MARKET EVIDENCE OF MISTAKEN MORTALITY RISKS *

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Abstract

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Abstract

We construct and implement a test of rational consumer beliefs in a high-stakes financial market. In particular, we test whether consumers make systematic mistakes in perceiving their mortality risks. We implement this test using data from secondary life insurance markets where consumers with a life-threatening illness sell their life insurance policies to firms in return for an up-front payment. We compare predictions from two models: one with consumers who correctly perceive their life expectancy and one with consumers who are misguided about it. We find that the data are most consistent with the predictions made by the second model.

1 Introduction

Making insurance and savings decisions is difficult. Traditional economic models of insurance decisions assume, at a minimum, that consumers can accurately assess the risks they face. But is this assumption reasonable, especially in a market where a consumer faces unfamiliar risks?

In this paper, we develop a market-based test of whether consumers make systematic mistakes in assessing their own mortality risks. Our test relies on nationally representative data from secondary life insurance markets, where terminally ill consumers bequeath their life insurance policies to firms in return for an up-front payment. These markets are good candidates for such a test because they require consumers to estimate their own mortality risks accurately in order to assess whether prices are fair.

To set up this test, we start with a standard model of the consumer decision to sell life insurance in which consumers accurately perceive their own mortality risks. In this model, an increase in mortality risk increases a consumer's wealth by increasing the market value of the consumer's life insurance policy. In response to this increase in wealth, the consumer wants to increase both consumption and bequests. Thus, the consumer sells some or all of his life insurance policy, uses some of the proceeds for current consumption, and invests the remainder for future consumption or bequests. This model produces two sharp predictions that are relevant here: a positive correlation between mortality risk and the decision to sell life insurance and a positive correlation between asset holdings and the decision to sell life insurance.

But is the assumption that terminally ill patients accurately perceive their own mortality risk right? Extensive evidence from the psychology literature shows that people make systematic mistakes in assessing their mortality risks. For example, Lichtenstein et al. (1978) and others have shown that people underestimate mortality risks from likely causes of death and overestimate mortality risks from unlikely causes

of death. In related research, studies have found that people overestimate highly publicized risks.[1] Evidence from the Health Retirement Study (HRS) suggests that people tend to be optimistic about their longevity, with optimism greatest for people with the shortest life expectancies.[2]

Motivated by these considerations, we develop a model in which unhealthy consumers are systematically too optimistic about their mortality risks.[3] Like the standard model, this model of misperceived mortality risk also predicts a positive correlation between mortality and life insurance sales. However, unlike the standard model, this model predicts that: (1) among healthier patients, those with significant non-liquid assets should be *less* likely to sell life insurance; and (2) among sicker patients, those with significant non-liquid assets should be *more* likely to sell life insurance. We test predictions from these models against nationally representative data on life insurance sales by HIV+ individuals.

2 A Standard Model

A secondary life insurance transaction (also called a viatical settlement) is the sale of a life insurance policy to a third party for immediate cash payment at a discount to face value; it involves the sale of a used life insurance policy. When a consumer sells his used policy, the buyer becomes the sole beneficiary of the policy and she collects

[1] Moore and Zhu (2000) find that people systematically overestimate the effects of passive smoking on their health.

[2] For example, Schoenbaum (1997) finds that heavy smokers tend to be overly optimistic about their probability of surviving to age 75. Hurd et al. (1999) report that less healthy older individuals in the HRS are overly optimistic about their survival probabilities.

[3] An alternate and consistent interpretation of this model is that consumers mistakenly focus on nominal price information in deciding to sell insurance rather than on the real discounted expected price. Like the "optimism bias" interpretation, this "misperceived prices" interpretation has a long pedigree in the psychology literature. Numerous studies have documented how such simple heuristics (like focusing on the nominal rather than the real price) sometimes lead consumers to make systematic mistakes. Much work has focused on the effect of such heuristic rules in decisions about household savings. See, for example, Bernheim et al. (1997) and Laibson (1997). For case studies from other financial markets, see Odean (1998), Daniel et al. (1998), and Benartzi and Thaler (2001). See (Kahneman and Tversky, 1979)and (Thaler, 1985) for important theoretical work relevant to this alternate interpretation.

the face value of the policy when he dies.[4]

There is a good reason why this market attracts only consumers who have suffered adverse health events. Life insurance premiums are set at the time of purchase based upon the mortality profile of the consumer *at the time of purchase*. When a consumer suffers an adverse health event (worse than average for his age), suddenly he is more likely to collect his life insurance earlier than originally thought at the time of purchase. Indeed, his premiums would be much higher were he to buy the policy after the event. In effect, the adverse health event creates equity in the consumer's used life insurance policy. It is this equity, which is a real asset for the consumer, that is sold on the viatical settlements market.

With this reasoning in mind, we consider first a standard model of the decision to sell life insurance, in which the terminally ill consumer accurately perceives his mortality risk.[5] In this standard model, the consumer is endowed with a life insurance policy that was purchased prior to the development of the illness, as well as some illiquid (such as a house) and liquid assets.[6] The consumer can sell all or part of his life insurance policy in the viatical settlement market, and he can sell or borrow against his illiquid assets in a market for capital. The value of these endowments is determined by prices in the viatical settlement and capital markets, both of which

[4]The secondary life insurance industry emerged in the 1980s in response to the advent of AIDS, which at that time was almost always fatal. The initial focus of the viatical settlement market on HIV+ consumers was due to the unique demographics of the HIV+ population. HIV+ patients tend to be younger (and therefore less likely to have dependents) and predominantly gay (and hence more likely to have lost their significant other to death from HIV). These demographics implied that HIV+ consumers were more likely than other comparably ill patients to sell their life insurance policies. The industry has grown rapidly since then; there were $500 million in policies sold by 1995 and $1 billion in policies by 1998 (National Viatical Association, 1999). The discovery of effective medication for HIV infection appears not to have deterred growth. Companies are expanding their business and some have started marketing settlements to the elderly and patients with other terminal illnesses (American Council of Life Insurance, 1999).

[5]Readers interested in a more formal presentation of this model should see Bhattacharya et al. (2003). We omit this presentation here because the analysis is, well, standard.

[6]In the formal version of the standard model, we assume that there are no premium payments needed to continue the life insurance policy after it has been sold. This is a simplifying assumption that does not affect the main conclusions or the generalizability of our results. This is also consistent with reality in that several life insurance policies have a disability waiver that waives premium payments when the policyholder suffers from a disability (such as an AIDS diagnosis).

we assume to be competitive.[7]

The consumer maximizes the expected net present value of a utility stream that depends on consumption in each period when he is alive and upon the level of bequests left to his dependents when he dies. The only uncertainty in this simple model comes from the timing of death; though the consumer correctly perceives his hazard of dying at each date, he does not know exactly when he will die. By transacting in the secondary life insurance and capital markets, the consumer can move resources from the present to the future, as well as between different uncertain states of the world.

There are three equilibrium conditions. First, since credit and viatical settlement markets are assumed competitive, firms in both earn zero profits. Moreover, in equilibrium there are no arbitrage opportunities; thus, firms and individuals cannot profitably borrow (or lend) in the credit market to finance a purchase (or sale) of a life insurance policy in the viatical settlement market. Second, the consumer chooses consumption in each period so that the marginal utility of consumption equals the expected marginal net present value of utility of future consumption and bequests. Third, consumers choose bequests to equalize the marginal utility of bequests regardless of when they die; that is, the marginal utility derived from bequests is the same in all the different uncertain states.

