

## **Multi-year Measures of End of Life Medical Expenditures**

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## 1. Introduction

The United States currently spends approximately 16 percent of its gross domestic product on health care and these costs are expected to rise substantially in the years ahead both in absolute terms and as a fraction of GDP, reaching nearly 20 percent of GDP by 2017.<sup>1</sup> While it is well known that people near end-of-life account for a large fraction of government and private payments for health care expenditures, there is increasing evidence of high levels of out-of-pocket expenditures as well. Coupled with rising overall health care costs and the erosion of retiree private health insurance, the trends in out-of-pocket expenditures are just as worrisome as for overall spending (Fronstin, 2007; Skinner, 2007). As well, even average measures of out-of-pocket spending masks substantial heterogeneity across individuals (French and Jones, 2004).

Less well understood is the extent to which out of pocket medical expenditures are sufficiently large as to impact other forms of consumption or to jeopardize the financial well-being of a surviving spouse.<sup>2</sup> In this paper, we use the Health and Retirement Study (HRS) to understand better the substantial variation in out of pocket medical expenses, particularly that occurring near the end of life. We also begin to shed light on the important relationship between expenses and financial resources by looking at out of pocket medical expenses as a fraction of income and wealth. The objective of our new work is to both (a) develop imputations for out-of-pocket expenditures that have not been created for the HRS since 2000, and (b) develop a lifecycle approach where we look at the potential run up in costs in the four or more years prior to the end of life, so as to assess the overall financial burden falling on American households. If

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<sup>1</sup> According to the Centers for Medicare and Medicaid Services (CMS). See [http://www.cms.hhs.gov/NationalHealthExpendData/25\\_NHE\\_Fact\\_Sheet.asp](http://www.cms.hhs.gov/NationalHealthExpendData/25_NHE_Fact_Sheet.asp).

<sup>2</sup> Although see Palumbo (1999) and McGarry and Schoeni (2005).

extremely high end of life expenses are associated with a sudden acute illness, the total financial burden is much less than if they are the end result of a more chronic condition, resulting in significant expenditures for many years prior to death. While this draft of our paper has not yet merged all waves of the data to create these life-cycle measures, we present preliminary results that use the new imputation methods developed under the SSA grant.

We find that while expenses are manageable on average, and the Medicare program does a good job in protecting individuals from financially devastating medical bills, there are some individuals for whom the costs of care are enormous. As we show, these extremely large costs tend to be associated with long term care needs, an expense that is not covered by Medicare or medigap insurance. By using panel data to look back from the date of death, we have (in preliminary results with incomplete imputation) found heightened out of pocket expenses 4 or 6 years prior to death. This result suggests that the disparities in health care expenditures are even larger than they might appear from a cross-sectional analysis of costs immediately preceding death, a result consistent with previous studies (French and Jones, 2004; Skinner and Feenberg, 1994).

In the next Section, we provide an overview of the literature on medical expenses near the end of life and unresolved issues. Section III provides a detailed description of our data. A central component of the analysis was the construction of usable data extracts. As we explain, the data on out of pocket medical expenditures, particularly those near death, are difficult to work with, containing large numbers of missing values, small sample sizes for many components of expenditures, and a significant degree of proxy reporting (obvious in the case of decedents, but also for those who are severely ill). Section IV analyzes health care expenditures for eventual decedents including break-downs of cost by type of care, and discusses how these relate to the

financial status of the individual and his or her spouse (if any). A final section concludes and presents our thoughts on the direction of future research work.

## **II. Overview**

There is increasing evidence that health shocks exert a large influence on the financial security of households. At earlier ages, much of the risk is from a decline in earnings. During a 10-year period for people in their 50s, seven out of ten adults developed health problems, lost their jobs, or lost spouses owing to divorce or death (Johnson, Mermin, and Uccello, 2005; also see Smith, 2005). New medical conditions were associated with a 17 percent decline in wealth for couples, while work disability caused a 16 percent decline and divorce a 44 percent decline (Johnson, Mermin, and Uccello, 2005). Individuals who do not yet qualify for Medicare or Medicaid could suffer further if they lose not only their job, but their employment-related insurance coverage. Such a loss would lead to substantial out of pocket expenses or the potential for deteriorating health if need care is postponed or foregone.

For older retirees, the financial risk stems from health care expenditures themselves rather than lost earnings. Although Medicare may provide nearly universal coverage for people 65 and over, there are substantial gaps in that coverage. For many, these gaps are filled by privately purchased “Medigap” insurance or by retiree health insurance. While these plans offer relatively complete coverage of the standard Medicare deductibles and copayments,<sup>3</sup> there are important limitations to the protections provided by such policies. First, the fraction of firms

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<sup>3</sup> Medicare requires a modest deductible for doctor visits and a copayment for costs beyond this amount. Medicare does not cover the cost of the first day of hospital care, requires a significant copayment for days 61-90 and covers nothing for days beyond 90. For those with long hospital stays and no other coverage, these costs can be substantial. Perhaps most importantly, Medicare covers neither home health care nor nursing home expenses except for brief periods of medically needed care following a hospital stay.

offering retiree health insurance is plummeting so that the breadth of coverage is limited. The Kaiser Foundation estimates that among large firms the percentage providing retiree coverage has fallen from 66 percent in 1988 to 31 percent in 2008.<sup>4</sup> Among all firms, the percentage offering retiree health insurance is substantially lower with an estimated 13 percent of firms providing retiree coverage in 2002 (Fronstin, 2005). Retirees without employer-provided coverage must purchase a Medigap policy on their own, potentially incurring substantial costs. Fronstin (2006) estimates that a 55-year-old couple retiring in 2016 will need to accumulate over \$400,000 over the next decade to pay for Medigap insurance.<sup>5</sup> The second limitation, and one of likely more widespread concern, is that neither Medicare itself nor these supplemental Medicare policies, cover long term care needs. Both home health care services and nursing home stays must be paid for out of pocket unless the individual qualifies for benefits from the means-tested Medicaid program or purchases a separate (and expensive) long term care insurance policy.<sup>6</sup> Finally, even with relatively generous health care coverage and supplemental policies, an individual may incur substantial non-medical costs. Items like handicap ramps, grab bars and food to meet special dietary needs, can be expensive and must be borne by the individual himself.

Skinner (2007) estimates that that in 2004, 6 percent of households age 75-84 in the Health and Retirement Study (HRS) spent more than 50 percent of their incomes on out-of-pocket medical expenses. French and Jones (2004) focus on health “shocks” and isolate the new

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<sup>4</sup> <http://ehbs.kff.org/images/abstract/7814.pdf>. The figure of 66 percent is for large firms (200 or more employees) that offer health insurance to those currently working. Ninety-nine percent of large firms offer health insurance.

<sup>5</sup> Premiums for these policies vary widely both across states and across insurers. Individual premiums between \$2000 and \$5000 a year are typical.

<sup>6</sup> Only 10 percent of the elderly have purchased long term care insurance (Finkelstein and McGarry, 2005).

information about health care spending that might arrive in any given year. Their estimates imply that over the course of a year, 0.1% of families encounter a health event with a present value of current and future expenditures in excess of \$125,000. As dramatic as these numbers sound, even they may underestimate the actual out of pocket costs. For example, in a study that also considers multi-year dynamics, French, De Nardi, and Jones (2006) study single households in the HRS to find both relatively high out-of-pocket health care costs in the years leading up to death, and a much more rapid decline in wealth than would be suggested simply by out-of-pocket health costs.

