication in col (5) of Table 2. The first row shows an elasticity for the entire sample around -1.07, consistent with the arc elasticities in Figure 1. There is considerable heterogeneity by age. Those under 30 have elasticities over forty percent larger in magnitude than those over 40. Sicker individuals—as measured by self-reported health problems and any past insurance denials—are less price-elastic. The health-status and age results are consistent with Strombom *et al.* (2002). Those in the lowest income quartile also have elasticities over forty percent larger than those in the highest income quartile, similar to patterns found by Marquis and Long (1995). While the pattern of elasticities generally conform to expectations, their range appears more limited than in past work, a point we discuss in Section 4.4.

4.3 Estimating the demand curve for insurance among the uninsured

The raw data give us an interval (though not always a closed interval) for each person's reservation price, but we can improve on the accuracy of the reservation price by estimating an interval regression that conditions on a large set of covaraiates: specifically, all the controls listed in Table 2, as well as a set of ten income dummies, interactions between sex and race, and dummy variables related to marriage and cohabitation arrangements. This regression gives us a vector of estimated coefficients with which we can predict each person's valuation of the insurance product. So as not to discard any information from the survey, we use the estimates to calculate the *expected valuation conditional on it being in the respondent's reported interval.*[16]

Figure 2 shows the resulting demand curve. We plot price on the y-axis and the share of individuals whose valuation of the health plan is at least that price on the x-axis. Not surprisingly, given that we constrain predictions to be in the respondent's reported interval, the demand curve roughly takes the shape of a step function, with large discontinuities around the endpoints of the survey intervals.

4.4 Discussion

Overall, the results in this section suggest a precisely estimated effect of price on take-up rates substantially greater than that found in past work. The range of price elasticites across subgroups is also more limited than in past work. There are a number of potential explanations for these differences.

First, our sample is markedly different from those used in most existing papers on health

[16]More formally, we take the coefficient vector $\hat{\beta}$ from the interval regression. Then, for each person i we take their chosen interval (a_i, b_i) and calculate $\mathbb{E}(\hat{\beta}X_i + \varepsilon_i \mid a_i < \hat{\beta}aX_i + \varepsilon_i < b_i)$. As the interval need not be closed, b_i can equal $-\infty$ or ∞ and the expectation can in fact be negative, though for less than two percent of observations do we estimate negative reservation prices. Results are unchanged if we simply take the prediction $\hat{\beta}X_i$, keep it if $\hat{\beta}X_i \in (a_i, b_i)$ and otherwise replace it with the endpoint of person i's interval that is closest to $\hat{\beta}X_i$.

insurance decisions, which focus on the decision to take-up employer-provided insurance. As we noted earlier, less than fifteen percent of the uninsured have access to employer-provided insurance. Furthermore, most studies use samples in which the majority of respondents are actually covered by insurance and as insured people are far wealthier (see Table 1), we thus focus on poorer individuals than past work has, who may exhibit different elasticities. Indeed, as noted earlier in Table 3, in our sample of uninsured individuals those with lower incomes are indeed more price-elastic, suggesting that price elasticities diminish with income even in our relatively low-income sample. Thus, differences in income could account for part of the reason we find larger elasticities than do past researchers. Moreover, by dint of their all being uninsured, our sample may be more homogeneous than in past studies, leading to a smaller range of price elasticities.

Second, the context for respondents' decisions in our sample is markedly different from the context most heavily studied by past research: employees' decision to join an employer-provided health plan. It is possible that the influence of co-workers, employers and benefits counselors renders individuals less price-sensitive. As noted earlier, Gruber and Poterba (1994) study a context similar to ours—in which self-employed individuals make decisions to purchase private (non-employer) health plans—and find similar elasticities.

Third, perhaps most obviously, our methodology differs from past work, as we rely on respondents' answers regarding hypothetical purchases. As already discussed, our study differs in important ways from from contingent valuation (CV), as in our experiment individuals are asked willingness-to-pay (WTP) estimates of a *private* good with which many will have had some first-hand experience. Similarly, our experiment is different than most discrete-choice experiments (DCEs), where survey respondents are asked to choose between products that trade-off between distinct attributes—for example, asthma patients might be asked to choose between two hypothetical medications, one of which has worse side-effects but lasts longer while the other has milder side-effects but must be taken several times a day (Lancsar *et al.*, 2007). In general, Brown *et al.* (2008) find that individuals are most consistent and reliable (i.e., they do not make choices that imply $A > B > C > A$ and that they make the same choice when the same choice set is presented to them at different points during the experiments) when they are deciding between a private good and a sum of money (the case in our experiment), as opposed to two private goods (DCE) or a public good and money (CV). It is also worth noting that our survey follows many of the guidelines on CV described in the highly cited report of Arrow *et al.* (1993) (e.g., not asking open-ended WTP questions).

Despite these differences between our study and CV and DCE studies, some similar issues may emerge. Our reading of the literature on CV, DCE and hypothetical evaluation more generally suggests the following central concerns: anchoring bias (see, e.g., Herriges and Shogren, 1996 and Bhattacharya and Isen, 2008, the latter specifically on valuing health insurance), acquiescence bias (Bhattacharya and Isen, 2008), framing bias (see, e.g., Arrow *et al.*, 1993; Howard and Salkeld 2009), and respondents' unfamiliarity or ignorance with the product they are asked to evaluate (Diamond and Hausman, 1994). Some of these concerns we believe have little bearing on our results while others are harder to dismiss.

Anchoring bias is perhaps the easiest to address, as our survey experiment was designed to test for it and we found that the price of the first offer had no statistically significant relationship to enrollment decisions (a p-value above 0.6). As noted earlier, anchoring bias would push the elasticity estimate using enrollment decisions based on the first price offered on each questionnaire toward zero, but in fact it is very similar to the other elasticity estimates. Our finding of minimal anchoring bias differs from contingent valuation studies (see Green *et al.* 1998 for evidence of anchoring bias in CV surveys), reinforcing the notion that individuals have a greater ability to accurately value private than public goods.

Acquiescence bias also seems limited, given that roughly two-thirds of the respondents choose not to enroll at the first price offered. Moreover, as Bhattacharya and Isen (2008) argue, acquiescence bias leads price elasticity estimates to be biased toward zero, so cannot explain why our results might be "too big."

While we have not found any discussion of it in the literature, a more nuanced form of acquiescence bias seems possible. Suppose that respondents use the following heuristic—say "no" to the first price offered but "yes" to the second. Such a rule-of-thumb would lead to over-estimated price elasticities—it might also lead to uniform price elasticities, and could explain why we find less variance in price elasticities across subgroups than have observational studies. The fact that the elasticities based on the first price offered by each questionnaire are similar mitigates against this concern, as individuals have not already refused an earlier offer, but we still believe exploring this type of acquiescence bias is an interesting area for future work.