Selling life insurance helps the consumer reduce the riskiness of his bequest portfolio. Borrowing does not affect the riskiness of the bequest portfolio since the repayment of secured loans taken in prior periods is not contingent on the death of the consumer. On the other hand, selling life insurance enables the consumer to increase resources when alive at the cost of reducing near term bequests. In other words, the *ex post* cost of obtaining funds from a viatical settlement (relative to borrowing) will depend on the timing of the consumer's death. If the consumer lives beyond initial

[7]In Bhattacharya et al. (2005), we develop evidence that secondary life insurance markets were competitively priced in the period covered by the data that we use in this paper. In particular, we find that calculations of the expected net present value of viatical settlements for people with different life expectancies match (appropriately transformed) transaction prices in that market.

expectations, then a viatical settlement will have lower costs than borrowing; if the consumer dies earlier than initial expectations, then viatical settlement will be more expensive than borrowing. Of course, equilibrium requires that the expected *ex ante* cost of financing an extra dollar of consumption through borrowing and selling life insurance will be the same.

This standard model makes two important comparative static predictions. First, an increase in mortality risk increases the magnitude of life insurance sales. An increase in mortality risk increases the consumer's wealth by increasing equity in the consumer's life insurance policy. In response to this increase in wealth, the consumer will demand both increased consumption and bequests, which are both assumed to be normal goods. Thus the consumer will sell some or all of the life insurance policy and use some of the proceeds for current consumption and invest the remaining proceeds for future consumption or bequests.

Second, an increase in the value of the consumer's illiquid (such as a house) and liquid assets (such as income) raises the magnitude of life insurance sales. Trivially, an increase in the value of a consumer's house or an increase in income increases the consumer's wealth. This increase in wealth would mechanically increase the size of near-term bequests, were the consumer to die unexpectedly early. To maximize utility under these changed circumstances, the consumer will want to liquidate some of his life insurance holdings, effectively moving funds between from the early death state of the world (which is overly funded because of the nature of the increased wealth) to the current time period. Therefore, the consumer will increase life insurance sales and use some of his wealth to increase consumption and late term bequests, at the expense of the originally increased near term bequests.

3 Misperceived Mortality Risks

We next construct an alternative model of the decision to sell life insurance in which consumers have misperceptions about their mortality risks. Motivated by the behavioral economics literature, we assume in this model that relatively unhealthy consumers overestimate their life expectancy, while relatively healthy consumers underestimate their life expectancy. This misperception has strong implications for how healthy and unhealthy consumers behave in the viatical settlement market.

The price of a life insurance contract (measured by the discount to face value) offered in the viatical settlement market depends on the seller's life expectancy. Even for policies with the same face value, the market will pay a higher percentage of the face value to consumers closer the end of life, since firms are more likely to collect earlier. Since in this model a healthy consumer underestimates her life expectancy, she will perceive an actuarially fair price as being less than fair. Assuming that the market interest rate for borrowing is the same for everyone, relatively healthy consumers will thus perceive terms of trade to be less lucrative in the viatical settlements market than in the credit market. Analogously, relatively unhealthy consumers will perceive terms of trade to be more lucrative in the viatical settlements market.

As in the standard model of the previous section, the consumer holds three assets: a life insurance policy with a face value $\$\bar{F}$, other non-liquid assets worth $\$NL$, and liquid assets worth $\$L$. She can finance her consumption in three ways. She can consume liquid assets directly, borrow against other non-liquid assets at a given interest rate r, or sell part or all of their life insurance policy at a price p per dollar of coverage. Each action has costs in terms of foregone bequests. Liquid assets cannot be bequeathed once spent, loans must be repaid, and heirs cannot collect on life insurance that has been sold.

Unlike in the standard model, the consumer in this model solves a static optimization problem of distributing wealth between consumption and bequests to maximize

utility.[8] In particular, such a consumer does not discount bequests, while firms, which live forever and are risk neutral, discount future income at the market rate of interest. This simple model generates sharp predictions that we can test with the available data; adding some dynamic elements to the model would complicate it without altering the main predictions that we test in the empirical portion of the paper.

3.1 Mortality Risk Perceptions and Life Insurance Sales

Let a_i reflect consumer i's risk of death, and let $H_1 = \{i|a_i < \bar{a}\}$, $H_2 = \{i|a_i = \bar{a}\}$, and $H_3 = \{i|a_i > \bar{a}\}$ for some cutoff level $\bar{a}$ so that H_1 consists of healthier consumers than H_3. We define the cutoff value $\bar{a}$ to be set such that for consumers in H_2, the perceived costs of financing current consumption through the credit and viatical settlement markets are equal. H_1 consumers perceive lower prices in the credit market, while H_3 consumers perceive the viatical settlements market to be more lucrative. Figure 1 shows a typical the budget constraint for H_3 consumers. The vertical axis represents current consumption, the horizontal axis represents bequests, and W represents the initial endowment, $\left(L, NL + \bar{F}\right)$. B represents the net present value of the endowment—$L + p\bar{F} + \frac{NL}{1+r}$, where p is the actuarially fair unit price of life insurance sales.

Selling all of $\bar{F}$ moves consumers from W to A, where consumers have only non-liquid assets left to fund bequests. To increase current consumption past A, consumers must turn to the credit market, where they borrow at interest rate r, represented by the line segment AB. At point B, consumers leave no bequests, consuming everything in the current period. The kink in the budget constraint is caused by consumer's misperception about the relative prices of borrowing and selling life insurance. A consumer who correctly observed that the real prices of the two activities are the

[8] We also abstract away from a consumer who is not 'cash-constrained'—that is, those who saves liquid assets to finance future consumption or bequests—because such an individual would never be interested in selling her life insurance.

same would have a straight line connecting points W and B for a budget constraint since the policy is discounted by firms at the market rate of interest, the same rate at which consumers can borrow.

Another strategy that consumers could pursue would be to borrow first and then sell their life insurance after their credit is exhausted. WCB is the perceived budget constraint for this strategy, where C represents the exhaustion of non-liquid asset collateral and B represents the sale of $\bar{F}$ as well. Since H_3 (the unhealthiest) consumers perceive that the terms of trade favor the viatical settlements market; the slope of WA is greater (in absolute value) than the slope of WC. Therefore, consumers will sell first and then borrow only if $p\bar{F}$ is insufficient to finance current consumption. Similarly H_1 (the healthiest) consumers will perceive that the terms of trade favor credit markets and choose to borrow first. Therefore, like the standard model, this model also predicts a negative correlation between health status and the decision to sell.

3.2 Effect of Assets on Life Insurance Sales

Changes in non-liquid assets lead to a parallel shift in the consumer's budget line and do not affect the perceived terms of trade in the two markets. Increasing non-liquid assets raises both the value of the endowment and maximum possible bequests, since consumers either leave additional non-liquid assets as bequests or use them for borrowing.

For healthy H_1 consumers, these additional assets will induce them to substitute borrowing for life insurance sales, since the former is on more favorable terms. Figure 2 shows this effect. H_1 consumers initially borrow fully against their non-liquid assets and also sell life insurance at E. For the utility curves as drawn, increasing NL shifts the budget line from WAB to W'A'B'. At E', consumers have completely substituted

borrowing for selling life insurance.[9] For other preferences, this complete substitution may not happen, but as long as consumption and bequests are normal goods, increased assets will decrease life insurance sales for H_1 consumers.

