Price and the Health Plan Choices of Retirees

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Abstract

This study analyzes health plan choices of retirees in an employer-sponsored health benefits program that resembles "premium support" models proposed for the Medicare program. A recent change in the employer's premium contribution policy creates a natural experiment for estimating the effect of premiums on the choice among competing plans. The amount the firm contributes toward a retiree's coverage depends nonlinearly on when an individual retired and his or her years of service as of that date. Changes over time in the employer contribution generate additional variation. Since this price variation is exogenous to unobserved plan attributes and retiree characteristics likely to affect the demand for insurance, it possible to obtain unbiased premium elasticity estimates. The results indicate that price is a significant factor influencing the health insurance decisions of retirees. Preliminary elasticity estimates are at the low end of the range found in previous studies on active employees.

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1 Introduction

The future of the Medicare program represents one of the most pressing domestic policy issues facing the US today. The aging of the baby boom generation will create tremendous fiscal pressure on the program, both because of an increase in beneficiaries and a decline in the size of the working population funding the program through payroll taxes. The recently enacted prescription drug benefit will exacerbate the spending trends driven by demographic changes and technology-driven growth in health care spending. In light of these developments, controlling the growth of Medicare spending is a critical policy goal.

In recent years, a number of proposals have been made to reorganize Medicare to place a greater emphasis on market-based competition among health insurance plans.[1] In contrast to the current system of administrative pricing, payments to health plans in these "managed competition" or "premium support" models would be based on competitive bidding. The government's contribution toward coverage would be set so as to expose beneficiaries to differences in premiums charged by competing plans. Individuals choosing a more costly plan would be required to pay the difference between the plan's premium and the government contribution. Advocates of market-oriented reform argue that these financial incentives will cause beneficiaries to migrate to lower cost plans, which, in turn, will create a strong incentive for plans to control costs in order to compete on price.

In order to assess the potential impact of market-oriented reform proposals, it is necessary to understand the price sensitivity of Medicare beneficiaries. While a number of studies examine the effect of premiums on the choice among alternative health plans, this literature has largely focused on the behavior of non-elderly employees. An obvious concern is that the results from these studies may not generalize to the Medicare population. This study investigates the effect of premiums on the health insurance decisions of retirees in a setting

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[1]The most prominent examples are proposals that came out of the National Bipartisan Commission on The Future of Medicare. In 1999, the majority of the Commission's members supported a market-oriented reform proposal, though this proposal did not achieve the super-majority necessary for a formal recommendation. Subsequent legislative proposals include bills authored by the chairmen of the Commission, Senator John Breaux and Congressman Bill Thomas and more recent legislation proposed by Breaux and Senator Bill Frist (S. 357). These bills have important similarities to reform strategies advocated by academic health economists and other policy analysts.For example, see Enthoven (1988), Aaron and Reischauer (1995), Butler and Moffit (1995) and Dowd, Feldman and Christianson (1996).

that resembles prominent Medicare reform proposals. The analysis is based on six years of data from a medium-sized employer that offers its retirees several health insurance options. Like many employers, in the mid-1990s this company changed its policies concerning the financing of these insurance options. Whereas it had previously paid the full amount for each retiree's insurance, the amount the firm now contributes toward a retiree's coverage depends on when the person retired and her years of service at that point. As a result, otherwise similar retirees who either retired at different times or at the same time with different years of service face very different relative prices for the same menu of health plans. Changes over time in the employer contribution and plan premiums create additional price variation that is also plausibly exogenous to other health plan attributes and important retiree characteristics that are likely to affect the demand for insurance. Because of this variation, these data are well-suited for estimating the effect of price on retirees' health plan choice decisions.

Using these data, I estimate conditional logit models of the health plan choice decision. I find a negative and statistically significant effect of price on the probability a health plan is chosen by retirees. The magnitude of the effect is comparable to what has been found in previous studies of retirees that use different data and identification strategies. This effect is smaller than what has been found in studies focusing on non-elderly employees.

The paper is organized as follows. The next section reviews the existing literature on the effect of price on health plan choice decisions. Sections 3 and 4 describe the data and econometric methods, respectively. Results are presented in Section 5 and concluding comments in Section 6.

2   Previous Research on Health Plan Choice

A number of studies examine the effect of out-of-pocket premiums on health plan choice decisions, typically using data from a single employer and focusing on the decisions of employees rather than retirees. A key methodological issue for this literature is the source of variation in out-of-pocket premiums. When the variation comes entirely from differences across plans, correlation between premiums and other unmeasured plan characteristics becomes a possible

source of bias. Barringer and Mitchell (1994) suggest that this type of omitted variable bias is a likely explanation for their counterintuitive finding of a positive effect of price in some models. Similarly, in their cross-sectional analysis of data from the Federal Employee Health Benefit Program, Wedig and Tai-Seale (2002) find that the estimated effect of premiums is very sensitive to the inclusion of other plan characteristics in the regression model.

The most convincing evidence on premium elasticities comes from studies that rely on within-plan differences in employer premium contributions for identification. Feldman et al. (1989) use data from 17 Twin Cities firms that offer an overlapping set of health plans to their employees. In this data set, differences in employer contribution policies mean that different individuals face different prices for the same plans. Three other studies analyze the effect of price differences generated by changes in a single employer's contributions from one year to the next. Cutler and Reber (1998) examine the effects of a change in Harvard University's health plan contribution policy that changed out-of-pocket premiums for employees. Their results imply "enrollee perspective" premium elasticities ranging from -0.3 to -0.6. Royalty and Solomon (1999) analyze two years of data from Stanford University. Their conditional logit results imply enrollee perspective elasticities in the same range; results using a fixed effect logit specification imply even stronger price effects. Strombom et al. (2002) estimate premium elasticities using data on employees of the University of California (UC). The range of their elasticity estimates is very similar to those of the two earlier studies.