Framing bias is a central worry in hypothetical evaluation.[17] Unfortunately, we can offer little direct evidence on possible framing effects in our experiment, as we did not have the sample size to randomize respondents to differently worded versions of the questionnaire or to versions where our survey experiment fell at different points of the Gallup poll (to test for question-order effects). Instead, we present admittedly indirect evidence suggesting

[17] To give but a few examples from the health care context, in DCE studies, Kjaer *et al.* (2006) and Ratcliffe and Longworth (2002) find that the ordering and description of attributes affects how, respectively, psoriasis patients and women who recently gave birth rank treatment alternatives. McNeil *et al.* (1982) found that even physicians' valuations of treatments for their patients depended on whether (equivalent) outcomes were expressed as changes in the probability of dying or the probability of living.

framing bias may be limited. As Diamond and Hausman argue, framing bias might explain why, in contingent valuation surveys, WTP is not strongly related to income, as instead of responding to their actual preferences and budget constraints—which will vary across respondents—individuals are responding in a common manner to the way the question is framed. In contrast, our results show WTP is strongly related to income (see Table 3).

Interestingly, while framing has long been found to influence survey outcomes, more recent work has shown it also affects *actual* health insurance enrollment decisions, complicating the meaning of framing "bias." Schmitz and Ziebarth (2011) use individual-level panel data on health plan choices and show that enrollment price elasticities increased by a factor of three after German federal law required that insurers list price differences between health plans in absolute values rather than percentage-point payroll tax differences.

As with framing bias, it is difficult to provide direct evidence on the degree of respondents' understanding of the question or experience with the product. While respondents likely have far more first-hand experience with health insurance plans than they do with, say, environmental disasters (a common topic in CV studies), respondents in a survey might still think more vaguely about the purchase decision than they would in a real-world setting when they can more carefully assess plan attributes, consider their budget constraints, and reflect on their actual preferences. Of course, given the complexity of the product, individuals tend to make actual health insurance decisions without full information or understanding—surveys have shown that just over a third of those with employer insurance report that they could name their monthly premium contribution within $10 and less than half can even define the term "premium" and only a quarter the term "co-insurance."[18]

Moreover, while respondents likely have little if any direct experience with the FEHB system that members of Congress use, they likely have substantial experience with health insurance more generally. Using the Medical Expenditure Panel Survey (MEPS) of 2007-2008, we estimate that of the non-elderly adults who report being uninsured at the time of the final interview in December 2008, nearly 40 percent were insured at some point since January 2007 and 22 percent had been insured at some point in the previous wave (roughly February to August of 2008). Using the Panel Study of Income Dynamics, we find that among non-elderly adults who report being uninsured for at least six months in 2008, fully 80 percent had been insured at some point in the previous ten years and the median person had been insured for sixty of the previous 120 months. As such, health insurance is not a

[18]See `http://news.ehealthinsurance.com/pr/ehi/document/Health_Insurance_IQ_Survey_-_Topline_Results_FINAL.pdf`. Note that the survey did not confirm whether individuals actually *could* name their premium or define the terms, so given typical estimates of over-confidence, it is likely that the survey results overstate Americans' understanding of their health plans.

completely alien product to the currently uninsured.[19]

While it is difficult to know *a priori* the direction of the bias created by respondents' ignorance of the product in question, in general, many of the standard critiques of hypothetical evaluation (e.g., anchoring bias, acquiescence bias) suggest that price elasticities will be underestimated and thus cannot explain why our results might be "too big." Of course, it could simply be the case that individuals are more price-sensitive when considering hypothetical questions in surveys than they are when facing the actual purchase decision—frictions and inertia might prevent them from purchasing (dropping) a health plan once it becomes sufficiently cheap (expensive).[20] Little if any work focuses on the effect of hypothetical valuation on the *variation* in price elasticities by subgroup, and this question seems like an interesting area for future work to explore.

5 Policy simulations

We close the paper by using the results in the previous section to simulate the effects of different subsidy and penalty schedules, focusing in particular on the Affordable Care Act, with and without the individual mandate. Our estimates generally refer to enrollment in 2016, when the vast majority of the coverage provisions of the ACA are fully in effect.

One potential drawback of our data set is that it was collected in 2008, nearly eight years before the Affordable Care Act's central coverage expansions are complete. For several reasons, however, we believe data from this period may be more useful in projecting take-up rates under the ACA than data collected today. First, the employment landscape at the time of our survey is similar to projections for 2016. The unemployment rate in August and September of 2008 was 6.1 and 6.2 percent, respectively, nearly identical to projections for 2016.[21] By contrast, collecting data today would entail extrapolating from an environment of unusually high unemployment. Second, we collected our data more than 18 months before the passage of the ACA (George W. Bush was still president), long before the political fervor over "Obamacare" began. Again, one might worry that collecting data today would reflect respondents' passion either for or against the bill, instead of reflecting their actual willingness

[19] The PSID does not ask point-in-time questions about insurance status, so we use "uninsured for at least six months of the year" as a proxy. Further details on these calculations are available upon request.

[20] Indeed, Gallup recognizes there is often a large difference between what respondents say they will do and what they actually do. See, for example, their discussion on how they predict which respondents will actually vote, as opposed to just say they will: `http://www.gallup.com/poll/111268/how-gallups-likely-voter-models-work.aspx`.

[21] The CBO currently projects the unemployment rate to be 6.3 percent in 2016. See `http://www.cbo.gov/sites/default/files/cbofiles/attachments/Jan2012_EconomicBaseline_Release.xls` for the most recent CBO estimates, updated in January of 2012.

to pay for a specific insurance contract.

5.1 Estimating take-up rates under the Affordable Care Act

5.1.1 Enrollment without a penalty

Estimating the subsidized premium price for households under the ACA is relatively straightforward with the Gallup data. Using household size and yearly household income, we calculate each individuals' household income relative to the poverty line.[22] Beginning in 2014, Medicaid will cover individuals with income below 133 percent of the poverty line, so we set their premiums equal to zero. Between 133 and 400 percent of the poverty line, we follow the subsidy schedule established in the ACA—subsidized premium prices increase continuously from 2.8 percent of household income for those at 133 percent of the poverty line to 9.8 percent of income for those at 300 percent of the poverty line. The price remains at 9.8 percent of income between 300 and 400 percent of the poverty line. As 85 percent of individuals in our uninsured sample are below 400 percent of the poverty line, these two provisions cover the vast majority of cases.