For sicker H_3 consumers, the additional non-liquid assets can induce more life insurance sales. Figure 3 demonstrates the effect of an increase in NL for H_3 consumers. For these consumers, terms of trade favor the viatical settlements market. If consumption is a normal good, an increase in NL leads these consumers to sell a larger part of $\bar{F}$, as they can use the additional non-liquid assets to finance bequests. At G' on the new budget constraint, consumers sell the same amount of life insurance as at their initial optimum, E. Thus, the new equilibrium will lie on C'G', where consumers sell a larger part of $\bar{F}$ than at E.

Increasing liquid assets leads to a parallel shift in the consumer's budget constraint. Consumers use additional liquid assets to either finance increased consumption or to increase bequests by substituting for selling life insurance and for borrowing. If bequests are a normal good, increasing liquid assets will cause consumers to decrease their supply of life insurance, decrease their borrowing, or both. For H_1 consumers who do not initially sell life insurance, increasing liquid assets will reduce borrowing but have no effect on life insurance supply. For H_3 consumers who sell all of their life insurance and also borrow, the effects of increasing L depend upon the strength of the income effect. If the income effect is strong, consumers eliminate borrowing and reduce their supply of life insurance. If the income effect is weak, consumers continue to sell all of $\bar{F}$, but reduce borrowing. Hence, for H_3 consumers as well, increasing liquid assets will never increase the supply of life insurance.

[9]For H_1 consumers with an initial optimum in the lower part of the budget constraint, an increase in NL will have no effect on the supply of life insurance.

4 Comparing Model Predictions

Both the standard model and the misperceived mortality risk model make several sharp predictions regarding the behavior of consumers in the viatical settlement and credit markets.

Prediction 1: *Health status is negatively correlated with the decision to sell life insurance.*

Although this prediction is consistent with both models, the mechanism through which mortality risks affect life insurance sales is very different. In the standard model, an increase in mortality risk increases the value of the consumers' life insurance policy. This "wealth effect" induces consumers to increase life insurance sales to finance increased consumption at the cost of reduced bequests. In the misperceived mortality risk model, the negative correlation between health status and the decision to sell life insurance arises from a "price effect." Unhealthy consumers perceive that the terms of trade are more favorable in the viatical settlements market as the discount to face value of their life insurance increases with life expectancy.

Prediction 2[S]: *For all consumers, the decision to sell life insurance is positively correlated with non-liquid assets.*

This prediction is consistent with the standard model only and follows because an increase in wealth (all else equal) would induce a large and unwanted increase in bequests. The consumer in the standard model increases his sale of life insurance to reshuffle assets from bequests to current consumption instead.

The misperceived mortality risk model makes a different prediction:

Prediction 2[M]: *For the healthiest consumers, the decision to sell life insurance is negatively correlated with non-liquid assets. For the sickest, the decision to sell life*

insurance is positively correlated with non-liquid assets.

This follows from Figures 3 and 2 and is a rather stringent test of the misperceived mortality risk model. It requires that the impact of non-liquid assets on the decision to sell in our empirical specification have different signs depending on the underlying health status of the consumer.

Prediction 3[S]: *For all consumers, increase in liquid assets or current income will increase the incentive to sell life insurance.*

This prediction is consistent with the standard model only. Thus, it would constitute evidence in favor of the standard model if we observe that people with higher incomes are more likely to sell than are patients with lower incomes. In contrast, the misperceived mortality risk model makes the following predictions.

Prediction 3[M]: *For all consumers, increase in liquid assets will either reduce or leave unchanged the incentive to sell life insurance.*

Thus, a measured zero or negative correlation between the decision to sell life insurance and amount of liquid assets, all else remaining the same, would be consistent with the predictions of the misperceived mortality risk model.

5 Empirical Tests of the Models

Clearly, the standard model and the misperceived mortality risk model, in several cases, make sharply different predictions. We turn next to an empirical test of these predictions in the viatical settlement market.

5.1 Data

In our empirical test, we focus on HIV+ individuals because they were the primary participants in this market in the 1990s (National Viatical Association, 1999).[10] We use data from a nationally representative study of HIV+ patients in care – the HIV Costs and Services Utilization Study (HCSUS).[11] HCSUS collected data between March 1996 and January 1998 with three waves of interviews, which we refer to as Baseline, Follow-Up 1, and Follow-Up 2. HCSUS represents approximately 231,400 HIV+ adults and our analytic sample represents an estimated 123,200 of these HIV+ adults who owned life insurance (Bozzette et al., 1998).[12] HCSUS asked respondents about a wide variety of topics, including demographics, income and assets, health status, life insurance, and participation in the viatical settlements market. Though HCSUS does not contain information about transaction prices and quantities in the viatical settlements market, we do not need them to conduct the tests we describe in Section 4.

Questions about life insurance holdings and sales were asked in the first follow-up (FU1) survey in 1997 and the second follow-up (FU2) survey in 1998. Of the 2,466 respondents in FU1, 1,353 (54.7%) reported life insurance holdings. These 1,353 respondents are our analytic sample as they are the only patients at risk to sell life insurance. We exclude 344 respondents with missing values for at least one of the key variables—diagnosis date, health status, liquid assets, or non-liquid assets. These

[10]To verify this fact, we obtained data from detailed annual statements filed with the Texas department of insurance by every licensed viatical settlement company in Texas. These data show that in the years 1995 to 1998, 98% of the policies sold in the viatical market in Texas were by consumers with a diagnosis of HIV or AIDS.

[11]There were no nationally representative survey dataset on HIV+ individuals in the U.S. collected after 1998; HCSUS is the highest quality and most up-to-date dataset available on the HIV+population.

[12]The HCSUS employed a multi-stage national probability sample design to identify HIV+ patients over 18 years old, who made at least one visit for regular care in the contiguous United States in January or February of 1996. It does not include HIV+ patients whose only contact with the health care system was through military, prison, or emergency department facilities, or who have not made contact with the health care system for their HIV.

excluded respondents were similar to the sample with complete data when compared by their observed covariates. We also exclude 123 respondents who resided in states with minimum price regulation of viatical settlements as these regulations distort the viatical settlements market by restricting settlements by relatively healthy consumers (see Bhattacharya et al., 2005). In our remaining analytic sample of 886 respondents, 146 (16%) respondents had sold their life insurance by the FU1 or FU2 interview dates.

When HCSUS was conducted, the two most important health status measures for HIV patients were CD4+ T-lymphocyte cell count and the Center for Disease Control (CDC) definition of clinical stage. [13] CD4+ T-cell count measures the function of a patient's immune system; depletion correlates strongly with worsening HIV disease and increasing risk of opportunistic infections (Fauci et al., 1998). While healthy patients have CD4 cell counts above 500 cells per ml., declines into lower clinically recognized ranges correlate with worsening disease. These ranges are: between 200 and 500 cells per ml., between 50 and 200 cells per ml., and below 50 cells per ml. There are three categories in the CDC definition of clinical stage: asymptomatic, symptomatic, and AIDS (Centers for Disease Control and Prevention, 1993). Patients have AIDS if they manifest conditions such as Kaposi's Sarcoma, Toxoplasmosis, or the other life-threatening conditions on the CDC list. Symptomatic HIV+ patients manifest signs of to their infection, but not one of the CDC's listed conditions.