There are reasons to expect Medicare beneficiaries to be less sensitive to health insurance premiums than the active employees analyzed in these studies. Research on how the elderly perceive health insurance options suggests they place much more importance on factors such as quality of care, freedom of referral, and the burden of paperwork than on premiums (Harris 1997; Harris and Keane 1999). Thus, to the extent that Medicare beneficiaries view plan alternatives as being differentiated along these other dimensions, their choices will be less strongly influenced by differences in premiums. Experimental research finding that elderly consumers are more likely to treat health insurance premiums as a signal of quality (Uhrig and Short 2002/2003) also points to a negative relationship between age and price sensitivity. An additional reason to expect older consumers to have a less elastic demand for health insurance comes from the fact that health insurance decisions are subject to

persistence and "status quo bias" (Neipp and Zeckhauser 1985; Samuelson and Zeckhauser 1990). To the extent that older consumers face higher "switching costs", they will be even be less willing than younger individuals to change plans in response to a change in relative prices. In particular, it seems likely that Medicare beneficiaries with strong ties to particular providers will be reluctant to switch from one managed care plan to another if it means also having to change providers or to risk an interruption in treatment.

The results of several studies suggest the importance of switching costs in health insurance decisions. Strombom et al. (2002) estimate separate premium elasticities for 18 mutually exclusive groups of employees hypothesized to differ in terms of the cost of switching health plans. Consistent with the switching cost hypothesis, they find that price sensitivity declines with age and employment tenure and is lower for individuals with higher expected medical care utilization. Royalty and Solomon (1999) obtain qualitatively similar results when they test for differences in price sensitivity related to age, employment tenure and a different measure of health status. Wedig and Tai-Seale (2002) also find that new employees are substantially more price sensitive to incumbent employees and Beaulieu (2002) finds some evidence that younger employees are more price sensitive than older ones.

While limited, direct evidence on the behavior of elderly consumers also suggests that they are less sensitive to health plan premiums than younger consumers. In an earlier study, I examine how retirees from the UC responded to changes in out-of-pocket premiums caused by a change in the University's premium contribution (Buchmueller 2000). The results indicate that while changes in out-of-pocket premiums have a statistically significant effect on the decision to switch plans during open enrollment, UC retirees are much less price sensitive than active employees who faced similar price changes. I also examine the effect of rising premium contributions on the percentage of retirees choosing fee-for-service Medigap coverage rather than an HMO. The structure of this part of the analysis resembles the work by Cutler and Reber (1998). The enrollee perspective elasticities for UC retirees range from -0.12 to -0.24, which is smaller than the range of Cutler and Reber's (1998) estimates.

Atherly, Dowd and Feldman (forthcoming) use data from the 1998 Medicare Current Beneficiary Survey (MCBS) to estimate premium elasticities for beneficiaries living in areas where more than one HMO was available through the Medicare+Choice program. Since

they exclude from their analysis individuals with retiree health benefits through a former employer, their sample represents a different subset of the Medicare population than the UC retirees. Dowd, Feldman and Coulam (2003) conduct a similar analysis using aggregate (county-level) data from 1999. The results from these two studies are quite similar to the results for UC retirees, with estimated premium elasticities of -0.14 (Atherly, Dowd and Feldman) and -0.13 (Dowd, Feldman and Coulam).

Since these two studies are based on national data, it would seem that they are not subject to the same concerns about generalizability as ones using data from a single firm. However, because of numerous exclusions, the sample used by Atherly et al. is not representative of the entire Medicare population either. In addition, there is significant ambiguity about the exact choices and prices faced by individuals, which is a potential source of bias. A major limitation of both of these studies is that because they use cross-sectional data, they cannot fully control for plan benefits and other important plan characteristics.

3 Data

3.1 The Sample

This analysis is based on administrative health plan data from a medium-sized employer (roughly 2700 employees) located in the Southwestern US. The data are for the years 1997 to 2002, during which time the number of retirees eligible for health benefits grew from 924 to 1244. Many of these are individuals who retired before age 65. There are arguments for and against including these early retirees in the analysis. Since plan benefits do not change when a retiree becomes covered by Medicare, but the required premium contributions do, pooling retirees above and below age 65 provides additional price variation. Including pre-Medicare retirees also allows for larger sample sizes. On the other hand, to the extent that younger retirees behave differently than older ones, the results may not generalize well to the Medicare population. To guard against these effects, I exclude from all retirees under age 60 from all analyses. To further reduce heterogeneity within the sample, I also exclude individuals who retired before January 1986.

3.2 The Choice Set

In each year from 1997 to 2002, retirees and active employees had four health insurance options to choose from: three health plans and a cash payment for declining coverage. Two of the health plans are HMOs, which I will refer to as HMO A and HMO B in order to maintain the anonymity of the employer providing the data.[2] The other plan on the menu is a PPO. For enrollees living in its service area, the PPO has a \$250 per-person deductible and 10% coinsurance rate for providers in the plan's network and a 50% coinsurance rate for non-network providers. For retirees outside the service area who use non-network providers, the coinsurance rate is 20%.

While all employees and retirees have the option of declining coverage, the exact menu of health plans depends on where an individual lives.[3] Approximately two-thirds of retirees face the full choice set, 7% face the choice of one HMO and a PPO option and roughly one-quarter choose between the PPO and the cash payment for declining coverage.

3.3 The Price Variable

What makes these data well suited for analyzing the effect of price on the choice of health plans is that there is substantial variation in premium contributions facing retirees sharing a common choice set. Essentially, the data set combines the type of cross-sectional variation in prices exploited by Feldman et al. (1989) with the intertemporal variation that is the basis for the estimates by Cutler and Reber (1998), Royalty and Solomon (1999) and Strombom et al. (2002).

The cross-sectional variation comes from the way that the employer's contribution depends on a retiree's prior work history. The rules for determining the employer contribution differ across three groups of retirees: (1) those retiring on or before January 1 1988; (2) those retiring between January 2 1988 and January 1 1993; and (3) those retiring after January

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[2]Both plans are headquartered in the same city as the employer, have long histories there and are similar in other important respects. For example, they receive comparable scores on various quality "report card" measures. In 2001, 14% of all Medicare beneficiaries in the county where the employer and the two plans are located were enrolled in Plan A, and 12.4 % were enrolled in Plan B.

[3]Because the data I use comes from the same system that generates Open Enrollment materials sent to employees and retirees, there is no ambiguity as to which plans are available to each individual.