Above 400 percent of the poverty line, individuals do not receive subsidies. Since the question we formulated refers to individual (as opposed to family) insurance, we assume such individuals would face a price of $3756.96, the price of the basic Blue Cross plan offered to federal employees in 2008.[23] Note that this price is the total of the employee *and* employer contribution and as such substantially over-states the price for anyone with an offer of employer insurance—for example, the federal worker would only pay $1023.84 a year for the Blue Cross plan, with his employer (the federal government) covering the rest of the premium. Using the household component of the 2005-2006 Medical Expenditure Panel Survey, we estimate that over two-thirds of *uninsured* adults ages 18-64 living in households with income over 400 percent of the poverty line have an offer of insurance from their or their spouse's employer, and as such we believe the premium we set for such individuals in

[22]Household size is not actually included in the Gallup survey. We impute household size by summing the total number of children in the household (which is asked) and two for individuals who report being married or living with a domestic partner and one otherwise.

[23]Note that this price is likely lower than the price actual respondents may have faced at the time they answered the survey in 2008, as for some the only possibility of acquiring insurance may have been through the non-group private market, which tends to have higher costs and lower quality due to adverse selection. Indeed, many respondents said they would have purchased the insurance plan offered in the survey at a price of $4,000, suggesting the prices they actually faced for a comparable plan in 2008 were higher (given that they were uninsured when answering the question). In this sense, our estimates assume that the ACA exchanges solve at least some of the adverse selection problem and thus that the premiums individuals would face in the exchanges are similar to premiums in FEHBP.

our sample is considerably overstated, leading to conservative enrollment results.[24]

Finally, we make an adjustment for the estimated share of unauthorized immigrants among the uninsured, who are not eligible for the coverage expansions in the ACA. The CBO projects that without the ACA, 52 million non-elderly individuals would be without insurance in 2016, a figure that includes unauthorized immigrants. We thus subtract estimates for the number of unauthorized immigrants without insurance when we calculate our projections. The Pew Hispanic Center estimates that in 2012 there were 11.2 unauthorized immigrants, of which 13 percent are children. They further estimate that 59 percent of adult unauthorized immigrants are uninsured, compared to 45 percent of children, suggesting a total of $11.2 * (0.87 * 0.59 + 0.13 * 0.45) = 6.4$ million uninsured unauthorized immigrants, or, that 45.6 million or 87.7 percent of the 52 million uninsured are ACA-eligible.[25]

In our baseline estimate, we assume anyone whose estimated willingness-to-pay is above their premium price takes up coverage, and report these estimates in the first row of Table 4. Col. (1) reports that 56 percent of currently uninsured adults would gain coverage (this number would rise to 64 percent if unauthorized immigrants were not excluded). Col. (2) translates this figure into an estimated number of covered adults. Assuming that the adult share of the uninsured population remains at its 2010 level of 0.8546, we estimate that $0.8546 * 52 \text{ million} * 0.56 = 25.1$ million adults would enroll in either Medicaid or an exchange insurance plan in 2016.[26] Assuming an equal share of children would gain coverage, we estimate that 29.3 million people would gain coverage via the ACA provisions without a

[24]We caution that the MEPS sample has just over 150 uninsured adults above 400 percent of the poverty line between ages 18 and 64, so our estimates on employer offering are likely noisy. Moreover, these individuals may disproportionately work for firms that only cover a relatively small portion of the premium, thus leading them to refuse the offer. Nevertheless, assuming that individuals in our sample above 400 percent of the poverty line must pay both the employee and employer side of the premium almost surely overstates their actual financial contribution.

[25]The 52 million figure is taken from the CBO's cost estimate of the final version of the ACA: `http://www.cbo.gov/ftpdocs/113xx/doc11379/AmendReconProp.pdf`. The information on unauthorized immigrants are all from Pew Hispanic Center publications. The 11.2 million figure is from `http://www.pewhispanic.org/files/2012/04/Mexican-migrants-report_final.pdf` (while the report focuses on Mexican migrants, it also contains the most recent estimates for all unauthorized immigrants); the information on the adult share of unauthorized immigrants and on insurance status is from `http://www.pewhispanic.org/2009/04/14/a-portrait-of-unauthorized-immigrants-in-the-united-states/`. Note that we do not adjust the 11.2 million figure in our calculations—it is difficult to project the number to 2016 and in fact the number of unauthorized immigrants has fallen significantly since 2008, meaning using the 11.2 million figure may over-estimate the number of uninsured unauthorized immigrants and thus underestimate the number of uninsured who are ACA-eligible in 2016.

[26]The 0.8546 figure is calculated using estimates from the most recent version of the annual Census publication "Income, Poverty and Health Insurance Coverage in the United States": `www.census.gov/prod/2011pubs/p60-239.pdf`.

mandate.

Given that we estimate negative reservation prices for less than two percent of individuals in our sample and that Medicaid has no premium, the calculation in the first row of Table 4 essentially assumes full Medicaid take-up. Given that individuals below 133 percent of poverty will be *de facto* insured whether or not they officially enroll in Medicaid, in terms of who gains access to coverage, this assumption seems reasonable. From a fiscal standpoint, even if Medicaid recipients do not enroll until they are ill, they are not "free-riding" as they do not pay a premium regardless of when they choose to enroll.

Nevertheless, officially enrolling in Medicaid may facilitate contact with health care providers and thus promote preventive and primary care. And official estimates of insurance coverage may depend on whether Medicaid eligibles actually enroll. Thus, we present estimates assuming different levels of Medicaid take-up in the second and third rows of Table 4. In the second row we assume that 85 percent of Medicaid-eligible individuals enroll, which lowers the total take-up rate among all uninsured adults from 56 to 54 percent. Using the same methodology as before, this take-up translates to 23.9 million adults or 28.0 million individuals gaining coverage. In the third row we assume that only fifty percent of Medicaid-eligibles take up coverage, and the corresponding enrollment numbers are 18.6 and 21.8 million.

The fourth row of the table focuses on those individuals above 133 percent of the poverty line and thus ineligible for Medicaid. These individuals would gain coverage via the private insurers in the state exchanges. We estimate that without a mandate just over forty percent of the uninsured above 133 percent of the poverty line, or roughly 11 million people, would voluntarily enroll in an exchange plan.[27]

5.1.2 Enrollment with a penalty

Following the typical terminology of the debate, we refer to an "individual mandate" as the financial penalty individuals must pay under ACA if they do not enroll in a health insurance plan. To assess the effect of the penalty, we add the penalty to individuals' estimated willingness to pay. The implicit assumption is that if individuals were willing to pay, say, \$2,000 for a health insurance plan, they would be willing to pay \$2,800 for a health insurance plan and the opportunity to avoid losing \$800. Treating the mandate as merely a tax is a simplification, and we discuss alternative models in Section 5.1.3.