Understanding the role that medically related expenditures play in affecting the resources of the elderly (as in Palumbo, 1999), and particularly the types of care that are responsible for the greatest burdens, is of primary policy concern as the nation grapples with the enormous problem of funding the Medicare and Medicaid programs and as individuals continue to lose employment-related retiree coverage. Our major concern is that people retiring today may be relying on inadequate savings and insurance policies to guard against future health care costs in a world where continued growth in overall health care expenditures is highly likely. Thus understanding the origins and dynamics of risks arising from specific types of out-of-pocket medical costs are central to designing future insurance policies designed to temper these costs.

### **III. Data**

Our data for this task come from the Health and Retirement Study (HRS). The HRS began in 1992 with a nationally representative sample of the population born between 1931 and 1941. These original respondents have been interviewed biennially ever since 1992 with the most recent data collected in 2006. In 1998 and again in 2004 additional cohorts were added to the

survey so that the sample population is now approximately representative of the U.S. population ages 50 or older. We restrict our analyses to data from 1998 to 2006 so that we have a full age range of individuals from which to draw and more consistent sets of questions with respect to health care costs.

Another reason for considering just years since 1998 is that the original sample frames specify that individuals must be non-institutionalized. Thus in early years, health care expenditures (both overall and out-of-pocket) are likely to be non-representative of the elderly population since those in nursing homes, who likely have the largest expenses, are excluded. By 1998, however, the sample would have matured, with formerly non-institutionalized entering nursing homes, although with new cohorts being added to the sample, the HRS population will still appear healthier than average. Even with this restriction, our sample sizes are considerable: in 1998, the first year from which we draw observations, there were interviews for close to 23,000 respondents.

The HRS is unusual in that when sample members die, it conducts what is termed an “exit interview.” The exit interview is a survey administered to a surviving spouse (if available) or other knowledgeable individual, and collects information about the deceased individual pertaining to the period time since the previous “live” survey. Because we are concerned with the cost of health care in the time period near death, these exit interviews are central to our study and we focus our attention on them. We use data from the 1998, 2000, 2002, 2004, and 2006 exit interviews. These interviews have 1310, 1227, 1501, 1348 and 1254 decedents, respectively. (A few observations from each year are dropped because of incomplete death dates and other missing information that can’t be imputed.) Altogether we have information on 6630 individuals. (Table 1 shows the sample sizes by year.)

In both the exit interviews and the core survey, the HRS collects a great deal of information on financial status, health measures, and out of pocket medical expenses, all of which we exploit in our analyses. To improve on past data collection efforts, the HRS has introduced innovative methodology designed to increase response rates on many questions. In particular, if a respondent does not know (or does not wish to provide) an answer to a particular question about the amount of a health care expenditure (or other dollar-denominated question), they are asked a series of questions as to whether the amount is greater than or less than a particular value. This strategy provides us with bracketed responses to many questions. Although the exact amounts are still uncertain and for some uses must be imputed, these brackets are vastly more useful than the missing values that plague survey data and would likely be particularly severe in the proxy reporting required in exit interviews.

Both these bracketed responses and the remaining missing values for individuals who cannot or will not provide even a range of values, necessitate the use of some imputation strategy to provide exact values. While the HRS staff does provide imputed values for many survey years, there are no publicly available imputations for the exit interviews since 2000, nor is there complete imputation for all out-of-pocket variables in the “core” interviews of survivors. An important component of our analysis is thus the construction of these values, beginning with the exit interviews.

The imputation procedures involved are complicated and require a good deal of care and exploratory work. There are the usual difficulties in calculating imputations, but what makes the process particularly complex is in dealing with contradictory answers in the survey. We are programming these imputations using two independent programs, written in SAS and STATA, which has been central to ensuring the (relative) absence of coding errors in our results. We

detail our methods in the appendix and here provide a brief summary of some of the more difficult issues. Below, we discuss three main issues—the thinness of the samples on which imputations are based, particularly for extremely high values (and brackets); the timeframe referenced in the question; and variation in the time period covered by the interview. More detailed explanations and sample sizes are contained in the data appendix.

*Sparse Imputation Values:* One of the strengths of the HRS’s questioning procedures for health care costs is its use of detailed categories of expenditures. The HRS asks about the premiums paid for various types of health insurance, out of pocket expenses for doctor visits, hospital stays, nursing home stays, hospice, home health care, prescription drugs, as well as other, less specific categories that ought to capture expenses such as medical equipment and various social services. This detailed probing likely captures more expenditures than would a general catch-all question. The component by component information also provides the analyst with information on exactly which types of health care costs might be most problematic and how various types of expenditures vary across the population. However, it also means that the distributions of spending for each of the underlying components are may be quite sparse, particularly at the upper tails. In any given exit interview there are only 1000 or so deaths so for rare but important outcomes, such as the out of pocket expense associated with a stay in a nursing home, there are many fewer observations.

The thinness of the data makes it difficult to impute values using conditional means or a hot-decking procedure. In the case in which a specific bracket is available, say that spending on a particular service was between \$10,000 and \$25,000, we might be comfortable with imputing a value equal to the midpoint (\$17,500) or even the mean, despite it being based on a small number of continuous responses—the scope for error is relatively small in that the bounds are in

place. However, there are many cases in which we do not have closed brackets. Individuals could respond that they spent more than (say) \$25,000 on a health expense but they don't give the exact amount, nor is there any upper limit. Should we impute \$26,000? Or double that? With relatively few decedents in any given year, there might not be more than a handful of people who report values above the upper break point for any given component of spending, making it extremely difficult to impute an overall conditional mean, much less one tailored to individual specifics.

To deal with the sparseness of observations, we impute values based on a distribution constructed from exit interviews for all survey years, a total of over 6000 exit interviews. We then base our imputations on the mean values for particular intervals, including the open ended interval where statistical power is most critical. While we recognize the potential concern that the conditional distribution for a given type of expenditure may evolve over time (and thus we are drawing from different distributions in each year), we believe that this latter potential bias is likely to be less of a problem than the very sparse data reporting. We have considered using the stacked sample along with regression equations to control for individual characteristics, but even with the full complement of decedents we feared that the sample would be too thin and sensitive to outliers to make such a procedure feasible or stable.<sup>7</sup>

*Varying Reporting Periods:* A second difficulty has arisen from the questions themselves and the varying periods of time to which the responses ought to pertain. In some cases respondents are asked to report out of pocket expenditures since the previous interview while in

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<sup>7</sup> We therefore assume that imputed expenditures conditional on being more than (say) \$20,000 are the same whether in 1998 or in 2006. Thus any secular change in out-of-pocket expenditures would arise from the growth in reported actual values, and from a larger percentage of respondents who say they experience expenses higher than \$20,000.

others they are asked to report a value for the last month (e.g. money paid to at home helpers), or, in the case of prescription drug expenses, for an average month. This change in the relevant period can confuse respondents and may lead to falsely overstated medical expenses if, for example, when asked about monthly health expenditures, respondents report the total expense since the last interview. To deal with this potential for erroneously high values we establish upper limits on what might be reasonable amounts of spending for monthly nursing home costs, home health care costs, and pharmaceutical expenses (these are detailed in the Appendix). Before capping these values we carefully inspected each report subject to the cap to ensure that we were not mistakenly shrinking costs.