1 1993. For the first group, the employer contribution covers the full cost of all plans. For individuals retiring between 1988 and 1993, the employer contribution depends on coverage tier (i.e., single, two-party) and is set below the premium of the PPO, which is the most costly plan. As a result, premiums vary by plan, coverage tier and Medicare status. All pre-1993 retirees who decline insurance coverage receive $75 per month. For individuals who retired after January 1, 1993 the employer's contribution decreases by a fixed percentage for each year of service less than 25.[4] Thus, for this group, out-of-pocket premiums vary within as well as across plans.

To give a sense of how the rules of the program lead to differences in relative prices, Table 1 presents the 2002 retiree premium contributions for different retiree profiles. The data in the top panel show that all plans are free for individuals who retired before January 1988. As a result, these retirees represent a "control group" when considering the effect of premiums on health plan decisions. For individuals retiring between 1988 and 1993 (second panel), out-of-pocket prices depend on coverage tier and Medicare status. In 2002, the difference between the cost of the PPO and HMO B ranged from $27.24 ($65.49 - $38.25) for single, pre-Medicare coverage to $144.81 for two-party Medicare coverage; the mean difference is $70 per month.[5] For Medicare beneficiaries in this cohort the 2002 prices for the two HMOs are identical, while for pre-Medicare retirees Plan A requires a slightly larger contribution.[6]

The last two panels of Table 1 summarize the situation of post-1993 retirees with 20 and 10 years of service. For a single Medicare-eligible retiree with 20 years of service, the monthly cost for the PPO is $82.54 more than the cost of the less expensive HMO. This amount is larger than the difference facing an otherwise identical individual who retired between 1988 and 1993 ($50.24), but smaller than the difference for someone who retired at the same time with only 10 years of experience ($147.13). For all post-1993 retirees HMO A is more

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[4]Individuals with 25 or more years of service receive the same contribution, and therefore face the same prices, as retirees in the middle cohort.

[5]This mean is calculated using the premium contributions corresponding to each individual's chosen coverage tier.

[6]Differences in the way the PPO and the two HMOs are underwritten lead to differences in the relationship between premiums and coverage tier. For example, note that for the 1988-1993 retirement cohort there is no difference in the PPO premium charged for a husband and wife who are both under age 65 and a husband and wife where one person is on Medicare and the other is not. In contrast, for the two HMOs, these two types of couples would face very different premiums.

expensive than HMO B; this price difference is larger for retirees with fewer years of service.

One potential concern regarding the variation induced by the company's premium contribution policy is that it may have affected the timing of some employees' retirement decisions. If such effects were large, it would raise questions about the exogeneity of the price variable. As it turns out, this is not an issue, since the change in the health insurance contribution policy was enacted retroactively. An examination of the timing of retirements since 1985 (Appendix Figure A-1) suggests that, if anything, the company chose the retirement date cut-offs to fall just before spikes in retirement in the fourth quarter of 1988 and the second quarter of 1993.

Additional variation comes from changes in the level of the employee contribution and change in total premiums for the plans.[7] For pre-1988 retirees premium contributions are constant at zero throughout the time period analyzed, whereas relative prices have changed over time for the other two cohorts. For most individuals in most years, the PPO option is more expensive than the HMOs. The average difference between the contribution required for the PPO and the price of the lowest cost HMO option declined from 1997 to 1999 and has increased thereafter. Premiums have evolved differently for the two HMOs. In some years they have the same price for all retirees, while in other years, like 2002, this is true for some retirees but not others. Because of the way that the employer's contribution is set, there is substantial variation among retirees in the year-to-year price changes for each plan.

3.4   Covariates

As in most studies using this type of data, there is relatively little information on individual characteristics. Age, gender, marital status[8] and whether or not the covered individual is a surviving spouse of a former employee of the company are observed, though as is the case in most other studies in this literature, other correlates of medical care utilization are not. This omission means that it is not possible to test for differences in price-sensitivity related to expected health care costs or to conduct other tests related to the problem of adverse risk

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[7]In the regression analysis, prices are normalized to 2002 dollars using the Consumer Price Index.

[8]Unlike data used in most prior studies, this is actual marital status, not simply whether or not the retiree has chosen to cover a dependent spouse.

selection. However, the lack of health information does not pose problems for estimating average elasticities for all retirees. Retiree income is also unobserved. As a proxy, I use data from the 2000 Census on the ZIP-code level median income for households with heads between the ages of 65 and 74. The data on ZIP code is also used to creat an indicator variable for retirees living outside of metropolitan areas. This variable enters the regression models to account for the fact that HMO coverage will tend to be less attractive to individuals living in rural areas.

Table 2 summarizes the observed characteristics of the retirees in the sample, stratified by retirement date. The figures illustrate why I exclude individuals who retired before 1986. They are substantially older and different in other ways from the more recent retirement cohorts. Since pre-1988 retirees face very different prices than the later two cohort, including these older retirees would raise a concern that the estimated effect of price would be biased by unobserved heterogeneity. Individuals who retired between 1986 and 1988 are also older than more recent retirees, though the difference is not large: their mean age is 69.7 years compared to 68.2 for individuals retiring between 1988 and 1993. They are also similar to the latter two cohorts in terms of the percent who are married and the percent who are male. Individuals who retired between 1986 and 1988 are less likely to live in metropolitan areas than members of the two later cohorts. Differences among the three cohorts in the ZIP code level income variable are not significant.

3.5   The Distribution of Plan Enrollment

To give a preliminary sense of how price affects the health plan choices of these retirees, Table 3 reports the distribution of plan enrollment for 2002 broken down by retirement cohort. Overall, the PPO is the most popular plan, enrolling almost half of the retirees in the sample. HMO B has a higher enrollment share than HMO A (32% *vs.* 13%); 9% of the sample decline coverage. Differences across retiree cohorts suggests that price is a significant factor affecting health plan choice decisions. PPO enrollment is greatest for pre-1988 retirees, for whom such coverage is "free" and lowest for post-1993 retirees, who face the highest prices for the PPO option. Similarly, the percentage of retirees choosing an HMO coverage and the percentage waiving coverage altogether are both highest for the post-1993

retirees and lowest for those who retired prior to 1988.

4 Econometric Specification

Premium elasticities can be estimated from a discrete choice regression model, which assumes that the expected utility that individual i receives from plan j can be expressed as a linear function of plan attributes and individual characteristics:

$$V_{ij} = \beta_1 P_{ij} + Z_{ij}\gamma + X_i\theta_j + u_{ij}. \tag{1}$$

The variable of primary interest is P_{ij}, the price that individual i must pay for option j. The vector Z represents other plan attributes. Since in these data the non-price attributes of each plan (e.g., benefits, provider panels, quality reputation) are the same for all individuals, Z consists of a set of plan dummies[9] plus a dummy variable that equals one for two-party coverage and zero for single coverage.

