Empirical investigation of life settlements: The secondary market for life insurance policies*

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Abstract

This paper examines the secondary market for life insurance in the United States using a large and comprehensive dataset of 9,002 policies with aggregate death benefit of $24.14 billion purchased from their original owners between 2001 and 2011. We find that policyowners selling their policies collectively received more than four times the amount they would have received had they surrendered their policies to their respective life insurance companies. Using cash-flow data for a subsample of 7,890 policies with aggregate death benefit of $21.08 billion, we find that the investors expected to make an average internal rate of return of 12.5% per annum, which is 8.4% in excess of treasury yields. Finally, we observe a systematic relation between life settlement contract characteristics and returns expected by investors. Our findings suggest that the primary determinant of returns across different life settlement contracts is not adverse selection relative to underlying life expectancies, but other economic phenomenon such as cost-benefit trade-off, bequest motive, convexity of premiums, diversification of unique risks and mitigation of life expectancy estimation risk.

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1 Introduction

Over the past few decades, there has been a significant increase in longevity and decrease in birth rates.[1] These demographic trends have accentuated the underfunding of defined benefit pension plans and increased the pressure on U.S. government social insurance and health programs, such as Medicaid and Medicare.

The recent development of the secondary market for life insurance - life settlement market - could increase the flexibility of the financing choice of retirees. A life settlement is a transaction in which a life insurance policyowner sells a policy to a third party for more than the cash surrender value (CSV) offered by the life insurance company.[2] The buyer pays all subsequent premiums to the life insurance company and receives the net death benefit (NDB) of the policy at its maturity. In terms of cash flows, for the buyer, a life settlement is a negative coupon bond with uncertain duration. For the seller, it is a form of equity release similar to that in a reverse mortgage.

A policyowner's decision to sell a policy could be driven by a combination of factors that result in a change in life insurance needs or a need for liquidity, such as an income shock, a health shock, an increase in medical costs, a need for long-term care funding, a loss of bequest motive, or a change in estate tax law. Irrespective of the reason, it is clear that the life settlement market endows policyowners wishing to discontinue their policies the ability to realize the market value of their policies. For investors, it offers an opportunity to gain exposure to longevity risk through the purchase of securities whose performance is life contingent, and thereby largely uncorrelated with other financial markets.

This paper is the first to empirically examine settlement transactions by original policyowners using a comprehensive dataset provided by Coventry First - a pioneer and leading provider in the life settlement market.[3] The data provides all information pertaining to 9,002 policies with aggregate NDB of $24.14 billion purchased by Coventry First from original policyowners in the secondary market for life insurance from January 2001 to December 2011. Using this data, we answer many important questions: First, to what extent did the presence of the secondary market make the policyowners wishing to sell their policies better off, thereby improving their welfare? Second, what rates of return could investors purchasing these policies have expected to make, given the life expectancy estimates of the insureds, optimized cash flow projections over time and other policy characteristics? Finally, to what extent is adverse selection relative to life expectancy (LE) of the insured an important driver of expected returns across life settlement contracts?

In our sample, we find that by selling their policies in the secondary market, policyowners collectively received $3.11 billion of value comprised of $2.83 billion in cash and $0.28 billion in the form of the expected present value of retained death benefit (RDB).[4] This amounts to more than four times the $0.77 billion CSV they would have received had they surrendered their policies to their respective life insurance companies. Clearly, the presence of the life settlement market has helped significantly in enhancing the welfare of policyowners who have sold their policies. Furthermore, the market has provided

[1] In the United States, life expectancy at birth increased from 70 years in 1960 to almost 80 years in 2010. At the same time, birth rates decreased from 25 in 1960 to 15 per 1,000 per year in 2010. Data from the World Bank at http://data.worldbank.org/.

[2] For ease of referencing we collate all abbreviations used in this paper in Appendix A.

[3] See Pleven and Silverman (2007).

[4] RDB is the portion of the death benefit that the policyowner keeps while transferring the liability of continuing to pay the policy premiums to the investor. We discuss the implications of having a RDB in Section 5.3.

an alternative to lapsing or surrendering that could potentially be of value to all policyowners.[5]

Having quantified the extent to which policyowners are better off by selling their life insurance policy in the life settlement market, next we estimate the returns investors purchasing these policies could have expected to earn from their investment. Towards that end, we estimate the expected annual internal rates of return (IRR) for each policy using the schedule of cash flows and the insured's estimated survival probabilities. Using cash flow data for 7,890 policies with aggregate NDB of $21.08 billion, we find that the cost of purchase weighted average expected IRR on the life settlements in our sample is 12.5% per annum, and it ranges from a high of 18.9% in 2001 to a low of 11.0% in 2005, 2006 and 2007. In recent years, we find that the expected IRR has risen substantially to 18.3% per annum in 2011, which is 15.9% in excess of treasury yields.

The accuracy of these expected IRRs critically depend on the precision of the LE estimates provided by different third-party medical underwriters. From an investor's point of view, all else being equal, longer estimates of LE, lower the expected returns. Therefore, as a robustness check, we extend all LE estimates and find that the average expected IRR in our sample decreases from 12.5% to 9.0%, 6.1% and 3.2%, as we extend all LE estimates by 12, 24 and 36 months, respectively. Thus, in this sample, even if the LE estimates are assumed to be 36 months longer than stated by the underwriters, investors would still have had an average positive expectation of returns.