*Time to Death:* A final problem which we note here is the differing length of time between interviews, particularly for exit interviews where the date of death might be just a few months after the last interview or as long as two years. If deaths are randomly distributed across a two year interval, the varying length of time will not affect our averages. (We note that the average time elapsed, from the respondents' final "live" interviews until their deaths, is approximately 15 months, with the median 14 months.) However, variation in the timing of death relative to the interview will bias the *distribution* of health care expenditures upward; people who die 24 months or more after the last interview will appear to experience much larger expenditures than those dying after the last interview.

But there are also potential biases in reporting patterns as proxies may forget costs when the death occurred several years back, or because of upticks in spending very near death. Figure 1 shows average *monthly* expenditures on the vertical axis, this is calculated by taking total expenditures since the last interview and dividing by the number of months between the last interview and the date of death. On the horizontal axis is the number of months between the last

(core) interview and death. The red line measures average monthly spending, each dot represents an individual in the exit interview. This graph demonstrates is that when death comes shortly after the last live interview so the exit interview captures only spending in the last few months of life, monthly expenditure are much higher than when the exit interview captures spending over a much longer period of time. While this pattern is consistent with the largest expenditures coming at the very end of life, it is also consistent with proxies forgetting earlier (and large) expenses. The practical implication for this pattern is that we cannot simply aggregate up monthly expenditures to normalized 12-month spending for each individual. Instead, one must either adopt an explicit life-cycle approach – that is, by including several waves of data over 4 or 6 years (which minimizes this type of error) or adjust for the time interval using semi-parametric dummy variables for how many months since the last interview.

These issues aside, the data are unusually rich and provide us with an opportunity to examine out of pocket expenditures at the end of life in a more comprehensive manner than has been done previously. We examine 11 separate components of spending: insurance premiums (including privately purchased health insurance, medigap plans, employer provided insurance, Medicare HMOs, Medicare Part B, and long term care insurance), hospital care, nursing home care, home health care, physician services, hospice care, prescription drugs, informal caregivers at home, “other medical care” (including expenses not covered by insurance, such as medications, special food, equipment such as a special bed or chair, visits by doctors or other health professionals, or other costs), “special” expenses (including in-home medical care/special facilities or services/in-home medical care, special facilities or services), and finally, non-medical spending such as modifying the house with ramps or lifts, hiring help for housekeeping or other household chores or for assisting with personal needs.

In the exit interviews for 1998 and 2000, nursing home and hospital costs were combined into a single category, and there was no category for “special” expenses; we assume these sorts of expenditures were included in the “other” category. In much of our work below we will therefore combine the categories although we note that there are important differences in expenditures for nursing home care and hospital stays that are obscured by the aggregation.

#### **IV. Results.**

Our sample of 6630 decedents provides us with a rich resource on which to base observations of end of life medical expenditures and allows us to examine characteristics of out of pocket spending that have not been possible before. The exit interviews for these individuals were obtained between 1998 and 2006, inclusive. For much of our work we will stack the observations from the various exit survey years.

Table 1 shows the means of the data for the entire sample and separately by year. The sample of decedents is, unsurprisingly, quite old. The average age at death is 79.5 and is fairly constant across survey years. There are slightly more women than men among decedents reflecting the larger number of women in the population of this age due to previous differential mortality experience.

In foreshadowing our later results, the table shows that mean out of pocket medical expenditures are large, averaging just over \$14,000. This figure represents medical expenditures since the previous survey and thus ranges from a few months to two years with the median time elapsed being 14 months. Total expenditures are, unsurprisingly, positively correlated with elapsed time. The correlation is 0.21 and is significant at the 1 percent level (not shown). The mean values of total out of pocket medical expenses across survey do not appear to follow a

consistent pattern, and as we note later, differences in means are driven in large part by some rather large outliers.

Our central interest is with the distribution of medical expenditures near end of life. We are concerned first with the costs borne by those in the upper tail of the distribution—costs which may be sufficiently high that they result in a significant depletion of wealth. We are also interested in examining the components of spending to assess which factors are most responsible for these large expenditures and which type of expenses are the most prevalent.

The distribution of total expenditures is shown in the first row of Table 2. Average expenditures are \$14,057 during the last months of life, and nearly everyone, or 5793 of our 6330 decedents had some out of pocket cost. The median out of pocket cost, however, is just \$4221. Although large, this median value does not necessarily cause financial ruin. For those in the upper tail of the distribution, however, the costs are much larger; the 75<sup>th</sup> percentile is approximately \$12,000 and the 95<sup>th</sup> percentile is a substantial \$61,366. It is difficult to imagine that many households could pay bills of this magnitude without reducing consumption on other goods and reducing net wealth.

The remainder of the table divides this total out of pocket cost into various categories of expenditures. The most common component is spending on insurance premiums. We include in this category Medicare part B premiums so two-third of our sample has a positive expenditure. (We assume that individuals who report that they are covered by Medicaid or other government programs like CHAMPUS, do not pay part B premiums.) The distribution for insurance premiums is less skewed than total spending and the median cost is relatively low, \$708 over the

time span, approximately equal to the value of the Medicare part B premium (\$88.50 per month, or just over \$1000 per year in 2006). Even in the 95<sup>th</sup> percentile, the cost is just \$6240.<sup>8</sup>

The next most frequently occurring expenditure is that for prescription drugs, with well over one-half of decedents having some out of pocket prescription drug expenditure and the average cost being a substantial \$1482.<sup>9</sup> Those in the upper tail spend \$6000; this round number is the consequence of our capping drug expenditures at \$500 per month to avoid the potential biases noted above in which the question about prescription drugs per month appears (from the very large responses) to reflect total spending since the last interview.

Medicare and other medigap insurance policies apparently do a good job of covering outpatient care. The average out of pocket expenditures for physicians are just \$497. Even in the upper portion of the tail the amounts are manageable, with the 95<sup>th</sup> percentile being \$2000.

Hospital and nursing home costs were unfortunately combined in 1998 and 2000 so we cannot discern the portion spent on each in those years. Together, however, they comprise the largest fraction of formal spending, with an average of \$3864 and an extremely large upper tail of \$20,000. Note, however, that the median is zero indicating that even among decedents, the majority do not have uncovered hospital expenses. In the years following 2000, we can look separately at hospital and nursing home costs. As shown in the bottom two rows of Table 2, the average nursing home costs are \$3,209, similar to the overall average. However, if one looks at the expenses for those who did have some out of pocket cost, the average increases dramatically to over \$20,000. (There were some improbably large nursing home expenses which may reflect

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<sup>8</sup> We capped insurance premiums at \$60,000 per year to deal with outliers who may have misunderstood or misreported the frequency with which premiums were paid.

<sup>9</sup> We note, however, that the importance of prescription drugs as a component of total spending will likely change following the enactment of Medicare Part D.

the total spent on nursing home care since the decedent was admitted to the home. In constructing our data extract we capped expenditures at \$15,000 per month.)