The vector X_i includes individual characteristics that are assumed to be related to preferences for the different alternatives. Age enters as a continuous variable along with an indicator variable that equals one for individuals who are under age 65 to account for the fact that a person's outside options change discretely when she qualifies for Medicare. Since a key source of price variation is across retirement cohorts, it is important to be sure that the results are not sensitive to the treatment of age. For this reason, I also estimated models where age was parameterized as a quadratic and with a set of categorical variables. Since the estimated price elasticities are not at all sensitive to the way age enters the model, I report the results from this more parsimonious and easily interpreted specification. The other control variables in X are marital status, a dummy for individuals who qualify for coverage as a surviving spouse of a former employee, a dummy for residence in a non-metropolitan county, and the ZIP code level median income variable.

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[9]Chernew et al (2002) interpret these dummies to represent consumers average assessment of plan quality. It is likely that that they also pick up such things as provider panel size and the convenience of provider locations.

The error term u_{ij} captures unobserved factors affecting person i's assessment of option j. An individual will choose alternative j if

$$V_{ij} > V_{ik}, \forall k \neq j. \tag{2}$$

Under the assumption that the error terms are i.i.d. with a Type I extreme value distribution, the choice of health plans can be estimated as a conditional logit model (McFadden 1974). A well known limitation of this model is that it is subject to the independence of irrelevant alternatives (IIA) condition, which implies strong restrictions on the predicted substitution patterns. An alternative model that is not subject to IIA is the "mixed logit" model (McFadden and Train 2000; Train 2003), which allows utilities to be correlated across alternatives, which can lead to more realistic substitution patterns.[10] I estimated several versions of mixed logit models incorporating different distributional assumptions. These alternative models performed slightly better than the standard conditional logit model in terms of log-likelihood. However, the conditional logit and mixed logit models did not differ in any meaningful way in terms of the implied elasticities. For this reason, I report only the results from the simpler conditional logit model.

There are two important issues relating to the definition of the choice set. The first is that single and married retirees face a different set of options. Whereas singles simply choose from among the three plans and the option of waiving coverage, married retirees also have the decision of whether or not to cover their spouse. Most previous studies have treated the decision to cover dependents as exogenous to price and modelled the choice among plans conditional on that decision (Feldman et al. 1989; Barringer and Mitchell 1994; Royalty and Solomon 1999; Buchmueller 2000; Strombom et al. 2002). This assumption is reasonable in cases where the employer contribution covers a large share of the cost of family coverage and, therefore there is little financial disincentive to cover dependents. However, as shown in Table 1, for many retirees in this data set the incremental cost of covering a dependent spouse can be substantial. Approximately 16% of married retirees in the sample choose single coverage. Thus, treating the choice of coverage tier as exogenous ignores one margin where price matters. Auxiliary regressions of the decision to decision of married retirees to cover

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[10]The nested logit model, which has been used in previous studies of health insurance choice (Feldman et al. 1989; Atherly, Dowd and Feldman forthcoming) can be seen as a special case of the mixed logit model.

a dependent spouse (conditional on choosing a plan) indicates that this decision depends significantly on the difference between the price of two-party and single coverage. For this reason, I treat single and two-party coverage from each plan as distinct choice alternatives. This means that for married retirees the choice set has up to 7 alternatives (3 plans times 2 coverage tiers plus the waive option).

The second specification issue pertains to the treatment of the option of waiving coverage. Previous studies have not modelled the decision to decline coverage, presumably because in the cases analyzed there is little financial incentive to decline coverage, making such behavior very rare. However, it is clear from Tables 1 and 3 that retirees in this data set both have an incentive to decline coverage and appear to respond to that incentive. Therefore, I include waiving as an option in the choice set. For the purpose of sensitivity testing and to allow for clear comparisons with previous work, I also estimate models on a restricted sample of individuals who chose to enroll in one of the health plans offered by their former employer. This is equivalent to treating the waive option and the three plans as being in distinct "nests" and estimating the choice within the plan nest.

5   Results

5.1   Main Results

Table 4 presents coefficient estimates from the conditional logit model. The first column is for the full sample, in which married and single retirees are pooled. In columns 2 and 3 the sample is stratified by marital status.

Before focusing on the estimated price effects, I will briefly summarize the results for the control variables. Since the option of waiving coverage is treated as the baseline alternative, the coefficients on the interactions of individual characteristics and the plan dummies are interpreted as the effect of a characteristic on the probability of choosing the particular plan relative to the probability of waiving coverage. Pre-Medicare retirees are more likely to accept coverage than those over age 65. Since in this program plan benefits do not change when a person becomes Medicare eligible, I interpret this result to reflect the high

premiums and other barriers faced by the near elderly in the market for non-group health insurance. Conditional on Medicare eligibility, the demand for PPO coverage relative to HMO coverage increases with age, which is consistent with the findings of previous studies (Feldman et al. 1989; Barringer and Mitchell 1994; Cutler and Reber 1998; Royalty and Solomon 1999; Buchmueller 2000). The finding that men are more likely to accept coverage is also consistent with previous research (Buchmueller 1996/1997). Retirees living outside of metropolitan areas are more likely to choose PPO coverage than to either decline coverage or enroll in an HMO.[11]

In all models, the estimated coefficient on the out-of-pocket premium is negative and statistically significant at the .01 level. The price coefficient is more negative for the single retiree subsample as compared to the married retirees. Beyond this, the coefficients themselves are not useful for gauging the magnitude of the price effect or comparing effects across samples. Therefore, I calculate two quantities that give a sense of the magnitude of the price effect: premium elasticities and the predicted change in market share caused by a \$10 increase in premiums. For the conditional logit model, the own-price elasticity of demand is given by

$$\eta = \frac{\partial ln Prob_j}{\partial ln P_j} = \beta_1 P_j (1 - Prob_j), \tag{3}$$

where β_1 is the price coefficient, P_j is the price of plan option j and $Prob_j$ is the probability that j is chosen. The fact that the elasticity depends on plan prices and market shares means that a given model will generate different elasticity estimates for different plans. Therefore it is necessary to be careful in making comparisons across studies as differences in elasticities may be driven not only by real differences in price sensitivity, but also by differences in average prices facing consumers. Since the observed price is zero in many cases, the elasticities are calculated at the sample means rather than calculating elasticities for each observation and then averaging over the sample. The predicted loss of market share is less sensitive to the level of observed prices. It is calculated by predicting for each

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[11]Note that each HMO option only appears in an individual's choice set if the plan is truly an option–i.e., if the person lives in the plan's service area.

observation the probability of choosing a plan at given prices and the probability of choosing that plan if its premium increased by $5 while the price of all other plans remained constant. The difference between these two predictions is calculated for each person and then averaged over the estimation sample. These two measures are reported in Table 5.