In recent literature, researchers have argued that differences between policy-by-policy expected returns such as ours and the realized returns of open-end life settlement funds can be explained by adverse selection with respect to underlying life expectancies. Our detailed data on life settlements allows us to test if this is the case. Our investigation does not find that adverse selection is a major driver of expected returns across life settlement policies. Instead it finds that well-known economic phenomena such as cost-benefit trade-off, bequest motive, convexity of premiums, diversification of unique risks and mitigation of life expectancy estimation risk explain the differences in expected IRRs across different policies.

The rest of the paper proceeds as follows: Section 2 reviews literature. Section 3 develops the testable hypotheses. Section 4 gives a brief overview of the life settlement market. Section 5 describes the data. Section 6 describes our results. Section 7 explains differences in expected IRRs across different policies. Section 8, concludes making suggestions for future research.

2 Literature review

In this section, we summarize the existing literature and develop testable hypotheses. In the following section, we describe the life insurance and life settlement markets and their regulatory framework in more detail.

In a seminal paper, Hendel and Lizzeri (2003) model the life insurance market and show that for long-term life insurance contracts to exist, policyowners need to pay a premium schedule that is in excess of the actuarial fair amount during the early part of the contract and vice-versa during the latter part of the contract. Without such front loading of premiums, the long-term life insurance market cannot survive as insureds with improved health drop their policies in favor of cheaper ones in the spot market and only insureds with worsened health remain in the pool of insureds. Daily et al. (2008) extend this

[5]See Appendix B for a discussion of the implications of reduction in lapsation rate to pricing in the primary market.

model by allowing for changes in the need for life insurance coverage. They argue that on one hand the life settlement market raises life insurance prices by diminishing the amount of lapsed insurance policies, while on the other hand it can increase welfare by allowing policyowners to partially insure against health shocks and income shocks (in case there are borrowing constraints and an incomplete health insurance market).[6]

More recently, Braun et al. (2012) analyze open-end funds investing in U.S. life settlement policies. The authors construct a life settlement index from available open-end funds, for the period of December 2003 to June 2010, and analyze its performance vis-a-vis other asset classes. This index has an annualized return and volatility of 4.85% and 2.28%, respectively. The authors argue that the life settlement index performance compares relatively well to stocks, which performed poorly during the same period. Other asset classes such as government bonds and hedge funds had higher returns but also higher volatility. The authors suggest that life settlement funds offer attractive returns paired with low volatility and are uncorrelated with other asset classes.[7] We believe that these findings need to be interpreted with caution. This is because their life settlement index, like many hedge fund indexes, suffers from potential self-selection, survivorship and delisting biases.[8] In addition, the monthly net asset values of life settlement funds in their sample are generally "marked to model" and may not accurately reflect the changes in health of the funds' pool of insureds or changes in discount rates over time.

Zhu and Bauer (2013) argue that differences between expected returns on life settlements and the realized returns of open-ended life settlement funds studied in Braun et al. (2012) can be explained by adverse selection due to asymmetric information with respect to underlying life expectancies.[9] Many empirical studies failed to rejected the null hypothesis of symmetric information in life and health insurance markets. These studies include Cawley and Philipson (1999) and Cardon and Hendel (2001), who study the U.S. life insurance market and the study the U.S. health insurance market, respectively. On the other hand, Finkelstein and Poterba (2004) study the U.K. annuity market and find evidence that there is asymmetry of information regarding life expectancy which impacts the prices of different annuity contracts. This may be because in the U.K., annuity providers are not allowed to discriminate based on health and therefore revelation of information relating to health needs to take place through policy choices.

There exist a number of industry reports highlighting the positive and negative aspects of the life settlements. These publications focus on, inter alia, benefits that accrue to policyowners from an active secondary market, comparison of market price to the policy's "intrinsic economic value", the risks to the insurance carriers from changes in lapsation rates and pricing assumptions, and the issue of insurable interest. There also exists regulatory reports that focus on harmonization of regulation in order to protect policyowners and investors. We describe these in more detail in Section 4 below as well as in Appendix B.

Finally, there are other strands of insurance literature that focus on longevity risk such as life cycle finance, and insurance-linked securities as investment opportunities such as catastrophe bonds. In life cycle finance literature, Koijen et al. (2011) show how variable annuities allow investors to combine

[6] See also Fang and Kung (2010).

[7] Rosenfeld (2009) analyzes the performance of the QxX index (an index comprising 50,000 lives provided by Goldman Sachs) and finds similar results.

[8] See Fung and Hsieh (2000) for a detailed overview of hedge fund biases.

[9] See Akerlof (1970), the seminal paper on adverse selection which explores how information advantages of sellers relative to buyers create market inefficiency and may drive markets to collapse.

protection against longevity risk as well as market risk at the time of retirement. Cocco and Gomes (2012) extend the work of Farhi and Panageas (2007) on endogenous retirement age to include a longevity bond and show that there are substantial benefits from investing in financial assets that hedge shocks to aggregate survival probabilities. In insurance-linked securities literature, Froot (2001) and Froot and O'Connell (2008) provide a comprehensive analysis of the catastrophe insurance industry in general and catastrophe bonds in particular.