Other components of expenditures are less prevalent and on average do not pose a substantial burden. We note, however, one important exception. The amount of money paid to helpers for home-based care can be substantial. Although only one-eighth of our sample paid money to someone who helped with tasks around the home, when money was spent, the average was over \$35,000.<sup>10</sup> The large average expenditure observed here, coupled with the high average cost of nursing homes / hospitals, provides some evidence that it is with respect to long term care needs that the elderly may be most vulnerable. Both these categories of expenditures have extremely high values in the upper tail of the distribution, and although they are felt by relatively few individuals, they have to potential to be extremely burdensome.

One further item to note in the table is the prevalence of zeros among the medians. For many services, the majority of decedents had no out of pocket costs. In some cases this may simply reflect understatements for small fees, but it also highlights the fact only a small fraction of the elderly population are using services such as home health care or nursing homes, and thus we are quite limited with respect to the distribution of these costs in any given year. Thus combining years to gain a more precise estimate of the distribution of such expenses is key to more accurate imputations.

Even the exceptionally high expenditures observed in some categories may not be particularly burdensome if they are borne by those with ample financial resources. In Table 3 we examine expenditures by income and wealth category. Total spending rises monotonically with

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<sup>10</sup> This measure captures money paid to helpers who provide assistance primarily with activities of daily living or instrumental activities of daily living. The survey asks how much was paid in the last month. We cap that value at \$15,000 per month and scale it to be the time since that previous survey to agree with the other measures.

both income and wealth quartiles. In the case of spending by income, the highest income quartile spends 1.8 times that of the lowest. The differences by wealth, perhaps a better measure of financial resources for the elderly, are even more dramatic, increasing from \$7675 for the lowest wealth quartile to \$22,008 for the highest, a nearly three-fold difference.

Many of those in the lowest income or wealth quartile are likely to be eligible for Medicaid coverage and their lower out-of-pocket medical expenses are therefore not surprising. However, there are substantial costs for even those types of care which Medicaid covers such as prescription drugs and nursing home and hospital care. (Medicare Part D is likely to attenuate prescription drug spending for the Medicare population after 2006.) Similarly, one might have expected those in the highest income and wealth quartiles to have full insurance and first dollar coverage and therefore to have little in the way of out of pocket expenditures. For these well-off individuals, insurance premiums are large, averaging \$2500 in the highest wealth quartile, suggesting generous coverage, but expenditure across all categories, even those one would expect to be fully covered such as physician services, are larger than those in the lower quartiles. Among all income and wealth quartiles a large share of total costs are directed to helpers.

In Table 4 we look directly at the ratio of out-of-pocket expenditures to financial resources. We measure financial resources at the interview immediately preceding the exit interview. Thus, if a respondent died between 2002 and 2004, he would contribute an observation to the 2004 exit interview and we would obtain the income and wealth measure from the 2002 interview. The sample size for these calculations is therefore somewhat smaller than that for the earlier tables in that we require that we observe the decedent in the wave immediately preceding the interview.

On average, total expenditures are large relative to income or wealth with averages above one for all measures. However, as was the case with spending itself, there is substantial heterogeneity and the median ratios are all relatively small. At the midpoint of the relevant distributions, individuals are spending 18 percent of their income and 3 percent of their total wealth on health care costs. At the tails, however, the burden is exceedingly large. At the 95<sup>th</sup> percentile, expenditures for a decedent are almost 4 times the annual income for his household and similarly large if we look at expenditures relative to assets.

As a final exercise, we break down out of pocket medical spending by various characteristics of the decedent using a multivariate regression analysis. The results are shown in Table 5. We control for the age at death, birth year, sex, years of schooling, race, income and wealth (including housing). Although these are simply correlations, they demonstrate several clear patterns. Expenditures at the end of life increase significantly with age at death. Each additional year of life increases expenditures by \$917 or 7 percent (also see French and Jones, 2004). Expenditures increase with birth year, providing some evidence of a time or cohort effect suggesting that the growth rate in (inflation-adjusted) health care expenditures was 3.2 percent per year. Over the period of analysis, 1998-2006, this would translate to an average increase of \$3584 in out-of-pocket expenditures.

Expenditures for men are significantly less than those for women, with men spending \$3625 (28 percent) less on average, than women. This difference is consistent with the greater use of paid long term care for women than for men who are typically cared for by their spouses (Lakdawalla and Philipson, 2002). There are also differences by race with nonwhite spending nearly \$2500 less than whites, a result that is again likely related to the lower probability of

formal long term care use among nonwhites. Finally, we see the expected differences with income and wealth with expenditures increasing with both measures of financial resources.

## **V. Conclusion**

Previous studies of out-of-pocket expenditures have generally found low levels of average expenditures but a high degree of skewness in the distribution (Palumbo, 1989; Feenberg and Skinner, 1994; French and Jones, 2004). In part, the low mean values were the consequence of older data and generally lower health care levels of spending. Our results suggest that, at least for the period 1998-2006, out-of-pocket expenditures are both more pervasive and larger than previous studies have suggested. This finding is in part the consequence of much better and more detailed measurement of out-of-pocket expenditures pioneered in the HRS. But it may also be the consequence of a secular upward trend in out-of-pocket expenditures as suggested by our regression analysis.

The very large measures of out-of-pocket expenditures do not appear to be a consequence of errors in responses, as we were quite conservative in capping high reported expenditures because we suspected the respondent didn't understand the time frame of the question. Thus we may be understating the true risk of out-of-pocket health care costs. Still, these very large expenses of several times income or wealth appear to be due primarily to long term care needs and suggest that Medicare and Medicaid do a relatively good job in covering acute care needs but leave individuals exposed to substantial out of pocket expense with respect to long term.

As noted in the introduction, we have not yet linked the data fully for the analysis of dynamic health care expenditures in the 4 to 6 years prior to death. To link the "survivor" or

core data with the exit interview data requires further imputations for the core data. And while the HRS staff has provided their own imputations for the core data surveys from 1998-2004 for at least some of the more aggregated categories, there is no corresponding imputation at this point for the 2006 wave, nor do the HRS imputations use the full set of information about conditional expenses from the exit interview, as we do. Thus the next step is to provide better imputations – ideally, using all reported out-of-pocket expenses from the HRS data, both exit and core data, to construct imputed mean values. This would allow the complete merging of data both for surviving spouses and for expenditures in the household prior to death, allowing a much fuller description of the level and distribution of out-of-pocket health care expenditures for elderly Americans.