For the full sample, the elasticities range from -0.13 to -0.41 depending on the plan; the mean over all plans is -0.25. The simulations indicate that a plan that increased its premium by $5 while its competitors kept their prices constant would suffer a loss of market share of between 0.3 and 0.7 percentage points (not shown). Relative to observed market shares, this is an effect of between 1.3% and 3% (column 2). The results for the married subsample are quite similar, which is not surprising given that roughly three-quarters of the full sample is married. The price effects are slightly larger for single retirees. For singles, a $5 price increase is predicted to result in an average enrollment decline of 1.4 percentage points. Relative to the mean baseline market share among singles, this represents a decline of 4.5%.

5.2   Alternative Specifications of the Choice Set

The stronger price effect for single retirees may be due to the fact that switching plans is more costly for couples as two people rather than one may have to change providers. Alternatively, this result could simply be due to the fact that the choice among plans, which is the only decision facing single retirees, is more sensitive to price than the decision to cover a dependent spouse, which is incorporated into the price effect in the married sample. To test for this possibility, I estimate a set of models that conditions on the choice of coverage tier. That is, similar to previous studies, I treat the choice between single and two party coverage as exogenous and model the choice among the different plans within each person's chosen coverage tier.[12]   These regressions are reported in the first panel of Table 6. For married retirees, the price coefficient, elasticities and simulated market share effects are slightly smaller than the results in Tables 4 and 5, though the difference is very small. This suggests price has a similar effect on the choice among plans and the decision and that the

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[12]Note that this difference only matters for married people as even in Table 4 two-party coverage is not an option for single people.

difference between married and single retirees represents a difference in behavior, rather than an artifact of the model.

As noted, another difference between the results presented in Tables 4 and 5 and those from previous studies is that the previous studies do not include the decision to waive coverage in the choice set. Therefore, I also estimate models on the subset of people who elect to take coverage. The results from these alternative regressions are reported in the lower panel of Table 6. The price coefficients and the implied effects are slightly larger than the corresponding results in Tables 4 and 5. While the differences across the two estimation samples are small, the pattern is consistent with other research showing that for active employees the decision to take up coverage offered by an employer is less sensitive to price than is the choice among a set of plans conditional on having some coverage.[13]

5.3   Additional Sensitivity Tests

To test the sensitivity of the results, I estimate the conditional logit model on a number of alternative samples. The results of these regressions are summarized in Table 7. For brevity, I report only the price coefficient, mean elasticity and mean simulated loss of market share for the pooled (married plus single) sample. For ease of comparison, the first line of the table restates the full sample results from Tables 4 and 5.

The second and third rows consider the effect of cutting the sample by retirement date. This is important, given that price differences across the three retirement cohorts is an important source of identifying variation. In row 2, I drop individuals who retired before January 1988. This leaves a sample in which nearly everyone faces a higher price for the PPO compared to the HMOs, though the size of that differential varies. Many, though not all, individuals in this sample face different prices for the two HMOs. In row 3, I drop retirees in the most recent cohort. In this case, the main contrast is between pre-1988 retirees, for whom all plans are free, and later retirees who face a higher price for the PPO and, in some cases, differences in prices between the two HMOs. The price coefficient is larger in magnitude in row 3 (-0.0086 vs. -0.0054) as is the predicted loss of market share (-2.15% vs. -1.43%). The difference in the elasticities, however, goes in the other direction. This

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[13]See, for example, Gruber and Washington (2003) and Cutler (forthcoming).

underscores the sensitivity of elasticity measures to the prices observed in the data. Since all prices are zero for pre-1988 retirees, the mean price is lower in the row 3 sample than in the row 2 sample. Thus, even though the partial derivative with respect to price is larger in row 3, the elasticity is lower. Whichever measures are used, the differences between the two samples are not large. Both indicate a statistically significant, though economically modest effect of price.

Next, I consider the effects of limiting the sample to retirees over the age of 65. The price effects for this group are less pronounced than for the full sample, though again the difference is very small. The results for the over 65 group imply that a $5 premium increase would cause to lose 1.25% of its market share, whereas the regressions using the full sample imply a loss of 1.87%.

Finally, to test for the stability of the price effects over time, I cut the data by year. Results for the the years 1997-1999 are presented in row 5 and results for 2000-2002 are in row 6. The difference in the price coefficients is small as is the difference in the simulated loss of market share. The elasticity is higher for the later time period almost entirely because average retiree contributions have increased over time. The estimated market share declines are quite similar.

6   Comparisons with Previous Studies

These results can be put in perspective by comparing them to comparable measures from other studies. The most direct comparisons are with the two studies on the health plan choices of retirees (Buchmueller 2000; Dowd, Feldman and Coulam 2003; Atherly, Dowd and Feldman forthcoming).

In my earlier study on UC retirees, which modelled the demand for PPO coverage, the mean PPO market share was 51% and the mean out-of-pocket premium for that option was $64 in 2002 dollars. The corresponding figures for this data set are almost identical: 51% of retirees electing coverage chose the PPO option and the mean PPO premium was $62. These similarities in price and market share make it straightforward to compare elasticities. In the UC study, the full sample elasticity of demand for PPO coverage was -.14, which

is slightly lower than the elasticities for the PPO plan reported in Tables 5 and 6. The estimated elasticity for UC retirees living in New Mexico was -.22, which is much closer to the estimates presented here.