To the best of our knowledge, there are no empirical studies of adverse selection in the life settlement market. Due to lack of data, there is no study documenting mortality experience differences across life settlement contracts with different characteristics. Although our data does not permit direct inference based on mortality information, it does enable indirect investigation of economic phenomenon such as adverse selection by relating differences in expected IRRs to differences in contract features as described in the next section. Furthermore, our investigation can be of help to researchers modeling insurance markets in the context of life cycle finance choices after retirement. It also enables investors to compare expected returns across different types of insurance-linked securities such as life settlements vis-a-vis catastrophe bonds. Finally, it helps researchers to design more efficient insurance contracts that can incorporate some of the benefits of a secondary market.

3 Hypotheses development

3.1 Testing for adverse selection in the life settlements market

The prediction of standard models of adverse selection is that when given the choice from the same menu of insurance contracts, individuals with worse health will buy more life insurance cover. That is, in the primary market for life insurance, the amount of death benefit *purchased* is positively correlated with the degree of adverse selection, all else equal.[10] In the case of the life settlement market, where a policyowner can only settle up to the amount of the death benefit that he already owns, the amount of the death benefit *sold* is positively correlated with the degree of adverse selection, all else equal. In other words, from the point of view of the investor, the degree of adverse selection is greater when the policyowner chooses to sell his policy in its entirety as compared to a case in which he opts for a partial sale (where he retains a part of the death benefit).

Thus, models of adverse selection imply the following hypothesis in the life settlement market:

- ***H1***: All else equal, the higher the RDB as a fraction of NDB, the lower should be the expected IRR.

3.2 Alternative explanations

There are several alternative explanations for differences in expected returns across policies which we consider. These explanations include cost-benefit trade-off, bequest motive, escalating premiums (convexity), diversification of policy unique risk, liquidity constraints and model uncertainty. Note that contrary to adverse selection with respect to life expectancy, these reasons for cross-sectional

[10]See Chiappori (2000) and Chiappori and Salanie (2000) for a summary of models of asymmetric information in insurance markets.

differences in expected returns have no relation with mortality rates across the pool of policies bought by investors.

3.2.1 Cost-benefit trade-off to investor and bequest motive of policyowner

From the point of view of the investor, policies with RDB have worse cost-benefit trade-off. To see this, consider two identical policies on a given insured, one with RDB and the other without RDB. From the viewpoint of the investor, for the same amount of premium outflow, he is getting a lower net death benefit to investors (NDBI) relative to the policy without RDB. Investors don't like this unattractive cost-benefit trade-off, and would make a lower offer to the seller, resulting in higher expected IRRs for policies with RDB.[11]

The effect of a policyowner's bequest motive also works in the same direction. Policyowners demanding RDB signal that they derive utility from leaving money to the original beneficiaries. To achieve this objective, they may be willing to accept a lower offer which results in higher expected returns to investor. Both these effects work in the opposite direction to that implied by the adverse selection. Thus, the cost-benefit trade-off and bequest motive provide us with the following hypothesis in the life settlement market:

- ***H2***: All else equal, the higher the RDB as a fraction of NDB, the higher should be the expected IRR.

3.2.2 Convexity of premiums

Some policies may have more convex premium schedule relative to others over time. In general, the convexity of premiums increases the risk to the investor if the insured were to live longer. Therefore, one expects investors to demand higher expected IRRs for policies with more convex premium schedules. Thus, the premium convexity hypothesis implies that in the life settlement market:

- ***H3***: All else equal, policies with a higher convexity of premiums should be associated with a higher expected IRRs.

3.2.3 Diversification of policy unique risk

For the same amount of assets under management, policies with smaller NDBs enable investors to obtain exposure to longevity risk associated with a larger number of insureds. This results in better diversification of unique risk associated with individual policies and makes the portfolio less risky. Commensurate with lower risk achieved through diversification, the investor may be willing to accept lower expected IRRs on smaller policies. Thus, the diversification hypothesis implies that in the life settlement market:

- ***H4***: All else equal, policies with smaller NDBs should be associated with lower expected IRRs compared with policies with larger NDBs.

[11] Said differently, the presence of RDB has effects similar to leverage.

3.2.4 Liquidity constraints

One may argue that policy NDB could be positively correlated with wealth.[12] If this were to be the case, then owners of policies with smaller NDBs are more likely to be liquidity constrained. Such policyowners will have a higher marginal utility of a dollar and may be willing to accept lower offer prices resulting in higher expected IRRs for investors. The liquidity constraint hypothesis works in a direction opposite to that implied by the diversification hypothesis above and implies that in the life settlement market:

- ***H5***: All else equal, policies with smaller NDBs should be associated with higher expected IRRs compared with policies with larger NDBs.