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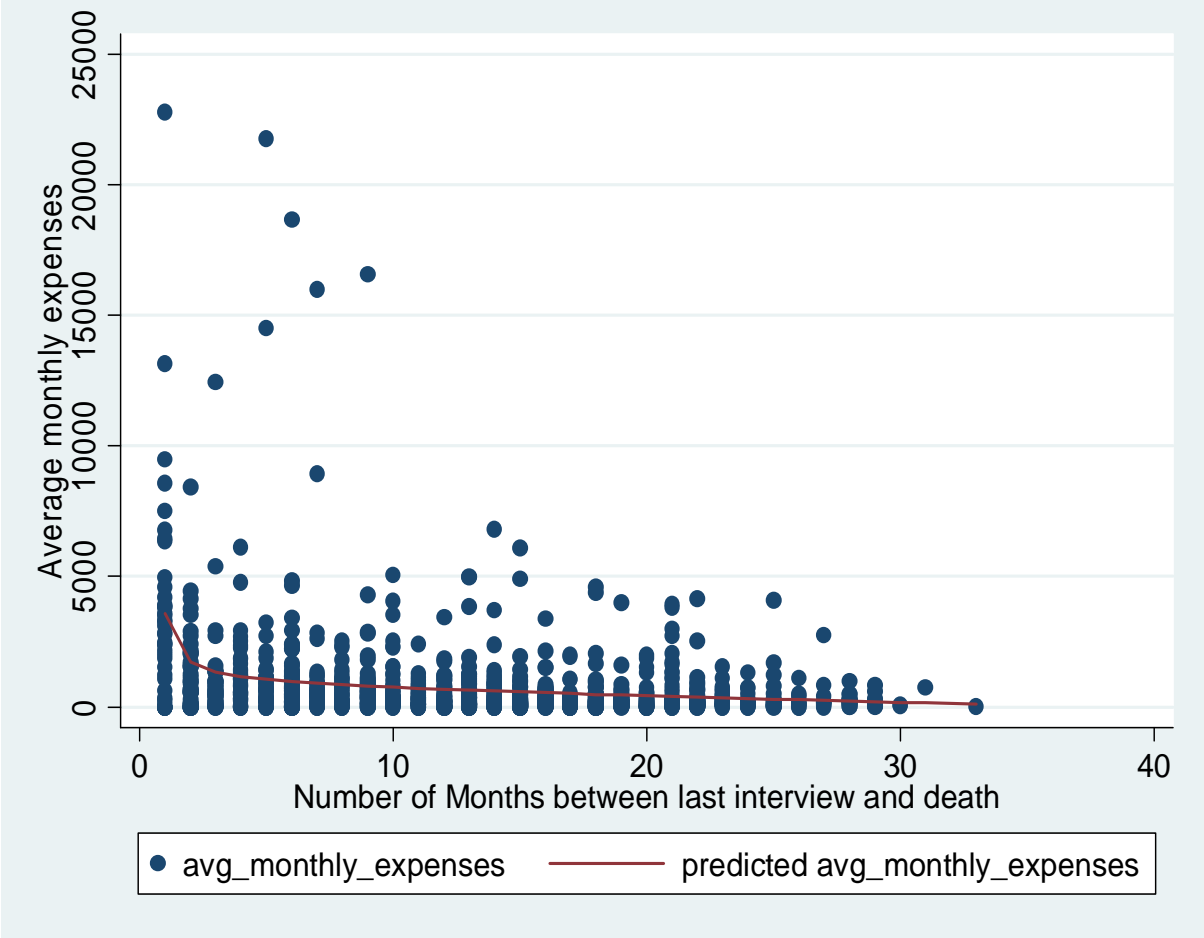
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Figure 1



**Table 1 Characteristics of Sample by Year**  
**Means (standard error of the mean in parentheses)**

	<i>Year</i>					
	All (n=6630)	1998 (n=1249)	2000 (n=1346)	2002 (n=1500)	2004 (n=1226)	2006 (n=1309)
Age at death	79.47 (0.13)	81.25 (0.28)	79.14 (0.30)	78.63 (0.28)	80.38 (0.29)	78.27 (0.33)
Sex (1=male)	0.48 (0.006)	0.46 (0.014)	0.49 (0.014)	0.48 (0.013)	0.46 (0.014)	0.49 (0.014)
Years of schooling	11.15 (0.05)	10.75 (0.12)	10.87 (0.10)	11.11 (0.09)	11.30 (0.11)	11.63 (0.09)
White	0.87 (0.004)	0.91 (0.008)	0.88 (0.009)	0.85 (0.009)	0.87 (0.010)	0.86 (0.010)
Birth year	1922 (0.14)	1915 (0.28)	1920 (0.30)	1922 (0.28)	1923 (0.29)	1927 (0.32)
Total out of pocket	14057 (393)	14688 (1029)	12144 (824)	11727 (560)	16466 (1016)	15330 (950)

**Table 2: Distribution of Expenditure by Category  
(std errors for mean in parentheses)**

	Mean	Num >0	Mean > 0	25%-tile	Median	75%-tile	95%-tile
Total	14057 (393)	5793	15502	1021	4221	12096	61366
Insurance Premiums	1715 (48)	4196	2370	0	708	2100	6240
Pharmaceuticals	1482 (54)	3625	2373	0	300	1540	6000
Physician	497 (20)	2549	1277	0	0	250	2000
Hospital / Nursing home	3864 (170)	2160	11648	0	0	1500	20000
Other Medical**	323 (20)	1380	1470	0	0	0	1500
In-home costs	470 (69)	1036	3001	0	0	0	2144
Non-Medical***	666 (67)	946	4596	0	0	0	2000
Helper Costs	5019 (286)	801	35407	0	0	0	31420
Hospice	22 (4)	70	2023	0	0	0	0

*For 2002, 2004, 2006:*

<i>Hospital</i>	1867	1771	6932	0	0	250	8244
<i>Nursing home</i>	3209 (227)	637	20424	0	0	0	17,811

. Source: HRS 1998-2006 exit interviews (with imputations). All means and distributions weighted by prior wave family weights, except as noted. Definition of categories: [Other Medical\*\*] . includes special and other medical categories.. Special being .in-home medical care/special facilities or services/in-home medical care, special facilities or services;..and other being other expenses not covered by insurance, such as medications, special food, equipment such as a special bed or chair, visits by doctors or other health professionals, or other costs; includes special costs. [Non-Medical\*\*\*] ....such as modifying the house with ramps or lifts, hiring help for housekeeping or other household chores or for assisting with personal needs? † Include premiums for Medicare part b and long term care insurance as well as medigap and other privately purchased policies.. Special and other are combined in 2002-2006 as are nursing home and hospital expenses for agreement with earlier years

**Table 3: Mean [median] Out of Pocket Health Care Expenditures: Total and by Category, in 1998--2006 Exit Interviews**

	<i>Income Quartiles</i>			
	Q 1	Q 2	Q 3	Q 4
Total	9983 [2312]	12901 [4356]	15083 [4872]	18044 [5778]
Nursing Home/Hospital	3328 [0]	4340 [0]	3621 [0]	3914 [0]
Physician	324 [0]	460 [0]	532 [0]	670 [0]
Prescription Drugs	1252 [0]	1179 [240]	1744 [500]	1760 [480]
Home care	284 [0]	348 [0]	416 [0]	837 [0]
Helpers	3081 [0]	3925 [0]	5566 [0]	7499 [0]
Other Medical**	240 [0]	288 [0]	303 [0]	462 [0]
Health insurance <sup>†</sup>	935 [133]	1529 [619]	2104 [960]	2312 [1063]
Non-Medical***	519 [0]	810 [0]	783 [0]	560 [0]
	<i>Wealth Quartiles (including housing)</i>			
	Q1	Q 2	Q 3	Q 4
Total	7675 [2000]	11444 [3982]	14886 [4783]	22008 [6427]
Nursing Home/Hospital	2778 [0]	3543 [0]	4016 [0]	4868 [0]
Physician	316 [0]	550 [0]	525 [0]	594 [0]
Prescription Drugs	862 [0]	1449 [375]	1756 [455]	1868 [560]
Home Care	187 [0]	335 [0]	522 [0]	841 [0]
Helpers	2122 [0]	3217 [0]	5010 [0]	9722 [0]
Other Medical**	220 [0]	294 [0]	317 [0]	461 [0]
Health insurance <sup>†</sup>	895 [58]	1442 [560]	2027 [986]	2517 [1199]
Non-Medical***	288 [0]	574 [0]	692 [0]	1119 [0]

Income quartile cutoffs points are \$10,374, \$19,922, \$38,747. Wealth quartiles (including housing wealth) are \$16,183, \$106,780; \$280,760 \$998,300. Hospice care omitted.