The terms of the individual mandate under the Affordable Care Act are relatively simple,

[27] Note that many currently insured individuals would switch from their current plans to exchange plans, as only the latter qualify for subsidies, so that total enrollment in the exchanges would be substantially higher than the estimated number of uninsured individuals who would gain coverage via the exchanges.

and thus calculating each respondent's penalty is straightforward. The mandate is phased in between 2014 and 2016; in 2016, individuals must pay the maximum of $695 or 2.5 percent of household income, with $695 indexed to a cost-of-living adjustment for subsequent years.[28] The mandate exempts certain groups, including those below the federal income tax filing threshold (in 2008, $8,025 for individuals and $16,050 for couples) and those facing a premium greater than eight percent of household income. We assume non-mandate take-up rates for these groups.

The last three columns of Table 4 present enrollment estimates assuming non-exempt individuals without insurance would be subject to the individual mandate penalty. Overall, we estimate that 67.5 percent of adults would enroll in a health plan assuming any Medicaid-eligible individual with positive willingness-to-pay enrolls (over 77 percent would have enrolled if unauthorized immigrants were not excluded). The share falls from 67.5 percent to 66.9 and 63.3 percent if enrollment among mandate-exempt Medicaid eligibles falls to 85 and 50 percent, respectively.[29] Using the same method as before, these figures translate to between 33 and 35 million uninsured individuals enrolling in a health plan.

The last row shows that the mandate substantially increases private insurance take-up. The number of currently uninsured individuals estimated to enroll in an exchange plan increases by nearly forty percent when a mandate is added to the ACA subsidies. The magnitude of the mandate effect depends in part on how one views Medicaid take-up. Because more than half of those under 133 percent of the poverty level are nonetheless subject to the mandate because they are above the filing threshold, in many of our simulations the mandate substantially increases Medicaid take-up. If without a mandate we assume that only half of eligibles actually enroll, then a mandate increases total enrollment by over fifty percent. If one instead takes the view that eligibility for Medicaid is equivalent to being covered, then the mandate's effect is more limited.

5.1.3 Discussion of enrollment estimates and comparison to CBO

Even when we assume low Medicaid take-up rates, our estimates are still greater than those of the CBO, which estimates that 30 million uninsured Americans will gain coverage by 2016. In fact, there are several modeling choices we have made that would tend to underestimate our coverage results relative to the modeling choices made by CBO, making our larger projections even more striking.

[28] We use the CBO's inflation projections to deflate the $695 into 2008 dollars.

[29] Note that in rows 2 and 3 under a mandate, we apply the Medicaid enrollment assumptions only to the *exempt* population (those under the filing threshold) as even many individuals at 100 percent of the poverty line would be subject to the $695 penalty and thus would enroll in the free program to avoid it.

First, we have only considered premium subsidies to individuals, whereas the CBO also considered the effects of premium subsidies to small employers.[30] Second, we have only considered premium subsidies, whereas the ACA also contains cost-sharing subsidies for low-income exchange enrollees, which makes the insurance plan more generous and would presumably increase take-up rates. Third, recall that we asked individuals what they would be willing to pay to "get a health insurance policy for yourself," whereas in reality the premium prices we imputed for individuals in Sections 5.1.1 and 5.1.2 were for policies that covered the *entire household*.

Finally, to be conservative, we have modeled the mandate as merely a tax, whereas the CBO suggests it takes a broader view of how the mandate will encourage enrollment. First, CBO suggests that the mandate might signal that enrolling in health insurance is now the social norm, and thus would have an additional effect as individuals tend to comply with social norms. Second, as Baicker *et al.* (2012) argue, loss aversion makes the mandate more effective than a subsidy—individuals know with certainty that they will lose money today (or when they file their taxes) if they do not follow the mandate. In contrast, health insurance typically involves a certain loss today (the premium) with a benefit only if one falls ill in the future, and thus individuals who are loss-averse might have low enrollment probabilities absent a mandate. Finally, the tax salience literature suggests that the more salient the penalty, the greater is compliance, and as such the political fervor over the mandate might actually increase its effectiveness.[31]

Given these important respects in which we have been more conservative than the CBO, how do we still find larger enrollment estimates? While the CBO never spells out its assumption on the price elasticity of demand for insurance, their past reports suggest they believe it is substantially smaller than our estimates.[32] An important piece of evidence supporting

[30]Nowhere in CBO's final report on the ACA do they specify the coverage effects of this particular provision, but given their past publications stating their assumption that the elasticity of employer offer with respect to premium is over one for firms with fewer than 25 employees, they likely calculate a small but non-trivial coverage effect of this provision. See "Key Issues in Analyzing Major Health Reform Proposals," December 2008, `www.cbo.gov/publication/41746`.

[31]See `www.cbo.gov/publication/21600` for the August 2010 CBO report "Will Health Insurance Mandates Increase Coverage?" This document provides an overview of how CBO modeled the effects of the ACA mandate and argues that modeling it merely as a tax would underestimate its effects. The report contains much of the "on the one hand....on the other" analysis but in the conclusion they suggest that overall the effect of the mandate is larger than a tax model would suggest (see p. 25 of the document).

[32]CBO writes: "The available studies suggest that a new 25 percent subsidy for individually purchased coverage would cause 2 percent to 6 percent of the uninsured population to buy that coverage." (see "Key Issues in Analyzing Major Health Reform Proposals"). In contrast, we find that one-third of uninsured individuals would purchase an individual plan at a price of $3,000,

the plausibility of our results is that our projections are very similar to findings from Massachusetts, which, as noted earlier, saw its uninsured rate for non-elderly adults fall by 70 percent after the adoption of the 2006 reform. In fact, Massachusetts might be a lower bound for the effect of the ACA. As the CBO writes, "although similar to the new national mandate [i.e., the ACA mandate], the Massachusetts mandate is more limited." They cite the Massachusetts mandate's smaller maximum penalty, its application only to adults, its applying to individuals only above 150 percent of the poverty line instead of above the substantially lower IRS filing threshold, as well as its weaker enforcement mechanisms.[33]

5.2 Estimating adverse selection under the Affordable Care Act

There are many questions in the Gallup data referring to past and current health conditions, and we examine whether people who appear in worse health are more likely to say they would purchase health insurance in our pricing experiment.

The first panel of Table 5 reports differential enrollment patterns with respect to general health variables.[34] With or without a mandate, no statistically significant differential selection patterns emerge for these variables. The next group of variables describe individual disease histories. Both with and without a mandate, individuals with a history of high blood pressure are more likely to take-up coverage. Without a mandate, those with a history of cancer are less likely to join whereas those with a history of asthma are more likely.