3.2.5 Model uncertainty

In the life settlement market, the main risk associated with buying a life insurance policy involves LE estimation risk. When more medical underwriters process the medical information of the insured and provide their LE estimates, the investor receives more information about the underlying unobservable LE. To the extent that different medical underwriters employ less than perfectly correlated models, having a greater number of LE estimates reduces LE estimation risk and therefore the model uncertainty hypothesis implies that in the life settlement market:

- ***H6***: All else equal, policies with more LE estimates should be associated with lower expected IRRs.

In Section 6 below, we examine the relationship between expected IRRs and the different contract characteristics in our sample and report which of these economic phenomenon best describe the variation of expected returns in the life settlement market.

4 Brief summary of the life insurance and the life settlement markets

There are two main types of life insurance policies: term insurance and permanent insurance. Term insurance provides coverage for a specified period of time, usually greater than one year, and can be renewed at the end of its term.[13] Permanent life insurance, unlike term insurance, provides protection for as long as the insured lives.

CSV is the savings component of permanent life insurance policies and it is typically zero for term policies. CSV depends on the size of the policy, the underwriting classification of the insured at issue and the amount of premiums paid into the policy since issue. Importantly, it does not depend on the current health condition of the insured. The difference between surrendering versus settling a policy in the secondary market, is that the life insurance company "buys back" the policy at CSV, while the life settlement participants bid up the price to the policy's market value.

[12] To be precise, this is likely to apply at the time of the life insurance purchase.

[13] Some term policies also include a conversion provision, which allows the policy to be converted to permanent coverage without seeking new underwriting. See the American Council of Life Insurers (2011) for more details on life insurance products and numbers.

4.1 Steps involved in a typical life settlement transaction

Policyowners submit their policies to the life settlement market to receive bids from potential investors. If the policyowner receives bids, they will be higher than CSV and the highest bid is the market value. Figure 1 describes the steps involved and illustrates the interactions among the main players in a typical life settlement transaction. In (1) the policyowner approaches an advisor. In (2) the advisor submits the policy to a life settlement provider. In (3) the life settlement provider submits the insured's medical records to a medical underwriter who provides a life expectancy report for each insured. In (4) the life settlement provider values the policy and makes an offer to purchase. In (5) the life settlement provider purchases the policy. In (6) the life settlement provider sells the policy to an investment vehicle. In (7) the servicer facilitates premium payments from the investment vehicle to the life insurance company, optimizes policy performance, monitors the insurance company to assure that the policies are administered consistently with the contract language, and monitors and processes death claims. In (8) the investment vehicle receives the net death benefit from the life insurance company. A life settlement transaction may also include other parties such as insurance agents, life settlement brokers, escrow agents, trustees, collateral managers and tracking agents.[14]

[Figure 1]

4.2 Factors driving demand for life insurance and life settlements

Demand for individual life insurance can be driven by a number of factors, including a bequest motive, estate planning, obtaining a mortgage, maintaining one's family's standard of living, the continuation of a business, the education of children or grandchildren, enforced saving and charitable giving. The reasons for taking out life insurance usually determine the type of life insurance policy taken out. For example, a term policy might be appropriate when taking out a mortgage, or for some other temporary need, while policies that build cash value might be used for savings purposes or estate planning.

Demand for a life settlement is parallel to the demand for life insurance. Examples of factors that may lead a policyowner to sell the life insurance policy include the loss of a bequest motive, the termination of a financial contract such as a mortgage, an income shock, a health shock, different life insurance needs, and other investment objectives.

For investors, demand for the life settlement asset class comes from the diversification benefits of the exposure to longevity risk.[15] Other risks associated with the asset class include liquidity risk, underwriting risk, operational risk, legal and regulatory risk. For international investors, there may also be currency risk.

5 Data

Our study uses data on 9,002 life insurance policies with an aggregate NDB of $24.14 billion purchased as life settlements from their original owners in the secondary market between 2001 and 2011 across 50 U.S. states. The data includes all life settlements funded by Coventry First during this period with

[14] See Aspinwall et al. (2009) and A. M. Best (2012) for more details.

[15] Diversification benefits are also offered by other insurance-linked securities such as catastrophe bonds.

the exception of 106 policies for which the data in Coventry First's systems is incomplete as a result of system upgrades that have been implemented since 2001.[16]

For each policy, the dataset includes: policy number, settlement type, month and year of funding, first insured and policyowner state of residence, policyowner zip code, policyowner type, current carrier name, Standard & Poor's (S&P) and Moody's carrier rating at time of funding, policy type, original policy type (if conversion), month and year of issue, month and year of original issue (if conversion), policy NDB, NDB maturity age, NDBI, existing loan, new loan/withdrawal at funding, RDB at funding, CSV, premiums at funding, total offer to seller and net total cost of purchase. Where NDB is the amount the life insurance policy pays to policy beneficiaries upon death of the insured and NDBI is the NDB paid to the investor after subtracting the RDB.[17]

For each insured, the dataset includes: insured number, gender, month and year of birth, mortality rating[18], LE, underwriting age, smoking status, date of estimate and decision type (clinical, no quote, not predictably terminal). Data from the most recent underwriting assessments received by Coventry First prior to funding from four leading third-party medical underwriters are included. This may be one, two, three or four assessments, depending on the number of underwriters asked to assess each insured. Primary diagnosis and up to three international classification of disease codes and their diagnoses are received from certain of these medical underwriters, and are also included.[19]