**Table 4: Expenditures Relative to Resources**

	Mean	Number	25%-tile	Median	75%-tile	95%-tile
Total Expenditures	14004	5961	1021	4207	12075	36281
Total / HH income	1.21	5870	0.04	0.18	0.65	3.91
Total / Assets (exc. home)	5.55	4825	0.02	0.10	0.55	9.01
Total / Assets (inc. home)	3.98	5231	0.01	0.03	0.17	2.68
HH income	32885	5961	10374	19922	38747	95121
Assets excluding home	194413	5961	11707	26681	143908	847833
Assets including home	287480	5961	16183	106780	280760	1061000

Sample consists of those decedents for whom resources in the previous wave were obtained. (N=5961). Ratio of expenditures to resources are for those for whom resources are strictly greater than zero. The variation in sample size is due to zero or negative values of income or wealth.

**Table 5: Regression of Total Out of Pocket Expenditures (n=5883)**

Variable	Coeff	Std Err
Age at death	917***	115
Birth year	488***	114
Male	-3625***	784
Years of Schooling	887***	114
Nonwhite	-2491**	1037
Income	0.031***	0.008
Networth	0.002***	0.0004
Constant	- 1006578***	250937
R2		0.06
Mean of dependent variable		13135

\*\*\*denotes significant at the 1 percent level

\*\* denotes significant at the 5 percent level

Regression is unweighted.

## **Technical Appendix: Imputing Out-of-Pocket Expenses in the HRS**

### *1. Creating the index variable*

The key variable needed for the HRS files, for all future merging and coordination even among helper files and to create “family” files is a person-specific identifier. This variable gives each individual a unique value that is consistent over time. This identifier is the concatenation of the household identification number (HHID) and person number (PN). It is used to merge biennial or exit interviews over time and with the HRS tracker file.

### *2. Population Weights*

Observations at exit interviews are assigned zero weights to reflected the fact that the individual is deceased. Respondents in nursing home in the early years of the survey were also assigned zero weight. (Recently, the HRS staff has begun to provide population weights for nursing home patients and when available we use these weights. Unfortunately, the weights for nursing home patients have not been “filled in” for earlier years.) In both cases in which weights are zero, we trace back through previous surveys to find the last valid individual weight and assign this value. Although not the exact weight needed to construct a population representative sample (decedents are no longer part of the population) they provide us with a convenient way to reduce the biases that result from over-sampling of certain groups were we to use unweighted data.<sup>11</sup>

### *3. Imputation values: general issues*

As noted above, if a respondent said that they spent more than x dollars (say \$100,000) on hospital costs, but with no upper limit, there is no clear cut answer as to what the best value is to assign them. All respondents who reported an actual value in any year 1998-2006 above \$100,000 (in the case above) were put together in one file and had their reported spending converted to 2006 dollars using the consumer price index (CPI) for urban consumers. (<http://www.bls.gov/CPI/>) This average is then assigned to individuals in each wave who report that the value is above the upper bracket. (We note that in addition to the issue we raised in the text of changes in the distribution of expenditures over time, the brackets themselves are not

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<sup>11</sup> We have conducted all our analyses with an without weights. The broad conclusions do not change.

index for inflation so any seem effects might also lead to problems. We ignore these complications.)

### *Imputations for Insurance Premiums*

The HRS asks respondents to report premiums for several types of insurance coverage. We address each type of premium in turn.

#### Medicare through an HMO

This variable assigns costs to people for any premiums they paid for a Medicare HMO. The file assigns the mean value to those people who do not report a lower or upper limit. Using the mean value ensures that the expectations (and hence the means of the final amounts) are unbiased. In theory, one could also assign median values within brackets. However, this approach creates some degree of uncertainty about what one is actually measuring in overall expenses – it is neither a good estimate of the median (since the sum of several medians is not itself equal to the median of the sum) nor is it a good estimate of the mean. The mean value of people from all years who reported above the cut off value is assigned. After this process is completed all of the variables from the program are dropped so that they may be recreated for the next variable that runs the program.

As can be seen, there are relatively few people who report the actual monthly cost for lowest bracket category, just 8 people, resulting in a mean value of \$10.80 per month, but there are many individuals for whom we must impute values. There are also relatively few people with reported premiums in the highest category (49 people with monthly payments over \$200 per month) but even fewer for whom we must impute a value so that we doubt that this imputation step will introduce much in the way of substantive error in constructing total out-of-pocket expenditures.

**Table A.1: Imputation Brackets for Monthly Medicaid HMO Payments**

	< 16	16 - 30	31 - 60	61 – 200	> 200
# of reported actual values	8	24	72	105	49
Mean	10.8	24.9	47.4	115.7	481.3
# imputed in 1998	59	58	0	0	0
# imputed in 2000	120	51	0	0	0
# imputed in 2002	180	11	22	0	0
# imputed in 2004	60	0	2	0	0
# imputed in 2006	161	41	9	7	5

Note that Table A.1 provides monthly payments; for both those who have their values imputed and those who did not, these estimates are multiplied by the number of months between the time of death and when the respondent was last sampled as part of the core survey.

#### Medicare Part B Coverage

Medicare Part B premiums are not reported in the HRS but we do know if the respondent has Part B coverage. For those who do, we simply assign the Part B premium for that year based on data from the Social Security Administration. For those who report that they are covered by Medicaid, or by Champs VA/ Champus (now called Tri-care) we assume that the Part B premium is paid for an assign a premium cost of zero.

#### **A.2: Monthly Costs for Medicare part B**

YEAR	Cost (in dollars)
1998	43.80
2000	45.50
2002	54.00
2004	66.60
2006	88.50

### Private Medigap

This section measures insurance premiums for private Medigap plans, whether obtained through the individual or through an employer. It covers insurance from both current and former employers, spouses' current and former employers, and self employed people. First, if people report that they had some expense, but don't know what it is, they are assigned the overall mean value. Next the people who do not have any private insurance are considered. Finally, the amounts of private Medigap insurance from all sources are added in.

The total imputation numbers are shown in Table A.3, and are presented in terms of monthly costs. Most of the reported payments are quite modest, and thus are assigned estimates of either \$12.40 or \$33.00 where appropriate. Respondents are less aware of the exact amounts of their Medigap payments, particularly in 2006 (note the sharp jump in people reporting expenses between \$151 and \$300 per month), but at the same time there are remarkably few people who reliable can tell the HRS what that value is. This is a particular problem for expenses over \$300 where there are no imputed amounts.