Average premiums are much lower in the data used by Dowd, Feldman and Coulam and Atherly, Dowd and Feldman ($8.16 and $10.17, respectively). This largely explains why their estimated elasticities (-.13 and -.14) are lower than the ones estimated here. However, when compared in terms of the effect of a small price increase, the results look more similar. In my full sample, a $5 increase in premiums is predicted to reduce a plan's market share by an average of 0.43 percentage points. This is closer to the corresponding estimate from Atherly et al. (0.31 percentage points) than it is to the effect implied by Dowd et al.'s results (2 percentage points).

The estimated price effects from this study are slightly lower than the results from previous studies based on non-elderly active employees. In their study of active UC employees, Strombom, Buchmueller and Feldstein (2002) report the simulated change market share associated with a $5 premium increase. Models that include a very expensive fee-for-service plan in the choice set imply an average reduction of 3.2%, which is comparable to the results presented here. However, a more appropriate comparison is with results for a subset of managed care plans offered to UC employees. Those imply that a $5 premium increase would reduce a plans market share by an average of 7.6%. The price effects from this study are closer to, though still lower than, the results for older UC employees with more than 5 years of job tenure. The elasticities reported in Tables 5, 6 and 7 are at the low end of the range from studies on active employees.

7   Summary and Conclusions

Prominent Medicare reform proposals call for a greater reliance of price-sensitive consumer demand as a force for driving competition and controlling costs. The premium elasticity of demand is a key parameter for understanding how Medicare beneficiaries would behave in such a setting. While previous studies have provide elasticity estimates, this literature has important shortcomings. The studies with the strongest research design focus on younger,

active employees, while the studies of older retirees have potentially important method-
ological limitations. This paper provides elasticity estimates that are directly relevant for
understanding how Medicare beneficiaries would behave in a "managed competition" or
"premium support setting." It extends the literature by analyzing retirees rather than ac-
tive employees and by using a quasi-experimental research design that exploits exogenous
variation in health plan premiums.

I find that retirees do consider price when choosing among competing health plans and
are willing to switch plans when relative prices change. The effect of out-of-pocket premi-
ums on the health plan choice decision is negative, statistically significant, and robust to
different modelling strategies. The implied price elasticities are squarely within the range of
estimates from earlier studies. The price effects estimated here are slightly larger than the
smallest estimates based on the observed choices of retirees and slightly smaller than the
best estimates based on the behavior of active employees. The fact that these results are so
similar to other studies using different types of data with different sources of identification
should give comfort to analysts who must use parameter estimates from this literature to
model the effects of market-oriented reforms.

The administrative data used is both a strength and a weakness of this study. On the
positive side, I observe perfectly the health plan options available to each retiree and their
corresponding prices. As a consequence, bias from mismeasured prices or ambiguities in
the specification of the choice set is not a concern. The main limitation of this type of ad-
ministrative data is the lack of information on individual characteristics. In particular, the
study is limited by a lack of information on retiree health status. The relationship between
expected medical expenditures and price sensitivity has important implications for the sta-
bility of competitive health insurance markets. If high risk consumers are substantially less
price sensitive than healthier ones, price competition can exacerbate the problem of adverse
risk selection. More research is needed on this relationship among Medicare beneficiaries.

Research of this type, however, cannot address the question of how price-sensitive con-
sumers must be to impose strong discipline on competing plans or how succesful competition
will be in controlling costs. Dowd, Feldman and Coulam (2003) describe the case of a Medi-
care demonstration project in Denver in which managed care plans were required to set their

prices in a competitive bidding process. The prices that plans bid were substantially lower than the current administratively determined payment rate in the area. Dowd, Feldman and Coulam interpret this result to suggest that health plans participating in Medicare perceive the price elasticity in that market to be large enough to encourage vigorous price competition. Unfortunately, this and other demonstration project were aborted for political reasons. The recent Medicare prescription drug bill calls for new demonstration projects to test the impact of competitively determined health plan premiums. If these demonstrations are allowed to proceed, they will provide much needed market-level information on how health plans compete when beneficiaries are exposed to out-of-pocket premiums.

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Table 1. Summary of Monthly Premium Contributions, 2002

	PPO	HMO-A	HMO-B	Decline
Retired Before 1/88				
Single Coverage, Medicare	0.00	0.00	0.00	-75.00
Single Coverage, Pre-Medicare	0.00	0.00	0.00	-75.00
Retiree + Spouse, Both Medicare	0.00	0.00	0.00	-75.00
Retiree + Spouse, One Medicare	0.00	0.00	0.00	-75.00
Retiree + Spouse, Both Pre-Medicare	0.00	0.00	0.00	-75.00
Retired 1/88 to 1/93				
Single Coverage, Medicare	50.24	0.00	0.00	-75.00
Single Coverage, Pre-Medicare	65.49	42.00	38.25	-75.00
Retiree + Spouse, Both Medicare	144.81	0.00	0.00	-75.00
Retiree + Spouse, One Medicare	160.06	42.00	38.25	-75.00
Retiree + Spouse, Both Pre-Medicare	160.06	104.75	93.82	-75.00
Retired After 1993, 20 Years of Service				
Single Coverage, Medicare	97.14	20.00	14.60	-60.00
Single Coverage, Pre-Medicare	109.34	75.65	69.03	-60.00
Retiree + Spouse, Both Medicare	229.13	40.00	29.20	-60.00
Retiree + Spouse, One Medicare	244.12	95.65	85.55	-60.00
Retiree + Spouse, Both Pre-Medicare	256.32	172.11	153.28	-60.00
Retired After 1993, 10 Years of Service				
Single Coverage, Medicare	190.93	60.00	43.80	-30.00
Single Coverage, Pre-Medicare	197.03	142.96	130.40	-30.00
Retiree + Spouse, Both Medicare	427.76	120.00	87.60	-30.00
Retiree + Spouse, One Medicare	442.78	202.96	179.95	-30.00
Retiree + Spouse, Both Pre-Medicare	448.85	306.84	273.21	-30.00