The Baseline HCSUS survey asked respondents about the value of real estate, vehicles, and farm or business, stocks, certificates of deposit and other financial as-

[13] We measure health of the respondents when the survey was conducted and not at the time when the policy was sold. However, we argue that current health (that is, when the survey was conducted) is a good proxy for past health (that is, when the policy was sold). For example, the correlation between CD4 cell counts measured in the Baseline survey and the first follow-up survey, which was conducted about 15 months after the baseline survey, is 0.81. Also, since effective treatment for HIV was not widely available during these survey years, current health can be viewed as a lower bound on health of the respondent when the policy was sold. For example, of the respondents with CD4 cell count below 50 at the time of the Baseline interview, less than 5% experienced a rebound in CD4 cell counts above 50. Similarly, respondents who were diagnosed with AIDS at baseline, all the respondents remained diagnosed with AIDS at the first follow-up survey.

sets less any debt on these assets. Unfortunately, these comprehensive questions on assets and debts have missing values for a large proportion of the respondents. In a different section of the survey, respondents were asked, "Do you live in a house or apartment which you or your spouse own." In contrast to the data on assets and debt, the data on house ownership do not have missing values. There was a significant positive correlation between net worth (assets less debts) and house ownership among respondents who report data on both assets and house ownership.[14] Given the small sample size of the HCSUS survey, the significant number of missing responses to the detailed asset ownership questions, and the high correlation between net worth and house ownership, we use indicators for house ownership and non-ownership as our measure of non-liquid assets in our empirical models. We designate the indicators for house ownership and non-ownership as *House* and *NoHouse*, respectively. Our results were qualitatively similar but less precise when we used data from the detailed asset and debt questions instead of house ownership.[15]

Finally, we use income—which was asked in each survey round—as a measure of liquid assets. Because many HCSUS respondents only report their income within ranges, we enter income in our models as a series of indicator variables: $1(Income < \$500 permonth)$, $1(\$501 \leq Income < \$2,000)$, and $1(Income \geq \$2,000)$.

Table 1 compares respondents in the Baseline survey who sold their life insurance at some point in time (hereafter, viators) with those who never did.[16] Viators are more likely than never-viators to be male, white, college-educated and older. They

[14]For example, the median net worth of respondents who did not own a house was zero and the median net worth of house owners was $23,000. Similarly, the mean net worth of house owners was nearly three times the mean net worth of respondents who did not own a house ($80,595 vs. $27,498).

[15]HCSUS does not contain information on home equity loans or bank loans. It only contains information on the stock of housing and financial assets net of debts on those assets. To test predictions related to borrowing and credit markets we would need information on borrowing and loans undertaken after the respondent was diagnosed with HIV disease. Unfortunately, such information is not present in the data. Therefore we rely on viatical settlement transactions data only to test the predictions from our models.

[16]Including the 344 respondents who had at least one missing value has no appreciable effect on the summary statistics that we report in Table 1.

are also richer and are more likely to own a house. They are also less likely to be married or have any children alive. Finally, viators are typically in poorer health than never-viators, with lower CD4 T-cell levels in the Baseline survey and more advanced HIV disease.

5.2 Empirical Model

HCSUS respondents report whether they sold their life insurance by the first or second follow-up interview. Given these responses, we estimate a logit model of the decision to sell life insurance. Since we do not observe the exact date of life insurance sale we include years at risk as an additional covariate[17] Years at risk are measured starting from the year the respondent was diagnosed with HIV or 1988—the viatical settlement inception date—whichever is earlier. All other covariates including health status and asset ownership are measured at time of the baseline interview.

In the logit model, we include demographics, health status, income, and a full set of interactions between non-liquid assets and health status as covariates in our empirical model. We also include marital status, living alone, and whether the respondent has at least one living child as proxies for the strength of the bequest motive.

Ideally, we would like to classify HCSUS respondents into groups H_1 and H_3 that are based upon their subjective mortality risks, but these data are not available. Instead, we construct a one-dimensional indicator of mortality risk by regressing two-year mortality after the baseline survey on the two clinical health measures. This probit regression is shown in Table 2. Of our sample of 886 respondents 4.4% died within two years of the survey. Not surprisingly, respondents with lower CD4 T-cell levels or with more advanced disease are more likely to die. Using these results, we predict two-year mortality rates for each respondent.

[17]We also test the sensitivity of the results by estimating a discrete-time hazard model of the decision to sell life insurance that more formally accounts for the time at risk and allows for time varying covariates. The results from the hazard model are similar to those reported in this paper.

Since we do not observe subjective mortality risk, we experiment with different definitions for classifying respondents as *Healthy* and *Unhealthy*. In the first specification, we assume that each HIV+ consumer perceives his mortality risk to be the same as the average mortality risk for all HIV+ consumers. Hence, we classify a respondent as *Healthy* if his predicted mortality risk, based upon the probit, is less than average mortality. We classify respondents as *Unhealthy* analogously. Respondents with CD4+ cell counts less than 50 or those whose disease has progressed to AIDS are classified as *Unhealthy* and the remaining as *Healthy*. 13% of the *Unhealthy* respondents died within two years of interview, while 1% of the *Healthy* died within the same period.

In the second specification, we assume that consumers perceive their mortality risks to be the same as the mortality risks for the average HIV+ person with their *CD4 levels*. Thus, in this specification those with AIDS will be classified as *Unhealthy*, and these respondents will perceive terms of trade to be more lucrative in the viatical settlements market than in the credit market. On the other hand, HIV+ respondents not exhibiting AIDS will be classified as *Healthy*, and these respondents will perceive terms of trade to be more lucrative in the credit market. In this specification, we must include CD4 levels as additional covariates in the logit regression analyzing the decision to sell, as consumers that information to estimate their own mortality.

In the third specification, we assume that consumers perceive their mortality risks to be the same as the mortality risks for the average HIV+ person with their *stage of disease*. In this specification, consumers with low CD4 levels will perceive terms of trade to be more attractive in the viatical settlements market. Thus, we classify consumers with CD4 levels less than or equal to 200 as *Unhealthy*, and consumers with CD4 levels above 200 as *Unhealthy*. In this specification, we must include stage of disease as an additional covariate in the logit regression analyzing the decision to sell, as consumers use stage of disease to estimate their own mortality.

6 Results

Table 4 reports the mean marginal effects for four different specifications of the empirical model. We average the marginal effects for each covariate across all individuals in the sample as they depend not only on the regression coefficient associated with the covariate but also on the values of the other covariates.

Table 3 maps the predictions from the standard and misperceived mortality risk models into empirical hypotheses and reports results from chi-squared tests of each hypothesis. The first prediction implies that the probability of selling life insurance should be higher for the unhealthy, regardless of home ownership.

Prediction 2[M] implies that home ownership should have an opposite effect on the healthy than it has on the unhealthy. For the unhealthy, home ownership should increase the probability of selling; for the healthy, it should reduce it. We consider this a strong test of the misperceived mortality risk model, since the effect of assets should reverse sign based on the classification of health from the two-year mortality regression. By contrast, Prediction 2[S] implies that the probability of selling should be higher for homeowners, regardless of health status. Prediction 3[M] implies that high income consumers with will be *less* likely to sell their life insurance to finance consumption, while Prediction 3[S] implies that high income consumers will be *more* likely to sell life insurance.

The second column (Model 1) in Table 4 and Table 3 report the results for the simplest empirical model needed to test the above hypotheses. Healthy consumers with houses have the lowest probability of selling. Healthy consumers without houses are more likely to sell than healthy house owners ($p < 0.05$). In contrast, unhealthy consumers without houses are less likely to sell than unhealthy consumers who own a house ($p < 0.01$). The results clearly demonstrate an ordering of the probability of selling life insurance that is consistent with the misperceived mortality risk model. The results are also consistent with Prediction 1 from both the standard and misper-

ceived mortality risk models. Regardless of home ownership, unhealthy consumers are significantly more likely to sell ($p < 0.01$). Income has no statistically significant effect on the probability of selling, which is also weak evidence favoring Prediction 3[M] of the misperceived mortality risk model.