For 7,890 policies, the dataset includes projected cash flows by policy number, including premiums, loan payments, NDB and NDBI from month of funding through policy maturity. Projected cash flow data is not included for the remaining 1,112 policies due to it being incomplete in Coventry First's systems as a result of system upgrades that have been implemented since 2001.[20]

5.1 Summary statistics

Table 1 presents the sum, mean, median, and distribution of key sample variables across years (Panel A) and age deciles (Panel B) at the time of funding. NDB, NDBI, RDB and CSV are as defined previously. CP is the net total cost of purchase and is defined as the total cost of purchase minus new loans/withdrawals at funding.[21] Offer is defined as the total cash paid to the policyowner at funding plus premiums paid to the carrier at or immediately prior to funding. Since RDB is a payment in the

[16]In recent years, life insurance policies purchased in the secondary market have been sold in a tertiary market. Our dataset does not include any transactions from the tertiary market.

[17]Although the face value of a policy typically remains constant, the NDB can be lower if policyowners partially liquidate the policy, for example, through policy loans, withdrawals or accelerated death benefits (i.e., living benefits with reduced death benefits).

[18]Mortality rating is a medical underwriter specific measure of health status. This measure is directly related to a LE estimate through the medical underwriters' proprietary mortality tables (except in cases where LE is determined by clinical judgement). The mortality rating is used to estimate the conditional survival probabilities of the insured.

[19]It is conceivable that factors such as wealth, income, education, occupation, or other indicators of socioeconomic status may influence mortality risk and prices offered to sellers. Our dataset does not contain this information.

[20]Ernst & Young LLP (EY) performed certain agreed-upon procedures on the data. The procedures were designed to confirm that the data is complete with respect to Coventry First's systems and that it is consistent with both the data in Coventry First's systems and the original funding documents. Firstly, EY observed that the query used to extract the data from Coventry First's systems extracted 9,002 policies and agreed the policy IDs of these policies with those in the data. Secondly, on the basis of a sample they selected, EY agreed the values of total offer to seller and net total cost of purchase with those in Coventry First's systems and the corresponding original funding documents. Lastly, and again on a sample basis, EY agreed the value of the total premiums with those in Coventry First's systems.

[21]In aggregate, these new loans/withdrawals total \$0.48 billion, which increases the gross initial outlay of the investors from \$3.43 billion to \$3.91 billion.

future and the timing of the death is uncertain, we define dRDB as the discounted (at treasury yields) present value of RDB, which accounts for insured's survival probabilities.[22]

Panel A shows that the aggregate NDB in our sample is $24.14 billion. The policyowners in our sample collectively received $3.11 billion of value in the form of $2.83 billion in Offer and $0.28 billion in dRDB, more than four times the $0.77 billion CSV they would have received had they surrendered their policies to their respective life insurance companies. Collectively, the policyowners received 12.9% of aggregate NDB in Offer and dRDB.

In 2001, when the life settlement market was in its infancy, the aggregate NDB funded was $1,068 million. The value of policies funded peaked in 2009 at $3,545 million. The number of policies funded also increased during the period from 77 policies in 2001 to a maximum of 1,463 policies in 2008. CP and Offer have generally increased up to 2007, and since then have decreased.

The average (median) NDB of the policies in the sample is $2.68 million ($1.00 million). Other corresponding average (median) numbers are as follows: the CP value is $381,000 ($160,000); the CSV value is $85,000 ($1,000); in settlements with no RDB component (representing 8,493 policies with an average NDB of $2.63 million) the offer value is $330,000 ($120,000); for settlements with RDB (representing 509 policies with an average NDB of $3.46 million), the initial amount of RDB is $725,000 ($393,000).

Relative to the size of each policy, as measured by its NDB, the average CP is 16.3% and the average CSV is 4.8%; offer for life settlements with no RDB component is 13.0%; and settlements with RDB have an average RDB of 25.3%.

Panel B of Table 1 shows these summary statistics in ten age groups from youngest (decile 1) to oldest (decile 10). Deciles 4 and 8 have the highest average NDB of about $3.23 million. Decile 9 has the highest average CP and the highest average Offer, with values of $557,000 and $490,000, respectively. Decile 10 has the highest average CSV and dRDB, with values of $143,000 and $103,000, respectively. Decile 10 also has the highest average Offer (including dRDB) relative to NDB, which is 25.4% of NDB. These results suggest that both young and old individuals sell policies with similar average NDBs. However, as the age of the insured increases, the average CP, Offer and CSV also increase. RDB increases with age too, suggesting that older individuals retain a higher amount of death benefit for their beneficiaries.

[Table 1]

5.2 Life expectancy estimates

Our dataset includes LE estimates for the insureds from up to four medical underwriters. We construct a unique LE measure for each insured by taking an average of the LE estimates, after accounting for the time elapsed between the date of estimation and the date of funding. We discuss the distribution of LE below.[23]

[22] Treasury yields are the monthly nominal constant maturity rate series from the Federal Reserve obtained from http://www.federalreserve.gov/releases/h15/data.htm. During the sample period, treasury yields have maturities that range from one month to 30 years. When policy cash flows occur at dates different from the maturities available on the website, we interpolate the yields using a spline function. We use the longest dated treasury yield for discounting all policy cash flows beyond that date.