Table 2. Retiree Characteristics by Retirement Date

	By Retirement Date			
	Before 1/86	**1/86 to 12/87**	**1/88- 12/92**	**1/93 and after**
Age	77.38	69.70	68.33	64.26
	(7.54)	(5.42)	(4.45)	(2.99)
% Married	47.22%	72.26%	70.60%	75.76%
% Male	52.06	74.54	71.37	70.97
% Surviving spouse	35.04	16.21	9.45	4.36
% remaining in state	91.04	89.04	86.88	88.02
% living in non-metro county	26.34	29.57	38.56	43.24
ZIP-level median income,	33.05	33.38	31.56	31.44
65-74 yr olds ($000)	(10.10)	(9.18)	(8.99)	(8.41)
Number of Observations	1,116	876	1,289	1,147
Number of Retirees	222	177	262	300

Table 3. The Distribution of Health Plan Enrollment by Retirement Cohort, 2002

		By Retirement Date		
	Full Sample	**1/86 to 1/88**	**1/88 to 1/93**	**After 1/93**
PPO	45.92%	63.75%	52.10%	30.90%
HMO	44.75	34.38	36.13	51.85
HMO A	13.12	11.25	9.66	17.01
HMO B	31.63	23.13	26.47	40.63
Waive Coverage	9.33	1.88	11.76	11.46
number of observations	686	160	238	288

Table 4. Conditional Logit Coefficients: Retirees Age 60 and Older

	(1) Married Plus Single	(2) Married	(3) Single
Premium	-0.0072	-0.0063	-0.0174
	(0.0008)	(0.0008)	(0.0042)
Two Party Coverage	2.1724	2.1222	
	(0.0756)	(0.0759)	
Married			
x PPO	-1.5582		
	(0.2058)		
x HMO A	-2.3544		
	(0.2335)		
x HMO B	-1.7625		
	(0.2247)		
Age (in years)			
x PPO	0.0550	0.1341	-0.0442
	(0.0259)	(0.0372)	(0.0386)
x HMO A	0.0036	0.0892	-0.0993
	(0.0310)	(0.0426)	(0.0506)
x HMO B	-0.0765	0.0240	-0.2199
	(0.0302)	(0.0412)	(0.0512)
Age < 65 (0,1)			
x PPO	0.3834	0.6763	0.3936
	(0.2457)	(0.3048)	(0.4571)
x HMO A	0.4413	0.7658	0.4336
	(0.2987)	(0.3716)	(0.5484)
x HMO B	0.3960	1.0760	-0.7286
	(0.2808)	(0.3456)	(0.5407)
Male			
x PPO	1.0579	1.0871	1.0219
	(0.1795)	(0.2133)	(0.3266)
x HMO A	0.7920	1.0704	0.3795
	(0.2118)	(0.2683)	(0.3690)
x HMO B	0.6846	0.7342	0.6915
	(0.1936)	(0.2265)	(0.3619)
Surviving Spouse			
x PPO	1.0800		1.1526
	(0.2749)		(0.3089)
x HMO A	-0.4994		-0.8399
	(0.3559)		(0.3930)
x HMO B	-0.5298		-0.6511
	(0.3315)		(0.3739)

Table Continues

Table 4. Continued.

ZIP Code level Average Income			
x PPO	0.0162	0.0232	0.0164
	(0.0096)	(0.0119)	(0.0182)
x HMO A	-0.0073	0.0125	-0.0615
	(0.0112)	(0.0136)	(0.0225)
x HMO B	0.0005	0.0142	-0.0362
	(0.0102)	(0.0123)	(0.0217)
Non-Metropolitan County			
x PPO	1.5359	1.2630	2.7193
	(0.1851)	(0.2133)	(0.4545)
x HMO A	0.1481	0.0197	0.8701
	(0.2756)	(0.3198)	(0.6203)
x HMO B	0.3417	0.0072	1.7881
	(0.2301)	(0.2586)	(0.5710)
Sample Size	3205	2382	823
Log Likelihood	-3431.7413	-2735.1250	-654.4327

Notes: Standard errors in parentheses. All models also include main effects for each plan (3 variables) and interactions with year dummies (15 variables). The surviving spouse dummy is excluded from the married sample regressions because surviving spouses do not have the option of two-party coverage.

Table 5. Estimated Price Effects

	Elasticity	Effect of a $5 Price Increase
All Retirees		
PPO, Single	-0.21	-1.7%
PPO, Two-party	-0.35	-1.3%
HMO A, Single	-0.16	-2.8%
HMO A, Two-party	-0.37	-3.0%
HMO B, Single	-0.14	-2.6%
HMO B, Two-party	-0.25	-2.1%
Average over all Plans	-0.24	-2.2%
Married Retirees		
PPO, Single	-0.19	-2.8%
PPO, Two-party	-0.31	-1.2%
HMO A, Single	-0.14	-3.0%
HMO A, Two-party	-0.32	-2.6%
HMO B, Single	-0.12	-2.9%
HMO B, Two-party	-0.22	-1.8%
Average over all Plans	-0.22	-2.0%
Single Retirees		
PPO	-0.37	-2.2%
HMO A	-0.34	-6.0%
HMO B	-0.28	-5.2%
Average over all Plans	-0.33	-4.5%

Notes: The price effects are based on the conditional logit results reported in Table 4. Elasticities are calculated by setting the premium and predicted market share equal to the sample mean for each plan and then averaging over all observations. The effect of a $5 price increase is the estimated loss of market share for a plan that raises its premium by $5 while other plan premiums remain constant. It is measured as a percentage of initial market share and is calculated for each observation in the data and averaged over the relevant sample.

Table 6. Estimated Price Effects Conditional on Electing Coverage and Coverage Tier

A. Plan Choice Conditional on the Choice of Coverage Tier

	Full Sample		Married		Single	
	Price Coeff.	(S.E.)	Price Coeff.	(S.E.)	Price Coeff.	(S.E.)
	-0.0066	(0.0010)	-0.0051	(0.0010)	-0.0174	(0.0042)
	elasticity	Δ market share	elasticity	Δ market share	elasticity	Δ market share
PPO	-0.24	-0.88%	-0.21	-0.69%	-0.40	-2.20%
HMO A	-0.25	-2.56%	-0.23	-2.08%	-0.32	-6.01%
HMO B	-0.14	-1.77%	-0.13	-1.32%	-0.23	-5.17%
Mean over all plans	-0.22	-1.78%	-0.19	-1.39%	-0.33	-4.53%