Model 2 in Table 4 and Table 3 adds demographic, education and bequest motive variables to Model 1. Model 2 corresponds with the first specification described in Section 5.2. As was the case with Model 1, the results from this model are also consistent with misperceived mortality risk model. In particular, we find that among healthy consumers those with houses are significantly less likely to sell than those without ($p < 0.05$), which is consistent with prediction 2[M] of the misperceived mortality risk model, but inconsistent with prediction 2[S] of the standard model.

In Models 3 and 4, we check the robustness of our results to a change in the definition of health status. In Model 3, respondents with AIDS are classified as *Unhealthy* and those with less advanced disease (Asymptomatic and Symptomatic) are classified as *Healthy*. This model corresponds to the second specification described in Section 5.2. Except for the change in definition of health status, the specification of Models 2 and 3 are identical. As with Models 1 and 2, the estimates from Model 3 are also consistent with the misperceived mortality risk model. We find that among the healthy, those with houses are significantly less likely to sell than those without ($p < 0.01$), which is consistent with Predictions 2[M], of the misperceived mortality risk model.

In Model 4, we classify the health status of respondents based upon CD4 levels. This model corresponds to the third specification described in Section 5.2. The point estimates from this model are also consistent with the ordering of the probability of selling implied by the misperceived mortality risk model. The point estimates show that among unhealthy consumers, those with houses are more likely to sell, but this effect is not statistically significant ($p = 0.135$). Among healthy consumers, those

with houses are less likely to sell, however the difference in the probability of selling is not statistically significant ($p = 0.107$).

7 Alternate Theories

The evidence presented here is consistent with the misperceived mortality risk model rather than the standard model. Here, we consider four alternate explanations that could, under certain conditions, give rise to similar findings.

One important consideration that we did not explicitly model is that the existence of means-tested government welfare programs such as Medicaid change the incentives for consumers to sell their life insurance. In most states, proceeds from viatical settlements are counted as assets for the purposes of means-testing, but life insurance polices themselves are excluded. Clearly, this might reduce incentives to sell life insurance for individuals who would otherwise be eligible for these programs. However, the bias here goes the wrong way. Such program rules make the unhealthy *less* likely to sell insurance—and contrary to what the data show—since they tend to be more indigent and thus more likely to be eligible for Medicaid or other public programs.

A related alternative explanation concerns the tax treatment of viatical settlements. The 1996 Health Insurance Portability and Accountability Act, which came into effect in January 1997, exempts proceeds derived from a viatical settlement from federal taxes as long as the seller is certified by a physician to have a life expectancy of 24 months or less or to be chronically ill. Several large states, such as California and New York, have also passed similar provisions exempting viatical settlement transactions from state taxes (Sutherland and Drivanos, 1999). Although these laws might lead to a negative correlation between health and the probability of selling insurance after 1997, the vast majority of our data refer to the period before the HIPAA implementation. Most respondents in our study reported that they sold their life insurance

before the first quarter of 1997 – thus there is only a 2-3 month overlap in the time when these laws were effective and the period of life insurance sales in the HCSUS sample. Removing the individuals from our sample who sold in the post-HIPAA era does not qualitatively affect our results.

As in any insurance market, asymmetric information (patients know more than firms about their mortality risks) could be an important determinant of market outcomes in the viatical settlements market. As Akerlof (1970), Wilson (1977), and Rothschild and Stiglitz (1976) demonstrate, asymmetric information might lead to adverse selection in insurance markets; that is, high-risk individuals are more likely to participate and low risks are driven out of the market. Since, consumers are sellers in this market, adverse selection in these markets leads to the opposite of the typical "lemons" problems; it is unobservably sick patients rather than healthier patients who are driven out of the market.

The institutional details of this industry argue against the importance of adverse selection in these markets. In particular, there are good reasons to believe that viatical settlement companies have accurate information on patient's mortality risks. Unlike other insurance markets, viatical settlement firms often use the services of independent physicians and actuaries to determine the life expectancy of the seller National Viatical Association (1999). Furthermore, companies scrutinize patient medical records before making an offer to buy, and they have access to the mortality experience of a large pool of patients. Of course, even these efforts may not completely eliminate asymmetric information–patients may still have private information about their health status.

If private information is a concern then we would expect that those who sold were less likely to die in the period after the sale. To check this we estimate a probit model with two-year mortality as the dependent variable and the decision to sell life insurance and our clinical indicators–CD4 levels and stage of disease–as

the explanatory variables. This test is similar in spirit to the test that Cawley and Philipson (1999) use to look for the presence of adverse selection in life insurance markets. In this model, the coefficient on whether a person sold his life insurance was insignificant and had the wrong sign (positive), which suggests that adverse selection is not an important concern in this market.[18]

Finally, it is worth considering the role of transaction costs. Transaction costs in credit markets might be systematically different for healthy and unhealthy consumers; in particular, compared with healthy consumers, unhealthy consumers might face a higher cost of borrowing against their house. For example, lenders might charge higher prices to unhealthy consumers if they expect to incur significant costs in collecting loan repayments from the estates of unhealthy consumers, but do not expect such costs for healthy consumers who are presumably more likely to repay their loans before they die. If so, unhealthy consumers would prefer the viatical settlement market to the credit market to finance consumption needs, while healthy consumers would prefer the credit market.

However, this explanation is based on two assertions that are unlikely to be true. First, this explanation assumes that lenders know the health status or life expectancy of borrowers. This is unlikely since credit applications do not usually require borrowers to disclose their health status. Second, this explanation assumes that transaction costs in the viatical settlement market do not systematically depend on the life expectancy of the sellers. On the contrary, it is likely that unhealthy consumers, who have little time left alive, might view the sometimes lengthy process of searching and negotiating with viatical firms in this relatively new market as particularly onerous. Therefore, it seems unlikely that our results are driven by differences in transaction costs in credit markets for healthy and unhealthy consumers.

[18]Results from this model are available upon request from the authors.

8 Discussion and Conclusions

Our empirical findings are that, among healthier chronically ill consumers, homeowners are less likely to sell their life insurance than are non-home owners. In contrast, among unhealthy consumers, homeowners are more likely to sell their life insurance policies. These empirical findings cannot be reconciled with a standard economic model of savings, consumption, and bequests. Instead, these findings are consistent with a model in which relatively unhealthy consumers overestimate their life expectancy. This "optimism bias" leads them to view viatical settlement offers more favorably than they would appear to someone correctly perceiving mortality risk.

This conclusion raises the following question: can such consumer mistakes persist in the long run? The standard argument against persistence of consumer mistakes is that they lead to mispriced or imperfect markets that in turn create arbitrage opportunities. However, Barberis and Thaler (2002), in their review of the literature on consumer mistakes in financial markets, argue persuasively that while the statement "prices are right" implies "no free lunch," the converse does not necessarily hold. They argue that mispricing does not always lead to arbitrage opportunities, as strategies designed to take advantage of mispricing—especially in financial markets—can be costly or risky. Our results add a new dimension to this debate; we find that "prices are right" does not imply "no mistakes." Our results show that despite consumer mistakes, there is no evidence of real mispricing in this market during the period covered by our data—the only mistakes are in consumer perceptions, not in market prices. Thus, since prices are actuarially fair, such mistakes are likely to persist.