[23] For 5827 insureds, our data provides primary health conditions as well. For this subset, we find that 65% of the variation in the LE estimates could be explained by the primary health condition of the insureds (analysis available from authors upon request).

Figure 2 presents medical underwriter LE estimates for each insured male and female (circle and cross scatter points, respectively), by age and year of funding (top and bottom panels, respectively). In addition, the figure plots average LEs (lines) and the average LE assuming that the insureds are of standard health (dashed lines).[24] Each observation is on a per policy basis and, for the purpose of the figure, we split joint policies into two individual observations.

As one would expect, LE estimates generally decrease as the insureds get older. The figure shows that, the average LE for 60 year old males in our sample is 156 months compared to 288 months for standard health, suggesting that health impairments reduce their average LE by 133 months (127 months for females). The LE of older insureds is closer to the LE under standard health. For example, 85 year old males in our sample have health impairments that reduce their average LE by 26 months compared to those with standard health (22 months for females). The figure also shows that, on average, given the same age, females have a longer LE than males, and given the same LE, males are younger than females.

Panels (c) and (d) of Figure 2 show that LE estimates of the insureds have generally become longer up to 2008, and have become slightly shorter thereafter. During 2002, the average LE estimate is 86 months for males and 79 months for females, while during 2011, the corresponding numbers are 135 months for males and 122 for females.[25] In terms of health impairment relative to standard health, during 2002 the average LE estimates are shorter by 76 months for males and 89 months for females, while the corresponding numbers in 2011 are 42 months for males and 27 months for females. The convergence of LE estimates towards those of individuals under standard health could be the result of a combination of factors such as (i) more realistic/conservative LE estimates, as the life settlement market matures and medical underwriters are better able to estimate LE; (ii) an improvement in actual LE of insured individuals in the sample (e.g.: from more effective medical treatments), and (iii) an increase in demand for policies with longer LE estimates.

[Figure 2]

Figure 3 presents LE estimates versus LE under standard health for males and females (circle and cross scatter points, respectively). 94.6% of insureds fall above the 45 degree line, reflecting the fact that, according to the LE estimates of the medical underwriters, the policies purchased in the secondary market are predominantly of insureds with health impairments. Policies falling above the 45 degree line may generally only be purchased in certain specific circumstances. These include when the policy contains features particularly attractive to the settlement option, such as when the insured was assessed as being in preferred health at issue based on medical underwriting or potential commercial considerations, and/or when policy options or guarantees are available which reduce the expected future premiums.

[Figure 3]

[24]For illustrative purposes here, standard health refers to an insured for which mortality is expected to be 100% of the Valuation Basic Table (VBT) from the U.S. Society of Actuaries (SOA). In current practice, underwriters may assume longer life expectancies for healthy unimpaired lives. We take the survival probabilities from the 2001 VBT and the 2008 VBT (age-last-birthday and standard health tables). The VBT tables can be found at:
http://www.soa.org/research/experience-study/ind-life/valuation/2008-vbt-report-tables.aspx
http://www.soa.org/research/experience-study/ind-life/tables/final-report-life-insurance-valuation.aspx

[25]Using regulatory filings data of two life settlement providers, Milliman (2008) finds that the average LE estimate in their sample has increased from 101 months in 2004 to 127 months in 2006.

In addition to LE estimates, medical underwriters also provide mortality ratings and information related to diseases or impairments. We believe that LE estimates are a better input for the estimation of survival probabilities given that (i) mortality rating measures are useful only when applied to medical underwriter's proprietary tables, which are not available, (ii) a LE estimate already incorporates a mortality rating and a mortality table, and (iii) mortality ratings are not available on clinical cases. This belief is further reinforced by the observation that the pair-wise correlation between the LE estimates of the four different medical underwriters ranges between 0.74 and 0.87, while their mortality ratings have a correlation between 0.28 and 0.66. We reverse engineer consistent mortality multipliers across policies ourselves, as explained in the following section.

5.3 Other cross sectional characteristics

An overwhelming majority (88%) of the sample is composed of universal life policies, with a small amount of variable universal life (8%), whole life insurance (3%), and term insurance (1%).[26] Policyowners are mostly trusts (44%) and individuals (44%), with the remaining sample consisting of corporations (11%), and partnerships (1%). The group of top 5 and top 10 insurance carriers represents a total of 38% and 53% of our sample. The number of policies funded seem to be more or less uniformly distributed across different months of the year, ranging between 7% and 10% per month.

Figure 4 presents the distribution of policies across (a) settlement type, (b) gender, (c) number of life expectancy estimates and (d) age at funding. For the purpose of this illustration, each observation is on a per policy basis.

An overwhelming majority of settlements are standard life settlements (LS). In addition, there are settlements in which the policyowner and/or their beneficiaries retain a portion of the death benefit (LS-RDB), simplified life settlements (SLS) and simplified life settlements with a retained death benefit (SLS-RDB). For every settlement type, the obligation to pay all future premiums is transferred to the investor. In LS and SLS, the investor receives the net death benefit, while in LS-RDB and SLS-RDB, the policyowner retains a partial interest in the death benefit.