B. Plan Choice Conditional on Electing Coverage

	Full Sample		Married		Single	
	Price Coeff.	(S.E.)	Price Coeff.	(S.E.)	Price Coeff.	(S.E.)
	-0.0088	(0.0011)	-0.0077	(0.0011)	-0.0255	(0.0068)
	Price elasticity	Δ market share	Price elasticity	Δ market share	Price elasticity	Δ market share
PPO, Single	-0.21	-2.6%	-0.20	-3.5%	-0.46	-5.8%
PPO, Two Party	-0.35	-2.2%	-0.34	-2.1%		
HMO A, Single	-0.16	-3.0%	-0.16	-3.7%	-0.46	-8.2%
HMO A, Two Party	-0.39	-3.3%	-0.37	-3.1%		
HMO B, Single	-0.14	-2.7%	-0.13	-3.5%	-0.37	-7.2%
HMO B, Two Party	-0.26	-2.3%	-0.25	-2.2%		
Mean over All Plans	-0.24	-2.5%	-0.24	-3.3%	-0.43	-6.9%

Notes: In panel A the sample sizes are 3205 (full sample), 2382 (married) and 823 (single). In panel B, the sample sizes are 1958 (full sample), 1496 (married) and 462 (single). In panel A, the choice set includes waving coverage. The single retiree results in panel A are identical to those reported in Tables 4 and 5. In panel B, the sample excludes individuals who waive coverage. Individuals living outside the service areas of both HMOs are also excluded because they do not have a choice of plans conditional on taking up coverage. The change in market share represents the loss of enrollment due to a $5 increase in premiums measured as a percent of initial market share.

Table 7. Sensitivity Tests: Estimated Price Effects from Different Samples

	Price Coefficient	Elasticity	Effect of a $5 Price Increase
1. Full sample [N = 3205]	-0.0072 (0.0008)	-0.24	-2.2%
2. Retired after 1/88 [N = 2334]	-0.0054 (0.0011)	-0.25	-1.4%
3. Retired before 1/93 [N = 2104]	-0.0086 (0.0014)	-0.13	-2.2%
4. Age > 65 [N = 1998]	-0.0053 (0.0010)	-0.10	-1.3%
5. 1997-1999 [N = 1368]	-0.0068 (0.0017)	-0.15	-1.7%
6. 2000-2002 [N = 1837]	-0.0076 (0.0010)	-0.34	-2.0%

Notes: Standard errors are in parentheses. Elasticities and estimated effects of a $5 price increase are the sample means for each effect.

Appendix

Figure A-1. Distribution of Retirement by Quarter, 1985 to 2002
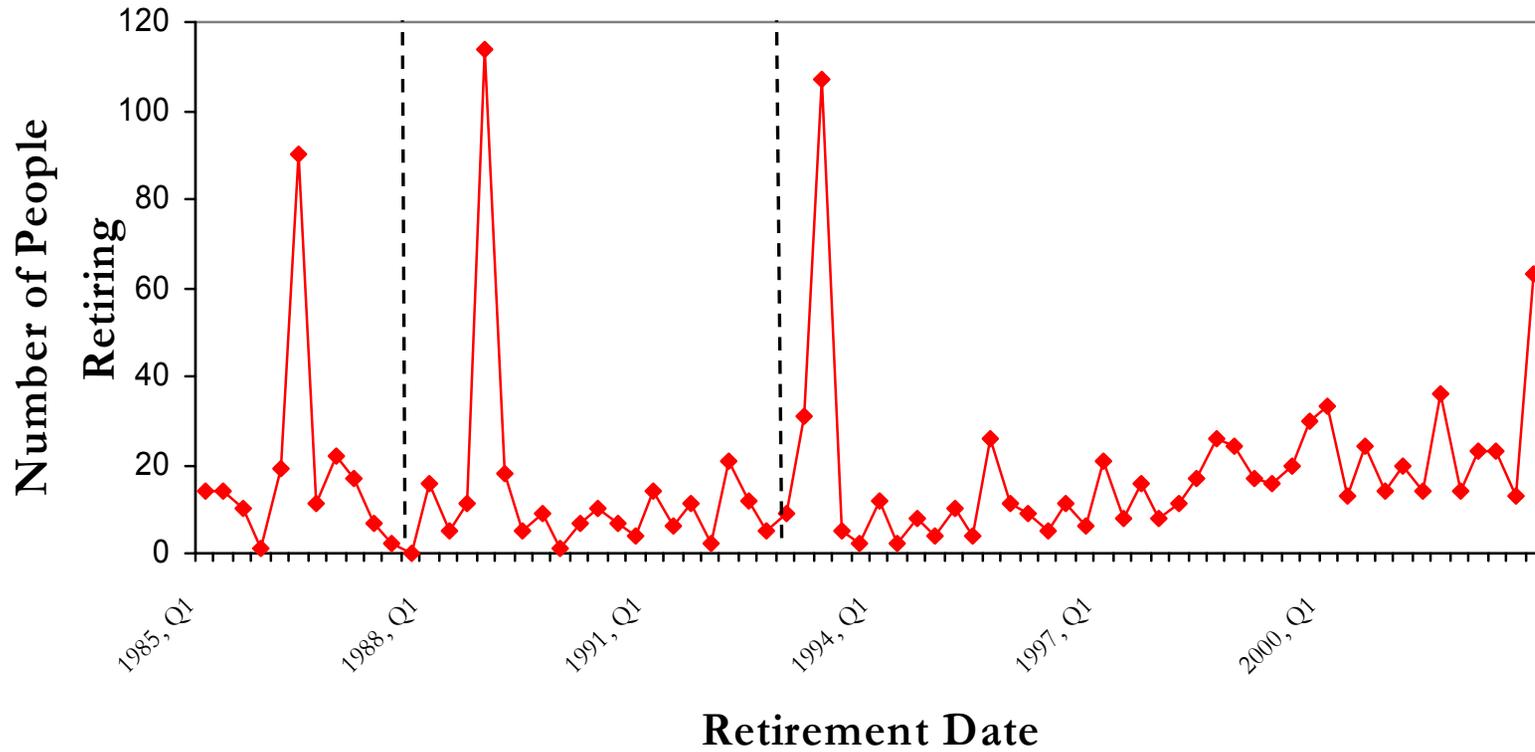
Notes: The data refer to the number of individuals retiring each quarter. The dashed vertical lines correspond to January 1, 1988 and January 1, 1993.