The above discussion leads naturally to the policy implication that consumer mistakes might be reduced by more forthright disclosure of mortality risks. Such regulations have recently been implemented in other mortality contingent claims markets such as the reverse mortgage market.[19] Recognizing that consumers typically find it

[19]Reverse mortgage markets allow consumers to take loans against equity in their homes. However,

difficult to compare the costs of a reverse mortgage with other credit instruments, the Home Owner Equity Protection Act (HOEPA, 1994) subjects all reverse mortgages to a Truth-in-Lending disclosure. This provision requires lenders to project and disclose the total annual average cost of these loans if they were repaid after two years, at the borrower's life expectancy and 40% beyond the borrower's life expectancy. Our findings suggest that similar regulations might be beneficial for consumers in secondary life insurance markets.

unlike normal loans, reverse mortgages limit the loan repayment to the value of the house and require no repayment for as long as the borrower is alive. Thus, just like viatical settlement markets, the loan amount available from a reverse mortgage will depend on the life expectancy of the borrower.

References

Akerlof, G. A., 1970. The market for 'lemons': Quality uncertainty and the market mechanism. Quarterly Journal of Economics 84 (3), 488–500.

American Council of Life Insurance, April 5 1999. Accelerated death benefits popularity doubles, new acli-limra survey shows. LIMRA International News Release, Washington, D.C.

Barberis, N., Thaler, R., 2002. A survey of behavioral finance. Working Paper 9222, National Bureau of Economic Research.

Benartzi, S., Thaler, R., 2001. Naïve diversification strategies in defined contribution saving plans. American Economic Review 91 (1), 79–98.

Bernheim, B. D., Skinner, J., Weinberg, S., 1997. What accounts for the variation in retirement wealth among u.s. households? Working Paper 6627, National Bureau of Economic Research.

Bhattacharya, J., Goldman, D. P., Sood, N., 2003. What accounts for the variation in retirement wealth among u.s. households? Working Paper 9863, National Bureau of Economic Research.

Bhattacharya, J., Goldman, D. P., Sood, N., 2005. Price regulation in secondary insurance markets. Journal of Risk and Insurance 72 (4), 61–75.

Bozzette, S. A., Berry, S. H., Duan, N., Frankel, M., Leibowitz, A. A., Lefkowitz, D., Emmons, C., Senterfitt, J., Berk, M., Morton, S. C., 1998. The care of hiv-infected adults in the united states. hiv cost and services utilization study consortium. New England Journal of Medicine 339 (26), 1897–904.

Cawley, J., Philipson, T., 1999. An empirical examination of information barriers to trade in insurance. American Economic Review 89 (4), 827–846.

Centers for Disease Control and Prevention, 1993. 1993 revised classification system for hiv infection and expanded surveillance case definition for aids among adolescents and adults. JAMA 269 (6), 729–30.

Daniel, K., Hirshleifer, D., Subrahmanyam, A., 1998. Investor psychology and security under and overreaction. Journal of Finance 53 (3), 1839–85.

Fauci, A. S., Braunwald, E., Isselbacher, K. J., Wilson, J. D., Martin, J. B., Kasper, D. L., Hauser, S. L., Longo, D. L. (Eds.), 1998. Harrison's Principles of Internal Medicine, 14th Edition. McGraw-Hill Inc., New York, NY.

HOEPA, 1994. The Home Owner Equity Protection Act of 1994. 15 U.S.C. §1639.

Hurd, M., McFadden, D., Merrill, A., 1999. Predictors of mortality among the elderly. Working Paper 7440, National Bureau of Economic Research.

Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk. Econometrica 47, 263–91.

Laibson, D., 1997. Golden eggs and hyperbolic discounting. Quarterly Journal of Economics 112 (2), 443–477.

Lichtenstein, S., Slovic, P., Fischhoff, B., Layman, M., Combs, B., 1978. Judged frequency of lethal events. Journal of Experimental Psychology: Human Learning and Memory 4 (6), 551–578.

Moore, M. J., Zhu, C. W., 2000. Passive smoking and health care: Health perceptions myth vs. health care reality. Journal of Risk and Uncertainty 21 (2/3), 283–310.

National Viatical Association, 1999. Nva information booklet. NVA: Washington, DC.

Odean, T., 1998. Are investors reluctant to realize their losses? Journal of Finance 53, 1775–1798.

Rothschild, M., Stiglitz, J. E., 1976. Equilibrium in competitive insurance markets: An essay on the economics of imperfect information. Quarterly Journal of Economics 90 (4), 630–49.

Schoenbaum, M., 1997. Do smokers understand the mortality effects of smoking? evidence from the health and retirement survey. American Journal of Public Health 87 (5), 755–9.

Sutherland, W., Drivanos, P., 1999. Viatical settlements: Life insurance as a liquid asset for the seriously ill. Journal of Financial Planning 12 (5).

Thaler, R., 1985. Mental accounting and consumer choice. Marketing Science 4 (3), 199–214.

Wilson, C., 1977. A model of insurance markets with incomplete information. Journal of Economic Theory 16, 167–207.