With and without a mandate, enrollment patterns display large differences along demographic dimensions, though the results above suggest these differences do not translate into large cost differences. Women and minorities are more likely to enroll, while higher-income individuals are less likely. The income result is likely due to two effects. First, subsidies, even on a percentage basis, are more generous for poorer households. Second, richer uninsured households are more likely to have had the opportunity to purchase health insurance in the past but evidently chose not to, revealing weak demand for insurance.

While Table 5 reports take-up patterns for all currently uninsured respondents in the Gallup sample, we may worry more about adverse selection in the *private* market, given

suggesting that even if they had been facing a price of $12,000 a year (which is roughly the price of most *family* plans), our estimates would still suggest greater price sensitivity and thus greater scope for subsidies to increase take-up.

[33]See p. 11 of the August 2010 report mentioned earlier.

[34]Because we are interested in the personal characteristics of those who take-up insurance and not the total number, we do not try to exclude unauthorized immigrants in this or the later analyses in this section, as there is no way to identify them in the Gallup sample (though results excluding Hispanics—an admittedly crude proxy for unauthorized immigrants—are essentially identical and are available upon request). As such, we report higher take-up rates than in Table 4 because we are not scaling by the ACA-eligible share of the uninsured.

that individuals in Medicaid do not pay any premiums and thus cannot meaningfully "free-ride." Appendix Table 1 replicates Table 5 after dropping all respondents under 133 percent of the poverty line and thus eligible for Medicaid. Most of the same patterns emerge, though fewer differences are statistically significant as the sample size shrinks.

How can our results of limited adverse selection be reconciled with past evidence of adverse selection in the health insurance market? First, some papers, e.g. Cutler and Reber, find that sicker people are more likely to choose a generous plan when offered a menu of choices, whereas our results concern the extensive margin of choosing to have insurance at all. Second, as the ACA subsidies are highly progressive, those with the highest projected take-up rates have very low income levels and are most likely uninsured because they cannot afford to pay even a modest premium, not because they were denied on the basis of their health.

While we project minimal adverse selection under the specific ACA subsidy schedule, we do not conclude that there is thus no benefit from an individual mandate. First, recall that we did report in Table 3 that healthier individuals are more price-sensitive. As such, they might not choose to enroll under a less generous subsidy schedule, meaning an individual mandate could be needed to prevent adverse selection were the subsidy schedule to change. Indeed, Chandra *et al.* (2011) compare pre- and post-mandate enrollment patterns in Massachusetts and conclude that the mandate was essential in drawing in healthier individuals.

Second, past work (e.g., Currie, 2004) has suggested that enrollment decisions are not merely a function of cost and willingess-to-pay, but of salience and convenience as well, and adverse selection could operate along the latter two margins. For example, being hospitalized might act as a trigger for an individual to enroll in Medicaid or a state exchange; not only does the experience likely make insurance more salient, but hospitals might well have an incentive to facilitate the enrollment process on behalf of the individual so they are reimbursed for his care. Given that contact with hospitals and other medical providers is a function of health, this mechanism might lead sicker individuals to enroll more quickly. A mandate could increase the salience of health insurance, even among those with limited contact with the health care sector, and thus help equate take-up rates between those in good and poor health.

Finally, our results suggest that the mandate increases take-up. Greater take-up means more access to primary and preventive care, which may have beneficial spillovers.

5.3 How would the ACA change the composition of the privately insured?

The analysis so far has focused on selection within the uninsured population. Now, we compare those we predict will take up private coverage under the ACA to those who already have private insurance. This analysis relates to whether premiums would increase for those already covered by a private plan due to the influx of newly insured individuals via the ACA.

The first column of Table 6 reports summary statistics for insured respondents in the Gallup data who are not covered via Medicaid, Medicare, or veteran's or military insurance.[35] The second column reports the difference between those who would gain private insurance without a mandate, and the privately insured respondents in the first column. The third column reports this same difference when the mandate is in effect.

The "flow" of the new entrants into private plans are over 2.5 (3.6) years younger than the "stock" of the currently enrolled without (with) a mandate. With respect to specific conditions and diseases, no clear pattern emerges. A history of high blood pressure, high cholesterol or cancer appear less likely among the new entrants than current enrollees, whereas the reverse is true for heart attacks and asthma. We conclude from these offsetting patterns that, overall, the health of the new entrants is not substantially different than the current enrollees and thus there should be little effect on the premiums of the currently insured through this channel.

5.4 Welfare analysis and distributional effects of the Affordable Care Act

Using our willingness-to-pay estimates, it is possible to estimate the implied consumer surpluses resulting from the coverage provisions in the Affordable Care Act. However, these estimates are very crude approximations of the welfare effects of the program. First, they ignore positive externalities from any improvements in health due to increased access to medical care. Second, they only consider the effects on the currently uninsured, whereas many currently insured individuals will see their premiums fall due to ACA subsidies. Third, the currently insured would also benefit from the insurance value of Medicaid expansions and exchange subsidies.

Without a mandate, we define surplus as the difference between willingness to pay and the premium price for all those who do enroll, and zero for those who do not enroll. With a mandate, consumer surplus is also equal to willingness to pay minus the premium price for all those who enroll, but in this case surplus will be negative for all those for whom $premium - penalty < WTP < premium$. For those who do not enroll, surplus is negative and equal to the amount of the penalty.

Table 7 shows how the level and distribution of the implied consumer surplus varies across the two regimes. The first two columns assume there is no mandate. The average surplus is just under $1,300, but among the 64 percent who enroll the surplus is over $2,000. The surplus is distributed in a highly progressive manner, with the poorest half of the sample

[35] That is, they are covered by their employer (84 percent) or "other" (16 percent).

receiving greater benefits than the richer half.

The rest of the table focuses on the case with a mandate. Average surplus falls, which by construction it must, since in the way we have narrowly modeled it, those who would have taken up without a mandate gain nothing and those who would not have taken up and who are not mandate-exempt are made worse off. Among those who do not enroll, surplus is bounded above by zero (for those who are mandate-exempt) and negative for anyone who must pay the penalty. The average surplus among this group is roughly -$400, with the loss to the richer half of households nearly twice that to the poorer half. The last column shows that the average loss to the 35 percent of uninsured individuals made no better off by the policy is roughly $600.

One of the largest determinants of whether an individual is made worse off by the mandate is income. On average, those made worse off are in households with income 4.4 times the poverty line, or $98,000 for a family of four. As discussed earlier, all else equal, having high income conditional on being uninsured suggests limited preference for health insurance. As these individuals have limited demand but face the steepest penalties, they have the least to gain from the policy.

6 Conclusion

We collect new data on uninsured Americans' willingness-to-pay for a health insurance plan. As this group is not usually offered health insurance by their employers (the primary providers of health insurance in the US) they are generally excluded from observational data used in the vast majority of past research, which focuses on employer-provided insurance. Yet the preferences of these individuals are key to formulating a policy that could achieve universal coverage.