In case of LS, medical records of the insured are gathered and LE estimates are obtained from medical underwriters. In contrast, SLS are programs usually for policies with face value under $1 million, which are purchased based on a review of the responses to a medical questionnaire rather than an assessment of detailed medical records.[27] Most of the sample is of standard life settlements (91%), although simplified life settlements and life settlements with RDB have became more popular over time.

We find that 67% of the sample are males, 23% females and the rest are joint policies (that pay on the death of the second insured), where both insureds are alive at funding. The percentage of males

[26]With universal life policies, premiums are flexible and therefore the CSV varies depending on how the premiums are paid. If the policy is funded at the minimum premium level, then the CSV is likely to remain very low, while if the policy is funded at the fixed premium level, as is the case with whole of life policies, then the CSV will increase initially and then decrease once the cost of insurance starts to increase. Variable universal life policies combine the features of both universal and variable policies (where NDB and/or CSV vary according to a portfolio of investments chosen by the policyowner).

[27]The responses to the questionnaire are analyzed by funder's underwriters and a mortality rating is provided. For SLS policies in this dataset, an LE is included based on the application of the funder's mortality rating to the 2008 VBT from the SOA. Due to the reduced scrutiny of medical information, SLS transactions can close considerably faster than the standard life settlement transactions.

and females in our sample is stable over the years. For 97% of policies, the insureds are non-smokers. We find that about 27%, 40%, 28% and 5% of the sample has one, two, three and four LE estimates.

The settlements in our sample are well distributed around 75 year old insureds. At funding, 18% of insureds are in their 60's, 56% are in their 70's, while 24% are in their 80's, and the remaining in their 90's. We also find that the average age at funding is relatively constant over the 11-year period.

[Figure 4]

Figure 5 shows the relative (a) number of policies and (b) NDB for different life settlement types, across year of funding, where the settlement type may be a LS, LS-RDB, SLS or SLS-RDB. The figure shows that RDB settlements have become more common in the life settlement market over time, as have SLS policies, which were not introduced by Coventry First until 2008. In 2011, 30% of transactions had a RDB component and close to 20% of transactions were SLS.

The recent rise in the number of LS-RDB policies is interesting for several reasons. From the investor's point of view, the presence of RDB provides better alignment of incentives between the investor and the policyowner. It also means that the RDB beneficiaries, who are typically in closer contact with the insured, have an incentive to report the maturing of a policy promptly, thereby reducing the potential for delay in claiming the NDB of the policy.

From the policyowners' perspective, RDB allows policyowners to retain a portion of the death benefit coverage while eliminating the financial burden of further ongoing premium payments. This feature can be particularly attractive to policyholders who can no longer afford to pay the increasing costs of their policy or may have a reduced insurance need and may have difficulty buying new coverage in the primary market due to a deterioration in the insured's health.

The trend in the number of SLS policies settled over time is also interesting for several reasons. First, these are policies with NDB under $1 million, with an average NDB of $3289 thousand. This is considerably smaller than the average NDB of $2.76 million in our sample. As SLS are purchased based on streamlined underwriting involving insured medical questionnaires, they can close faster and cost less to settle compared to standard LS policies, which call upon the full services of medical underwriters and a more detailed documentation of medical records. The recent rise in the number of SLS policies may also be indicative of a new trend representing the entry of middle-income Americans in the life settlement market. The rapid increase in the number of SLS policies funded may be indicative of a potential widening of the life settlement market to include a larger section of the U.S. population. It may also be driven by the desire of baby boomers approaching retirement age to release cash tied up in illiquid assets to be used for health care or other lifestyle choices.

[Figure 5]

Figure 6 plots the distribution of the ratio of Offer plus dRDB to CSV. As can be seen, although collectively the policyowners in our sample received more than four times the CSV of their policies, there is a considerable variation across policies.

[Figure 6]

Regarding the state of residence of the policyowner, 41% of the policies in the sample are from the States of California, Florida, New York and Texas, with each state representing between 5% and 15% of the sample. These states are followed by Illinois, North Carolina, Pennsylvania and New Jersey, each representing between 4% and 5% of the sample. This is consistent with the fact that California, Florida, New York, Texas, Pennsylvania, Ohio, Illinois, Michigan, North Carolina and New Jersey are, in descending order, the states with the highest population above 60 years of age in the U.S., representing collectively 52.8% of this segment of the U.S. population.[28]

Figure 7 shows the distribution of policyowners across (a) states and (b) counties in the United States. Individual policies are matched with ZIP code coordinates. States and counties are shaded according to number of policies per state and county, respectively (see legend).[29]

[Figure 7]

6 Expected internal rates of returns

Next we proceed with the description of the methodology we use in estimating the expected annual internal rate of return (IRR) on a life settlement policy. The expected IRR is the annual discount rate that, when applied to the future probabilistic cash flows, results in a policy value equal to the investor's cost of purchase. All computations are performed based on monthly increments of time. Probabilistic cash flows are based on the characteristics of the life insurance policy adjusted at each future point for the probability that the insured survives to such point or dies during the month ending at such point. For simplicity, the computations below are described for a policy insuring one living insured. In the case of a joint life policy insuring two living insureds, the computations mirror these with the modification that survival and mortality probabilities are determined based on the joint probabilities of either life living to a given month or the 2$^{\text{nd}}$ death occurring during a given month.[30]