Figure 1: Budget Constraint for H_3 Consumers

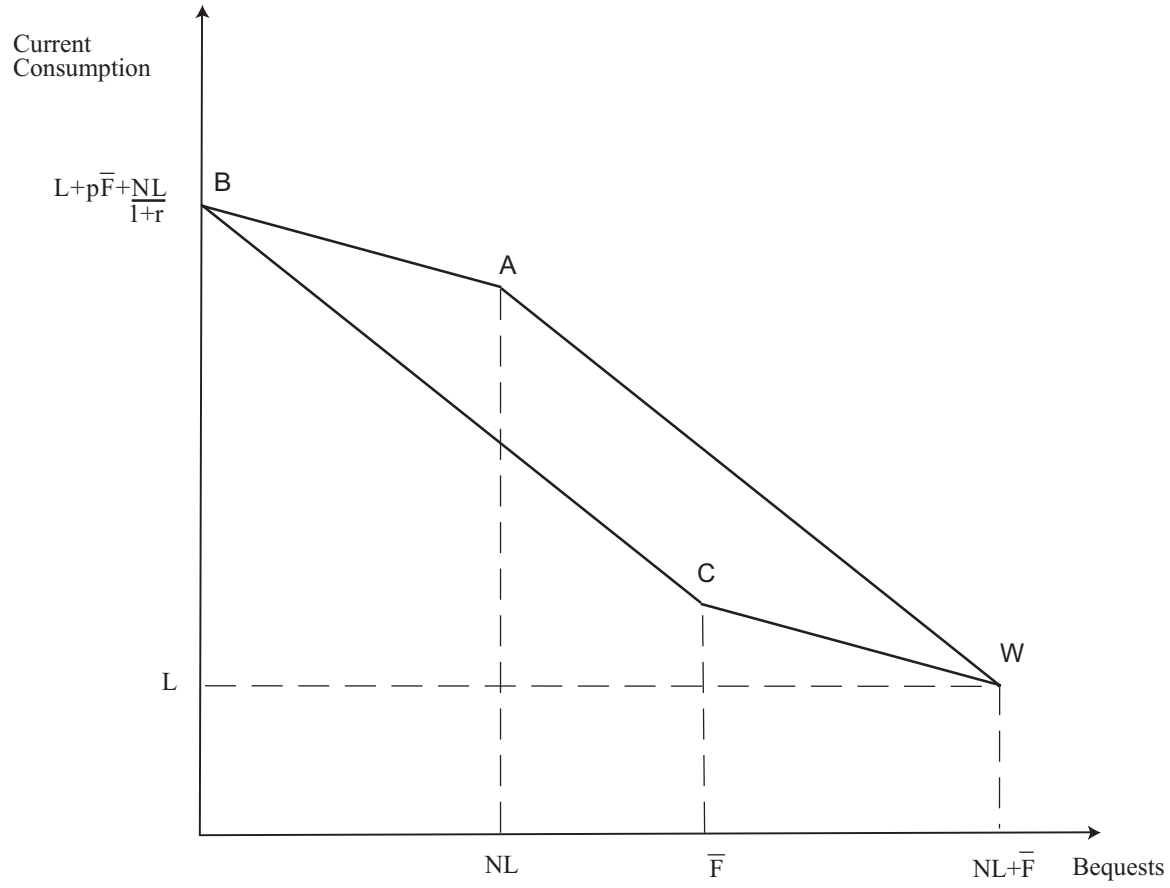

Figure 2: The Effect of Increasing Non-Liquid Assets for H_1 Consumers

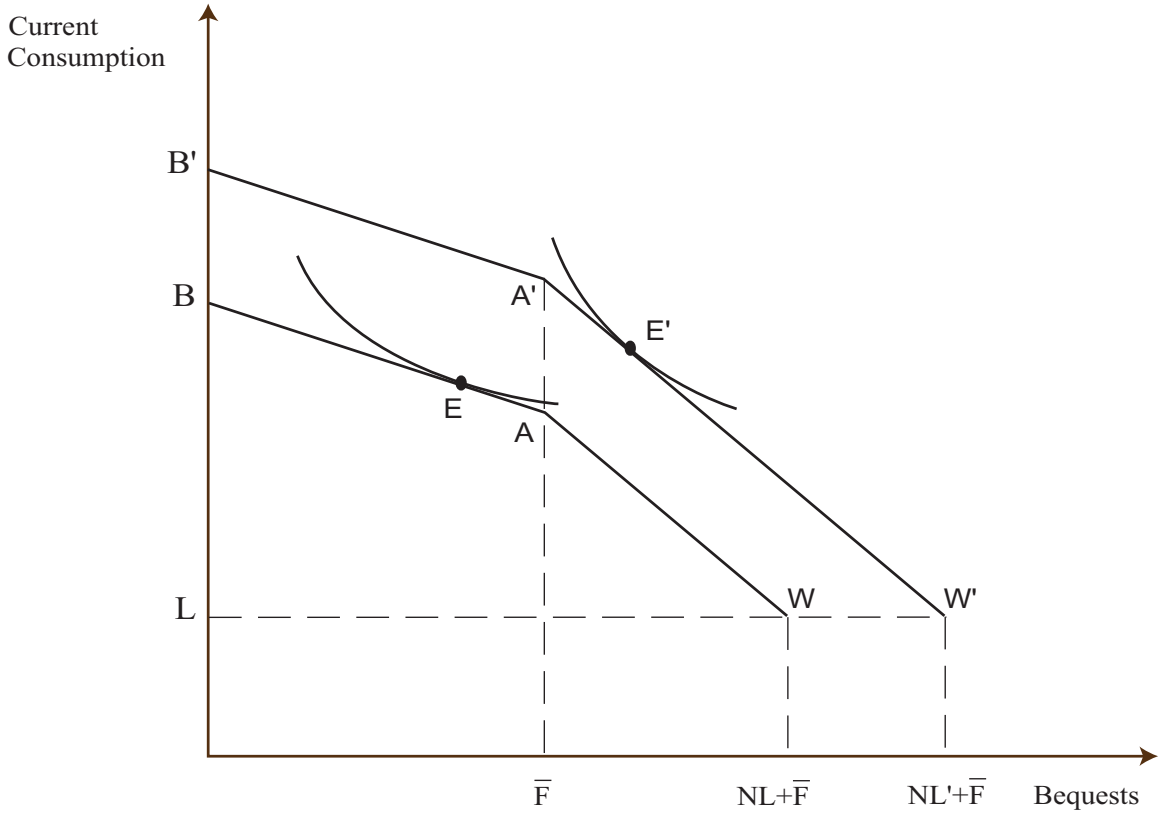

Figure 3: The Effect of Increasing Non-Liquid Assets for H_3 Consumers

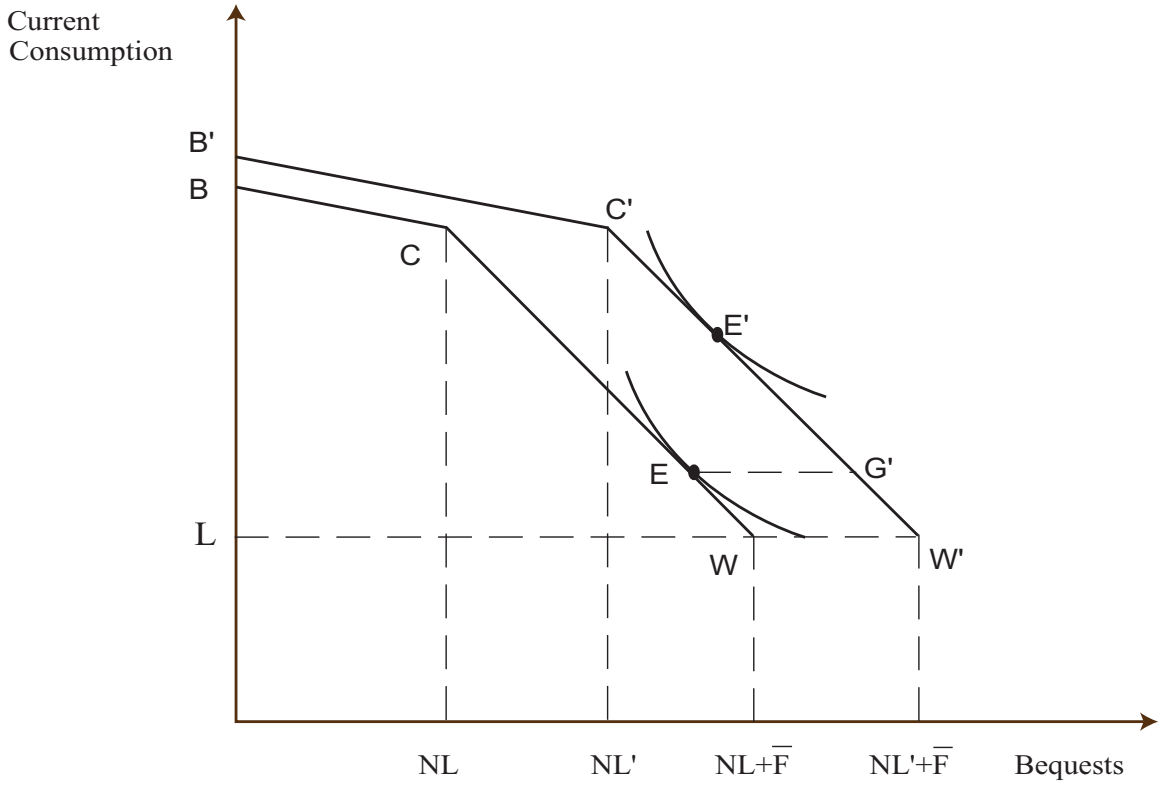

Table 1: Weighted Descriptive Statistics at Baseline

Variables	Never sold life insurance (N=740)	Ever sold life insurance (N=146)	Entire sample (N = 886)
CD4 T-cell levels:			
< 50 cells per ml	9.36%	12.08%	9.83%
50 – 200 cells per ml	21.68%	40.00%	24.84%
201 – 500 cells per ml	43.32%	31.40%	41.26%
> 500 cells per ml	25.64%	16.52%	24.07%
Disease Stage:			
Asymptomatic	10.93%	11.85%	11.09%
Symptomatic	54.37%	38.61%	51.64%
AIDS	34.70%	49.54%	37.26%
Income and Assets:			
House ownership	29.38%	33.57%	30.11%
Monthly Income			
< $500	15.81%	13.57%	15.42%
$501 - $2000	39.85%	38.73%	39.66%
> $2000	44.34%	47.70%	44.92%
Bequest Motives:			
Any Children Alive	37.82%	29.18%	36.32%
Married	16.01%	12.30%	15.37%
Separated, Divorced, Widowed	25.55%	28.06%	25.98%
Never Married	58.44%	59.64%	58.64%
Demographics:			
Age	34.88 years	38.01 years	35.42 years
Male	84.19%	89.35%	85.08%
Black	25.41%	17.32%	24.01%
Hispanic	13.61%	4.18%	11.98%
White	56.68%	75.97%	60.01%
Other race	4.30%	2.53%	3.99%
Have college degree	24.52%	36.38%	26.57%

Table 2: Two-Year Mortality Probit Regression

Variable	Coefficient	Standard Error
CD4 T-cell < 50	1.78	0.46
CD4 T-cell 51-200	1.09	0.45
CD4 T-cell 201-500	0.54	0.46
CD4 T-cell 500+	-	
Asymptomatic	-0.47	0.47
Symptomatic	-0.25	0.2
AIDS	-	
Intercept	-2.57	0.45

Note: "CD4 T-cell 500+" and "AIDS" are reference categories.

Table 3: Chi-squared Tests of Model Predictions

	p-value:[b]			
Model Predictions[a]	***Model 1***	***Model 2***	***Model3***	***Model 4***
Misperceived Mortality Risk Model				
Prediction 1: Negative correlation between health status and the decision to sell life insurance.				
[Pr(*Unhealthy, No Assets*) > *Pr*(*Healthy, No Assets*)] & *[Pr*(*Unhealthy, Assets*) > *Pr*(*Healthy, Assets*)]	p<0.01	p<0.01	0.018	p<0.01
Prediction 2a: Among healthy consumers, negative correlation between the decision to sell life insurance and the amount of non-liquid assets.				
Pr(Healthy, Assets) < Pr(Healthy, No Assets)	0.046	0.015	0.014	0.107
Prediction 2b: Among unhealthy consumers, a positive correlation between the decision to sell life insurance and the amount of non-liquid assets.				
Pr(*Unhealthy, Assets*) > *Pr*(*Unhealthy, No Assets*)	p<0.01	p<0.01	0.053	0.135
Prediction 3: Zero or negative correlation between liquid assets and the decision to sell life insurance.				
[Pr(*Income* $2000+) < *Pr*(*Income* $500 to $2000)] & *[Pr*(*Income* $500 to $2000) < *Pr*(|*Income* below $500)]	0.741	0.467	0.468	0.475
Standard Model				
Prediction 1: Negative correlation between health status and the decision to sell life insurance.				
[Pr(*Unhealthy, No Assets*) > *Pr*(*Healthy, No Assets*)] & *[Pr*(*Unhealthy, Assets*) > *Pr*(*Healthy, Assets*)]	p<0.01	p<0.01	0.018	p<0.01
Prediction 2a: Among healthy consumers, positive correlation between the decision to sell life insurance and the amount of non-liquid assets.				