#### **A.3 Imputation Brackets for Private Medigap Payments**

	< 26	26 - 50	51 - 100	101 - 150	151 - 300	301 – 500	> 501
# of reported values	849	110	9	1	1	0	0
Mean	12.4	33.0	61.4	125.8	166.9	-	-
# imputed in 1998	21	41	66	86	12	0	0
# imputed in 2000	43	50	2	63	1	0	0
# imputed in 2002	6	23	36	255	6	0	0
# imputed in 2004	8	13	73	123	48	0	0
# imputed in 2006	5	6	74	35	118	3	6

#### *Long Term Care Insurance Imputations*

For long term care insurance we follow the same methodology as above. The first thing that we do is to set all the 'don't know' and 'refuse to answer' responses (DKs and RFs) to

missing values so that – at the end of the process – we can assign the unconditional mean values to these people. We then measure the monthly premiums as best as possible and convert to a total amount using the number of months the individual has been in the sample.

One concern is that some people will report a lump sum insurance payment. We assume that people who pay one lump sum for their long term care (perhaps those who paid an upfront fee to enter a progressive care community) lived for twenty years after they paid it, so their value is divided by twenty. Table A.4 provides the long-term care insurance premiums. These estimates appear to provide sufficient sample sizes for each bracket, although the “greater than \$400” measure is quite high (\$2,418 per month). However, anecdotal evidence suggests that for some long-term care coverage among elderly enrollees, the costs can be quite formidable. Finally, these measures of insurance are all summed together for the overall insurance payments reported in Table 1 in the text.

#### **A.4: Long Term Care Insurance Brackets**

	< 26	26 - 50	51 - 100	101 - 200	201 – 400	> 400
# reported values	86	14	29	36	16	7
Mean	11.4	39.2	80.4	154.0	296.6	2418.5
# imputed in 1998	50	0	0	0	0	0
# imputed in 2000	34	0	0	0	0	0
# imputed in 2002	84	0	4	3	46	0
# imputed in 2004	47	0	14	20	1	1
# imputed in 2006	47	1	2	23	2	0

#### *Hospital/Nursing Home Out of Pocket Expenditures*

The HRS asked first about combined nursing home and hospital out-of-pocket expenditures, but beginning in 2002 they asked about the two components separately. This creates some complications in the imputations – which we need to check again for consistency – but the general procedure was to check first whether people reported that their insurance covered all costs (thus they were assigned zero expenditures) and whether they had been admitted to a

hospital. People who did not know if they had an overnight stay in the hospital and people who reported an overnight stay, but did not report a cost are also assigned the overall average.

A similar approach was used for nursing home imputations; zeros were assigned for people whose costs were totally covered by insurance and for those people who didn't spend any time in a nursing home, and so hence had no costs. The unconditional mean is assigned to people who did not have all of their costs covered by insurance, people who did not know if insurance covered any of their costs, and people who do not know, or refused to answer on whether the respondent was ever an overnight patient in a nursing home and all of whom have no existing data in the nursing home out of pocket variable. Note that we also impose a limit of \$15,000 per month for nursing home expenses (again to prevent mistakes of one-year responses to monthly expenses from creeping in to the imputation method.) The \$15,000 value was chosen after careful examination of average nursing home prices across cities as presented in MetLife, 2006, The imputations prior to this \$15,000/month limitation are reported in Table A.5.

#### **A.5: Imputation Brackets for Hospital/Nursing Home Out-of-Pocket Expenditures**

	< 501	501 – 5,000	5,001 – 10,000	10,001 – 20,000	20,000 – 50,000	> 50,000
# of reported values	186	537	136	131	114	114
Mean (S.E.)	243.5	2063.6	7180.1	13,836.18	32,741.85	107,386.4
# imputed in 1998	5	65	85	12	4	0
# imputed in 2000	26	61	85	17	14	0
# imputed in 2002	58	114	18	2	5	0
# imputed in 2004	60	92	20	6	2	0
# imputed in 2006	30	103	27	32	3	1

#### *Physician Out-of-Pocket Expenditures*

This section imputes the amount paid out of pocket for doctor and clinical visits during the last two years of the respondent's life. As for earlier categories, we impute the unconditional mean to people who report don't know or refused to answer for people who might have

plausibly experienced expenses. Zeros are included for people whose costs were fully covered by insurance, and/or who did not have any doctor visits. For these we have reported the standard error of the means. While the standard error of the smaller amounts of spending yield very tight confidence intervals, the smaller sample sizes among those with expenses more than \$20,000 yield both a high estimate (\$63,666) as well as a high standard error given that N = 6 (Table A.6). These imputations of the open brackets become more important for the sample of people in 2006.

**A.6: Imputations of Out-of-Pocket Physician Expenditures**

	< 501	501 - 2000	2001 – 5000	5,001 – 10,000	10,001 – 20,000	> 20,000
# of reported values	702	194	93	17	15	6
Mean (S.E.)	174.2 (5)	973.9 (29)	2991.5 (86)	6471.4 (304)	13,016.9 (708)	63,666.4 (22922)
# imputed in 1998	89	134	33	0	12	0
# imputed in 2000	80	156	30	0	11	0
# imputed in 2002	170	127	66	12	4	0
# imputed in 2004	140	107	36	13	1	0
# imputed in 2006	165	63	29	38	4	5

*Hospice Out of Pocket Expenditures*

This section adds up the entire out of pocket expenses for the hospice, with the standard approach for filling in the unconditional means for people who are unable to respond that they’ve either been in or not in a hospice – that is, people who respond to the insurance coverage variable (UN324 in 2006) that the insurance mostly, partly, or did not cover the costs any costs, or if the costs have not yet been settled; in the amount variable (UN238 in 2006) a DK or RF is reported; on the result variable, when the respondent is not able to give a range in the bracket variables, (UN331 in 2006) is a DK or RF; and/or the ‘have you ever been a patient in a hospice’ variable is reported as yes (UN320 in 2006). Next the people who have never been a patient in a hospice are added in as zeros. People who have been a patient in a hospice, but had all of their costs covered by insurance are added in as zeros too. Next the old mean is dropped and on the

following line the new mean is created. Results are shown in Table A.7. Note that there is just one person reporting more than \$50,000 in expenses, and that amount (\$83, 063) is imputed to just one person in 2006.

**A.7: Hospice Out-of-Pocket Expenditures**

Bracket	< 501	501 – 10,000	10,000 – 50,000	> 50,000
# of reported values	9	31	2	1
Mean (S.E.)	237.3 (54)	2795 (419)	14316.5 (3683)	83062.8 (-)
# imputed in 1998	1	2	1	0
# imputed in 2000	2	4	0	0
# imputed in 2002	7	4	0	0
# imputed in 2004	4	4	0	0
# imputed in 2006	10	2	1	1

*Prescription Drug Out of Pocket Expenses*

Prescription drug payments are reported in terms of months, and are then scaled to represent the time elapsed since the last interview. We suspect that in some cases, respondents provide an amount equal to total expenditures since the last survey, because that is the time frame used for a majority of the health care expenditure questions. They may not notice the change in time frame. Given the presence of several large outliers, and the likely possibility of such an error, we cap monthly payments to \$5000 per month. The amounts are then scaled to the time elapsed since the previous survey. .