Instead of relying on observational data, we present uninsured individuals with different premium prices and ask whether they would pay that price to enroll in a health plan equivalent to those offered federal employees. We find elasticities of take-up with respect to price around one, far larger in magnitude than those found in past work. Our results suggest that directly subsidizing the purchase of a private health plan would significantly shrink the uninsured population—for example, more than 60 percent of the uninsured would take up the plan at an annual premium of $2,000, and we estimate that 35 million individuals would gain coverage under the specifications of the ACA.

Part of the difference between our result and those in past work is that our sample of uninsured individuals is much poorer than the samples of people offered employer-provided insurance used in past papers and the rich and poor may have difference price elasticities (indeed, relatively richer people in our sample have lower elasticities). Moreover, as we focus on plans to subsidize premium prices, we estimate elasticities based on variation around a lower price point than most existing papers, which could lead to different estimated elasticities even if our subjects have the same demand function as subjects in past work.

It may also be that our methodology—which has the advantages of random variation in premium prices and a homogenous insurance product, but some of the disadvantages associated with hypothetical-valuation studies—may also contribute to the difference. While we cannot directly address every critique of hypothetical valuation, we find little evidence of common problems such as anchoring and acquiescence bias. Concerns about hypothetical valuation notwithstanding, the large elasticity estimates our results generate suggest that extrapolating the effects of premium subsidies for the uninsured from the elasticities generated in past papers could considerably under-estimate the coverage rates these policies could achieve.

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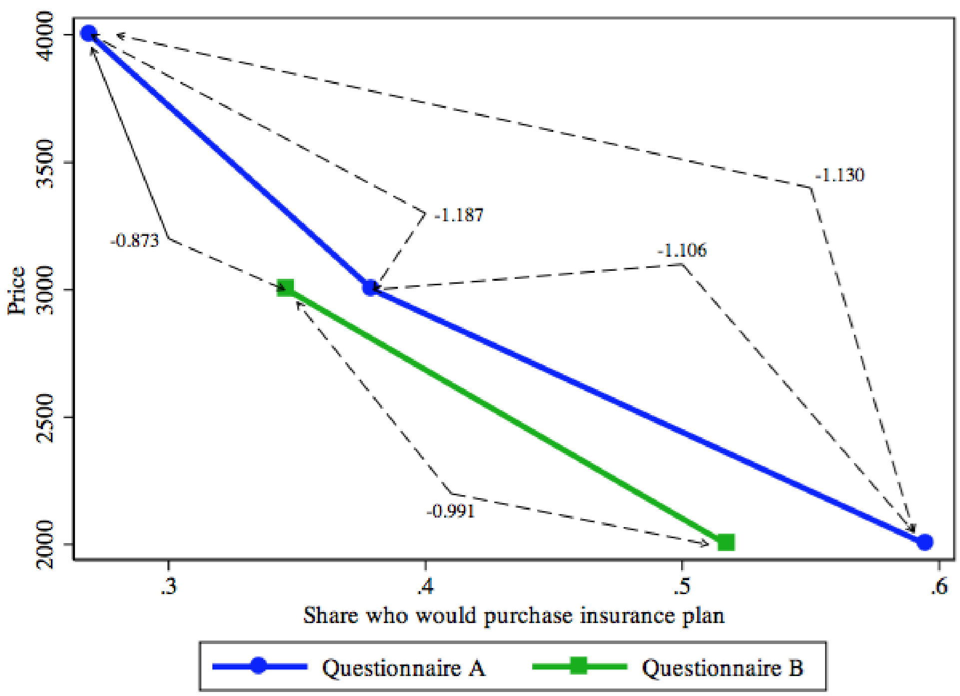
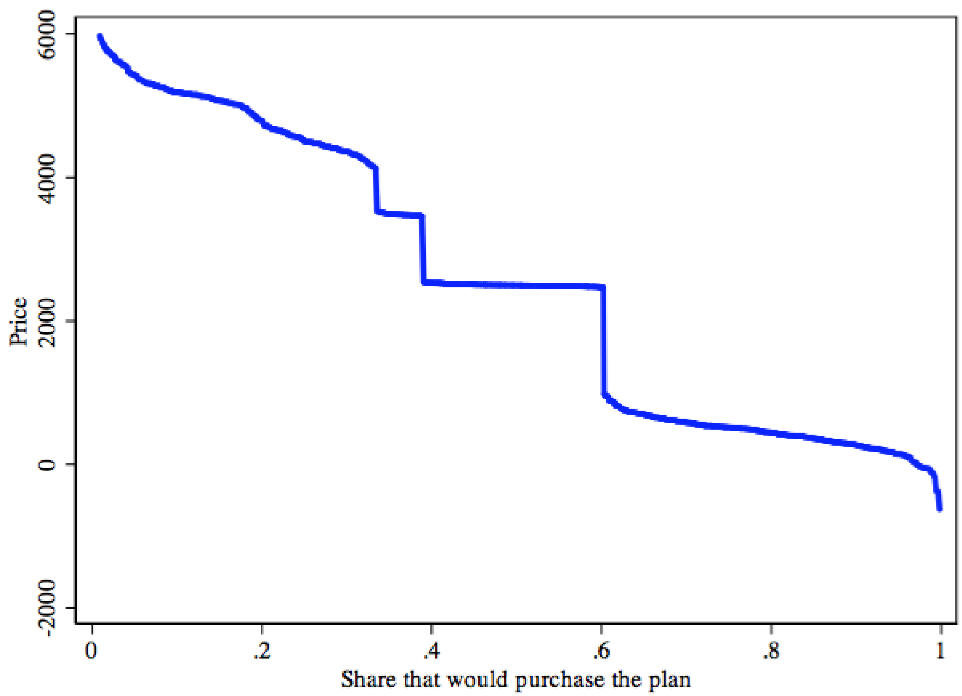
Figure 1: Take-up rates by premium price and implied arc elasticities



Notes: Figure based on data from the Gallup Daily Poll (see text for details). Subjects were randomly given either Questionnaire A (which offers a first price of \$4,000 and then subsequently \$3,000 and then \$2,000 if subject decline at previous price) or Questionnaire B (which initially offers a price of \$3000 and then \$2,000). Arc elasticities not labeled in the Figure are: -0.946 (comparing take-up at \$2,000 in Questionnaire B and \$4,000 in Questionnaire A), -0.769 (\$2,000 from B and \$3,000 from A) and -1.322 (\$2,000 from A and \$3,000 from B).

Figure 2: Estimated demand curve for subsidized health plan



Notes: Estimated reservation prices are plotted on the y-axis and the share with reservation price at or above that value on the x-axis. Reservation prices were estimated using an interval regression of subjects' reported price intervals. See Section 4.3 for details.