Pr(*Sell*|*Healthy, Assets*) > *Pr*(*Sell* |*Healthy, NoAssets*)	0.954	0.985	0.986	0.893
Prediction 2b: Among unhealthy consumers, a positive correlation between the decision to sell life insurance and the amount of non-liquid assets.				
Pr(*Unhealthy, Assets*) > *Pr*(*Unhealthy, NoAssets*)	p<0.01	p<0.01	0.053	0.135
Prediction 3: Positive correlation between liquid assets and the decision to sell life insurance.				
[Pr(*Income* $2000+) < *Pr*(*Income* $500 to $2000)] & *[Pr*(*Income* $500 to $2000) < *Pr*(|*Income* below $500)]	0.259	0.533	0.532	0.525

Notes:

[a] Pr(X, Y) is the probability of selling life insurance (viaticating) for consumers in groups X and Y

[b] p-values are reported for chi-squared tests. Each model prediction compares the probability of selling life insurance for consumers in different groups and predicts which group of consumers will have a higher (or lower) probability of selling life insurance. For each statistical test the null hypothesis (H0) is that probability of selling life insurance for consumers in the different groups is equal. The alternate hypothesis (HA) is that the model prediction is true. For example, for prediction 1 H0 is that the unhealthy and the healthy have an equal probability of selling life insurance. HA is that the unhealthy have a higher probability of selling life insurance.

Table 4: Empirical Models of the Probability of Selling Life Insurance

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Income				
Income(500,2000]	0.009	-0.013	-0.012	-0.010
	[0.039]	[0.038]	[0.038]	[0.038]
Income > 2000	0.037	-0.014	-0.014	-0.013
	[0.040]	[0.041]	[0.041]	[0.041]
Health and House Ownership				
Unhealthy*House	0.357	0.320	0.142	0.209
	[0.076]**	[0.072]**	[0.063]**	[0.068]**
Unhealthy*NoHouse	0.147	0.156	0.062	0.146
	[0.057]**	[0.055]**	[0.050]	[0.054]**
Healthy*NoHouse	0.062	0.078	0.092	0.049
	[0.037]*	[0.036]**	[0.042]**	[0.039]
Bequest Motives				
Married		0.003	0.012	-0.000
		[0.044]	[0.045]	[0.044]
Separated		0.007	0.017	0.017
		[0.035]	[0.036]	[0.036]
Child alive		-0.051	-0.06	-0.060
		[0.034]	[0.034]*	[0.034]*
Living Alone		0.007	0.002	0.005
		[0.027]	[0.026]	[0.027]
Demographics				
Black		-0.068	-0.066	-0.061
		[0.030]**	[0.030]**	[0.030]**
Hispanic		-0.129	-0.132	-0.132
		[0.027]**	[0.026]**	[0.026]**
Other race		-0.093	-0.094	-0.091
		[0.042]**	[0.042]**	[0.043]**
Male		0.001	0.003	-0.002
		[0.041]	[0.041]	[0.042]
Age		0.007	0.007	0.007
		[0.002]**	[0.002]**	[0.002]**
High school		-0.048	-0.04	-0.053
		[0.046]	[0.047]	[0.046]
Some College		0.053	0.072	0.051
		[0.050]	[0.051]	[0.050]
College		0.065	0.081	0.069
		[0.057]	[0.058]	[0.058]
Stage of Disease & CD4				
Symptomatic				-0.080
				[0.041]*
AIDS				-0.044
				[0.042]
CD4 < 50			0.111	
			[0.065]*	
CD4 [50,200)			0.167	
			[0.049]**	
CD4[200, 500)			0.028	
			[0.036]	
Years at risk	-0.000	-0.000	-0.001	-0.001
	[0.005]	[0.005]	[0.005]	[0.005]
Observations	886	886	886	886

Coefficients are mean marginal effects. Standard errors in brackets. * significant at 10%; ** significant at 5%. Reference Categories are Income < 500; Healthy*House; Never Married; White; Less than high school; Asymptomatic; CD4 > 500