The imputations are performed using the approach outlined above so that people who report some expenses, but who do not report more specific amounts, are assigned the unconditional mean value. Table A.8 reports the brackets for conditional means; note that there is sufficient reporting in each bracket to derive fairly precise estimates of these spending. Again the imputation appears to be greatest at the highest level (> 500) in 2006.

**A.8: Imputation Brackets for Pharmaceutical Out-of-Pocket Expenditures**

	< 6	6- 10	11 - 20	21 - 40	41 - 100	101 – 200	201 – 500	> 500
# of reported values	287	296	438	513	537	304	94	37
Mean	3.1	8.2	15.9	33.0	68.8	143.4	285.9	1011.1
# imputed in 1998	4	16	34	21	79	73	52	0
# imputed in 2000	5	8	25	25	67	98	50	0
# imputed in 2002	6	13	21	0	221	87	62	0
# imputed in 2004	2	11	17	0	164	85	54	0
# imputed in 2006	0	7	8	23	151	102	27	7

*Home Health Care Out-of-Pocket Expenditures*

As it turns out, home health care expenditures are quite important. We first use our standard approach to discern who had any home health care, and whether it was entirely covered by health insurance. (For those without any home health care expenses, or for those who were covered entirely by insurance, we assigned a measure of zero.) As in other categories of expenditures, we place limits on the total amount of home health care expenditures, capping such spending at \$15,000 per month. Thus the amounts shown in Table A.9 are before these limits were imposed. Table A.9 presents results for the home health care brackets. One might be concerned about the large mean value assigned for the bracket over \$20,000, but (a) these would be subject to the \$15,000 limit and (b) they are not used to impute any values, given that no one in the samples ended up in this open-ended bracket.

**A.9: Imputation Brackets for Home Health Care**

	< 501	501 - 2000	2001 - 5000	5001 – 10,000	10,000 – 20,000	> 20,000
# of reported values	84	68	27	11	11	14
Mean (S.E.)	191.7 (17)	962.1 (50)	3110.1 (172)	7313.2 (481)	15080.0 (965)	85698.0 (24204)
# imputed in 1998	20	21	23	7	4	0

# imputed in 2000	23	31	296	5	0	0
# imputed in 2002	49	15	20	5	0	0
# imputed in 2004	46	3	22	0	0	0
# imputed in 2006	54	8	5	12	0	0

*Other Out of Pocket Costs*

This section makes imputations for other costs, which may seem vague, but refers to things not covered by insurance such as over the counter medications, special food, doctor visits, special equipment and other miscellaneous expenses. The imputation is done using the standard approach, and is reported in Table A.10.

**A.10: Imputation Brackets for Other Out-of-Pocket Expenditures**

	< 501	501 – 2000	2001 - 5000	5001 – 10,000	10,000 – 20,000	> 20,000
# of reported values	322	222	82	22	19	8
Mean	192.8	1028.1	3097.2	6328.5	14573.8	30592.9
# imputed in 1998	11	30	1	3	2	0
# imputed in 2000	55	52	10	2	2	0
# imputed in 2002	80	20	25	5	0	0
# imputed in 2004	86	22	16	5	1	0
# imputed in 2006	81	15	25	6	1	2

*Non Medical Out of Pocket Costs*

This section imputes values for non medical expenses related to old age or disability such as: house modifications, assistants for personal needs or helpers for household chores. (Thus describing these as “non-medical” relates more to the type of care rather than the motive for why people need the care, which clearly does relate to medical disabilities.) We once again follow our standard approach to impute these values, shown in Table A.11. This is a surprisingly large

expense, and expenditures are highly skewed, with 3 people reporting more than \$100,000 in non-medical expenditures. However, the importance of imputations is quite limited – there are no people who receive an imputed value for more than \$100,000 in expenses, and just 4 for the closed interval of \$25,000 - \$100,000.

**A.11: Imputation Brackets for Non-Medical Expenditures**

	< 1001	1,001 – 5,000	5,001 – 25,000	25,000 – 100,000	> 100,000
# of reported values	281	191	70	28	3
Mean	392.2	2345.416	10470.3	50017.4	162,598.1
# imputed in 1998	41	38	14	0	0
# imputed in 2000	46	28	7	0	0
# imputed in 2002	42	16	15	1	0
# imputed in 2004	31	21	7	0	0
# imputed in 2006	44	10	10	3	0

*Out of Pocket expenses for Special Health Services*

This section imputes special health service costs such as an adult care center, a social worker, an outpatient rehabilitation program, or transportation or meals for the elderly and disabled. The variable was first introduced in 2002, and in the aggregate is quite modest in value – they are summed with “other medical expenses” in Table 1 above. The imputation amounts are estimated using our standard methods, and are shown in Table A.12.

### A.12: Imputation Brackets for Special Expenses

	< 501	501 – 1,000	1,001 – 5,000	5,001 – 10,000	10,001 – 20,000	> 20,000
# of reported values	79	16	15	4	2	0
Mean	126.0	630.4	2232.4	6072.0	14537.5	-
# imputed in 2002	26	4	2	0	0	0
# imputed in 2004	31	4	14	1	0	0
# imputed in 2006	36	1	1	3	1	1

#### *Out of Pocket Expenditures for In Home Helpers*

Some people in the exit interview had special in-home helpers. This set of variables comes from a different section from the rest of out of pocket expenditures (e.g. section G in the 2002 survey). These helpers are primarily providing assistance with activities of daily living or instrumental activities of daily living and include tasks such as dressing, grocery shopping, and walking.

The first question we asked the HRS staff is whether payment to these helpers are captured in the home health expenditure questions on the survey. The HRS staff suggested that the wording of the questions did not specify whether there was duplication, but they concluded that there probably was: “the question text and interview instructions do not tell the respondent to include or exclude the expenses in G\_hp from those amounts. Given this and the question wording, I would assume that those amounts are included.” [cite]

However, the data suggests much less overlap than stated by the HRS staff. Looking at the 2006 exit data, we found that of 211 positive values for helper out of pocket expenses, only 24 values for other home health expenses were greater than or equal to reported expenses for helpers, conditional on a positive value for their out of pocket expenditures for helpers. Thus we include these measures from the separate helper files in addition to any measures reported from other parts of the file.

Four variables are needed to create estimated spending. The first variable is the out of pocket variable or the variable where the respondents with actual values report their spending.

The next variable has to do with how often their expenses that they reported are for (i.e. years, months, days, etc.). The third variable that is read in is the bracket variable. This bracket is fortunately very simple because the respondent is only asked whether they paid more than, about, or less than one-hundred dollars per month. The final variable that needs to be read in is a question variable. It asks the respondent whether the helper they hired was paid to help or not. Using our basic decision rules (as described above), we estimated out-of-pocket spending for each helper file, and then aggregated over the helper files (of which there may be more than one per respondent) to create a measure of expenditures per person. Because there are just two brackets, the conditional means are straightforward to describe, as in Table A.13. The estimate spending amounts for those with more than \$100 per month are substantially above the \$100 limit. However, we note that home health care expenses are limited to no more than \$15,000 per month.

**A.13: Imputation Brackets for Helpers**

	< 100	> 100
# of reported values	37	497
Mean	44.4	3377.6
# imputed in 1998	7	54
# imputed in 2000	7	81
# imputed in 2002	6	72
# imputed in 2004	8	63
# imputed in 2006	6	67