Table 1: Summary statistics by insurance status

	Uninsured		Insured, all		Ins. by employer	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
Female	1213	0.461	8824	0.512	6474	0.507
Black	1067	0.115	8352	0.122	6194	0.106
Annual income	984	35,393	7203	71,269	5387	79,497
Employed	1213	0.640	8809	0.758	6465	0.866
Married	1204	0.353	8794	0.584	6456	0.666
Age	1213	38.39	8824	42.82	6474	43.41
Previously denied insurance	1182	0.139	1163	0.0633	861	0.0534
Days sick last month	1195	3.535	8775	2.835	6456	1.655
Ever diagnosed with...						
High blood pressure	1208	0.185	8800	0.240	6456	0.221
High cholesterol	1208	0.160	8789	0.232	6449	0.224
Diabetes	1211	0.0860	8804	0.0836	6459	0.0689
Heart attack	1211	0.0317	8802	0.0285	6459	0.0187
Asthma	1211	0.134	8808	0.118	6461	0.103
Cancer	1209	0.0312	8806	0.0483	6457	0.0451

Notes: All data from the Gallup daily poll of adults 18 and over from August 22 to September 8, 2008. We exclude individuals 65 and older, the vast majority of whom would be covered by Medicare. Sample weights provided by Gallup are used. For those with insurance, the question on previous denials of insurance was only asked the first two days of the survey.

Table 2: Estimating insurance take-up as a function of premium price

	Dependent Variable: Would purchase health plan					
	(1)	(2)	(3)	(4)	(5)	(6)
Price	-0.152***	-0.167***	-0.173***	-0.182***	-0.164***	-0.130***
	[0.0107]	[0.0126]	[0.0147]	[0.0124]	[0.0121]	[0.0314]
Female			-0.0491**	-0.0523		-0.0481
			[0.0204]	[0.0364]		[0.0314]
Black			0.156***	0.167***		0.148***
			[0.0338]	[0.0605]		[0.0522]
Asian			0.178**	0.189		0.168
			[0.0892]	[0.151]		[0.139]
Hispanic			-0.0607*	-0.0638		-0.00653
			[0.0314]	[0.0622]		[0.0484]
Age			0.000129	0.000121		0.00164
			[0.000816]	[0.00139]		[0.00126]
Log of income			0.0318***	0.0341***		0.0288***
			[0.00570]	[0.0117]		[0.00879]
Randomized to Questionnaire A			0.0159	0.0144		
			[0.0217]	[0.0363]		
Estimation method	OLS	OLS	OLS	Probit	OLS, fix. eff.	OLS
Sample	All	No missing controls	No missing controls	No missing controls	All	First price point
Observations	2,975	2,202	2,202	2,202	2,975	865

Notes: See Table 1 for information on data and sampling. Each observation is a person-price, where price takes on values of $\{\$2,000, \$3,000, \$4,000\}$ if the respondent received questionnaire A or $\{\$2,000, \$3,000\}$ if the respondent received questionnaire B. All regressions in cols. (1) through (5) are weighted by sample weights provided by Gallup, though sample weights are multiplied by $\frac{2}{3}$ for those in Questionnaire A so that they do not make a larger contribution to the estimate merely because they have three price points, though results are unchanged if the original Gallup sample weights are used. Col. (6) samples only the first price-point from each Questionnaire so uses the original Gallup weights. In col. (6), all price variation comes from random assignment to Questionnaires so the Questionnaire dummy variable drops out.

Table 3: Estimates of the elasticity of take-up with respect to premium price

Subsample	Elasticity	Observations
All	-1.074068	2975
Age 30 or younger	-1.299247	624
Age 40 or older	-.9020666	1745
Has a health problem	-.953825	673
Does not have a health problem	-1.098085	2289
Previously denied insurance	-.8665808	451
Never denied insurance	-1.109164	2511
Family income in upper quartile	-.841981	892
Family income in bottom quartile	-1.193488	1090

Notes: See Tables 1 and 2. Elasticities are based on the fixed-effects regression in col. (5) of Table 2, estimated separately for each subsample. "Top income quartile" is based on being above the 75$^{\text{th}}$ percentile in household income in our data ($54,000) and "has a health problem" is defined as answering "yes" to the question: "Do you have any health problems that prevent you from doing any of the things people your age normally do?" Observations are counted at the person-price level.

Table 4: Enrollment estimates under the Affordable Care Act under various assumptions regarding Medicaid enrollment

	Without "mandate"			With "mandate"		
		Number (millions)			Number (millions)	
Medicaid assumption	Take-up rate	Adults	Total	Take-up rate	Adults	Total
Enroll if $WTP > 0$	0.562	25.0	29.2	0.675	29.9	35.1
85% take up	0.539	23.9	28.0	0.668	29.7	34.8
50% take up	0.418	18.6	21.7	0.632	28.1	32.9
Excl. Medicaid eligibles	0.405	9.4	11.0	0.559	12.9	15.2
Total obs.	816					
–Ex. Medicaid	535					

Notes: Estimates based on willingess-to-pay results from the Gallup data in Section 4.3. As subsidies are based on an individual's income, we can only estimate the effect of ACA provisions on the 816 observations for whom we have both a willingness-to-pay estimate and a valid response to the household income question. In all cases we have adjusted take-up rate projections downward to account for the estimated 12.3 percent of the currently uninsured who are unauthorized immigrants, as described in Section 5.1.1. The first row assumes any enrollee for whom $WTP > premium - penalty$ will take-up coverage, and thus assumes that any Medicaid-eligible individual with positive WTP will enroll, as premiums are equal to zero for this group. The second and third column treat Medicaid eligibles differently, assuming that, respectively, only 85 and 50 percent will enroll. The second and fifth columns merely multiply the first column and fourth column, respectively, by the product of CBO's estimate of the total number of uninsured in 2016 without the ACA (52 million) and the adult share of the uninsured in 2010 (.8538). (Note that the adjustment for unauthorized immigrants is already accounted for in the lower take-up rate.) The estimated totals in the third and sixth column merely scale the numbers in, respectively, the first and fourth column by the inverse of the adult share and thus assume that children have the same take-up rates as adults. The fourth row replicates the first row, but only for the 535 observations with valid willingness-to-pay and income measure who are also above 133 percent of the poverty line and thus ineligible for Medicaid.

Table 5: Characteristics of those predicted to take up coverage or remain uncovered under ACA

	Without mandate			With mandate		
	Covered	Uncov.	Diff.	Covered	Uncov.	Diff.
General health variables						
Has a health problem	0.25	0.21	0.045	0.24	0.21	0.027
Days sick last month	4.07	3.31	0.75	4.02	3.04	0.98
Previously denied insurance	0.15	0.11	0.045	0.14	0.12	0.021
Age	40.2	37.4	2.81*	39.4	38.7	0.71
Ever diagnosed with...						
High blood pressure	0.23	0.16	0.078**	0.23	0.13	0.10**
High cholesterol	0.18	0.13	0.048	0.17	0.15	0.019
Cancer	0.029	0.052	-0.023*	0.032	0.055	-0.023
Heart attack	0.048	0.024	0.024	0.044	0.023	0.021
Diabetes	0.091	0.082	0.0083	0.097	0.058	0.039
Asthma	0.16	0.080	0.079**	0.13	0.12	0.016
Demographic variables						
Female	0.48	0.38	0.094*	0.47	0.37	0.093*
Black	0.14	0.055	0.086**	0.12	0.060	0.065**
Hispanic	0.12	0.059	0.061**	0.11	0.059	0.051
Annual income ÷1000	30.3	52.0	-21.6**	36.6	43.1	-6.46
Share enrolling	0.64			0.77		

Notes: The sample in this table are all 816 Gallup respondents who report being currently uninsured and have both an estimated willingness-to-pay value from Section 4.3 and non-missing household income information. "Covered" refers those who are predicted to take-up either Medicaid or exchange coverage under ACA, and "Uncovered" refers to the rest of the currently uninsured. We assume an individual will take-up coverage whenever $WTP > premium - penalty$, so these estimates correspond to the first row of Table 4. However, unlike in Table 4, we do not adjust for unauthorized immigrants, as in this table we focus on the individual characteristics of those who take up and not their total number (results excluding Hispanics, as a very rough proxy for unauthorized immigrants, are essentially identical). As such, take-up rates are higher in this table than in Table 4. $^{*}p < 0.1^{**}p < 0.05$

Table 6: Comparing those gaining private coverage under ACA to current private enrollees

		Difference: New versus current enrollees	
	Current enrollees	No mandate	Mandate
General health variables			
Age	42.9	-2.56**	-3.68**
Has a health problem	0.13	0.031	0.037**
Days sick last month	1.83	0.52	0.87**
Previously denied insurance	0.061	0.087**	0.073**
Ever diagnosed with...			
High blood pressure	0.22	-0.047**	-0.025
High cholesterol	0.22	-0.081**	-0.089**
Cancer	0.044	-0.016	-0.019*
Heart attack	0.019	0.016**	0.015**
Diabetes	0.068	-0.0054	0.013
Asthma	0.10	0.037**	0.0020
Observations	7726	263	353

Notes: The first column includes all those in the Gallup survey who report having health insurance, but excludes those who are on Medicaid or Medicare or on veteran's or military insurance (leaving employer and "other" as the source of insurance). The second column reports the difference between: 1) all the uninsured in the Gallup survey who are predicted to take up coverage under ACA without a mandate but who are over 133 percent of the poverty line and thus ineligible for Medicaid; and 2) the individuals in the first column. The third column is identical to the second but assumes the ACA mandate is in place. As in Table 5, we do not attempt to exclude unauthorized immigrants, but excluding Hispanics do not change results. $^{*}p < 0.1^{**}p < 0.05$

Table 7: Estimates of consumer surplus under the Affordable Care Act

	Without mandate		With mandate				
				Enrolled/Mcaid		Surplus > 0	
	All	Enrolled/Mcaid	All	Yes	No	Yes	No
Average surplus	1291	2013	1084	1528	-397	2013	-578
Avg., low income	1633	2187	1554	1900	-282	2187	-312
Avg., high income	636	1448	183	577	-491	1448	-807
Share of total		0.641		0.769	0.231	0.641	0.359

Notes: Consumer surplus is equal to willingess to pay minus premium price for all those who enroll in a plan. Enrollment is assumed whenever $WTP > premium - penalty$, as in the first row of Table 4. However, unlike in Table 4, we do not adjust for unauthorized immigrants, as in this table we focus on the individual characteristics of those who take up and not their total number (results excluding Hispanics, as a very rough proxy for unauthorized immigrants, are essentially identical). For those who do not enroll, consumer surplus is set to zero under the no-mandate assumption. Under a mandate, it remains at zero for those who are mandate-exempt, and equal to $-penalty$ for those not exempt. "High" and "low income" refer, respectively, to those above and below the sample's median income of $30,000.

Appendix Table 1: Characteristics of those predicted to take up coverage or remain uncovered under ACA, excluding Medicaid eligibles

	Without mandate			With mandate		
	Covered	Uncov.	Diff.	Covered	Uncov.	Diff.
General health variables						
Has a health problem	0.16	0.19	-0.031	0.17	0.20	-0.028
Days sick last month	2.35	3.16	-0.81	2.70	2.94	-0.23
Previously denied insurance	0.15	0.11	0.036	0.13	0.12	0.017
Age	40.4	37.9	2.46	39.2	38.7	0.55
Ever diagnosed with...						
High blood pressure	0.17	0.15	0.016	0.19	0.11	0.085**
High cholesterol	0.14	0.13	0.010	0.13	0.14	-0.0088
Cancer	0.029	0.033	-0.0044	0.025	0.042	-0.016
Heart attack	0.035	0.026	0.0087	0.034	0.025	0.0092
Diabetes	0.063	0.083	-0.020	0.081	0.060	0.021
Asthma	0.14	0.073	0.066**	0.10	0.10	0.0017
Demographic variables						
Female	0.42	0.35	0.072	0.39	0.36	0.030
Black	0.12	0.060	0.061**	0.10	0.063	0.040
Hispanic	0.093	0.050	0.042	0.074	0.062	0.012
Annual income ÷1000	52.9	55.9	-3.06	60.0	44.9	15.0**
Share enrolling	0.46			0.64		

Notes: See Table 5. The sample in this table are all 535 Gallup respondents who report being currently uninsured, have both an estimated willingness-to-pay value from Section 4.3 and non-missing household income information, and are at at least 133 percent of the poverty line and thus ineligible for Medicaid.

Survey questions

Questionnaire A

- If you could get a health insurance policy for yourself that is as good as the one that members of Congress have, given your current financial situation, would you buy it for \$4,000 a year, which works out to \$333 per month?
- If you could get that health insurance plan for \$3,000 a year, which works out to \$250 per month, would you buy it?
- If you could get that health insurance plan for \$2,000 a year, which works out to \$167 per month, would you buy it?

Questionnaire B

- If you could get a health insurance policy for yourself that is as good as the one that members of Congress have, given your current financial situation, would you buy it for \$3,000 a year, which works out to \$250 per month?
- If you could get that health insurance plan for \$2,000 a year, which works out to \$167 per month, would you buy it?