Given the age, gender, smoking status and LE of the insured at the time of funding (or the valuation date), we estimate the conditional probability that the insured is alive at the beginning of each month t, S_t, and the conditional probability that the insured will die during each month, D_t. For conservatism all premium payments are assumed to be paid at the beginning of the month in which they are due, and death benefits to the investor (NDBI) are assumed to be collected at the end of the month in which the insured dies. We multiply the optimized premiums with S_t and the $NDBI_t$ with D_t. The expected value of the policy as of the valuation date is then:

$$V = \sum_{t=0}^{T} \left\{ \beta^{t+1} \times D_t \times NDBI_t - \beta^t \times S_t \times Premium_t \right\} \tag{1}$$

where T is the earliest duration for which the probability of survival is assumed to be zero; $\beta < 1$ is the monthly discount factor; $NDBI_t$ is the net death benefit to be payable to investors in period t; $Premium_t$ is the premium to be paid in period t.

[28]From the census and population estimates on age, from the Administration on Aging at the Department of Health and Human Services: http://www.aoa.gov/AoARoot/Aging_Statistics/Census_Population/Population/2009/index.aspx.

[29]ZIP code coordinates are from the ZIP Code Tabulation Areas from the 2012 TIGER/Line® Files, while state and county shapefiles are from the 2012 TIGER/Line® Shapefiles, both at the United States Census Bureau, and can be found here: http://www.census.gov/geo/maps-data/data/tiger-line.html.

[30]These joint calculations are commonly referred to as fraserized probabilities in actuarial literature and make the assumption that the two lives are independent.

LE_t, S_t and D_t are determined by scaling the expected rates of deaths published in the VBT from the SOA by a multiplier, m, such that:[31]

$$LE = \sum_{t=0}^{T} S_t \times t + 1/2 \tag{2}$$

The constraint in equation (2) implies that the mortality multiplier is reverse engineered from the LE estimate, and then used to scale the death rates. For every life settlement policy, we compute the expected IRR and expected IRR in excess of treasury yields, where the maturity of treasury yields are matched with dates of the policy cash flows.

Since survival probabilities constructed from SOA tables are in annual terms and we have monthly cash flows (optimized premiums and net death benefits), we interpolate monthly survival probabilities (from annual survival probabilities) with a cubic interpolation. The SOA tables follow a select and ultimate pattern with a selection period that extends from the date of underwriting to a maximum of 25 years after which no selection effect remains.

6.1 Valuation example

Figure 8 gives an example of the steps followed in order to price a policy and illustrates the changes in expected IRRs of a policy for different realizations of mortality.

The figure depicts (a) the cumulative probability of survival and (b) the mortality probability distribution for a 75 year old male non-smoker in standard, good and poor health, using 2008 VBT from the SOA. These health states are equivalent to a LE of 14, 16 and 12 years, respectively, or a mortality multiplier of 1, 0.8 and 1.5, respectively.

The figure also plots (c) the probabilistic net death benefit, probabilistic premiums and probabilistic net cash flow of a policy with a NDBI of $1 million, an increasing monthly premium schedule of $NDB \times 50\% \times monthly\, death\, rate$, up to age 100 and zero thereafter, and a non-smoker male insured in standard health. A policy with these characteristics would be approximately valued at $168,040 using a discount rate of 10%. Panel (d) plots the IRR for different realizations of actual life duration duration relative to LE estimate, given a cost of purchase equal to this value.

[Figure 8]

6.2 Estimation of expected IRRs

The expected IRR is the annual discount rate that, when applied to the future probabilistic premiums and net death benefit, results in a policy value equal to the investor's cost of purchase.

Figure 9 plots for each month the (a) expected IRR, both raw and in excess of treasury yields, averaged over the previous quarter, (b) treasury yields of selected maturities, and (c) number of policies funded over the previous quarters. IRRs are shown on a CP weighted basis. The expected IRRs in excess of treasury yields take into account the term structure of treasury yields for the dates of cash flows (premium and death benefit payment dates). For the purpose of robust inference, we remove outliers

[31] SOA tables are specific to age, gender, year of funding and smoking status of the insured at the valuation date.

by winsorizing 0.5% of observations on each end of the distribution of expected IRRs. The figure shows the expected IRRs and policies funded on a quarterly rolling basis.

[Figure 9]

Table 2 shows the same results on a yearly basis. IRRs are shown both on a CP weighted basis and equal weighted basis.[32] The table shows that, on a CP weighted basis, the expected average annual IRRs decreased over time from 18.9% in 2001 to around 11.0% in 2005, 2006 and 2007, and have subsequently increased to 18.3% in 2011. The expected average annual IRRs in excess of treasury yields follow a similar pattern, decreasing from 14.6% in 2001, to 6.1% in 2006. The latter increased substantially after the financial crisis to 15.9% in 2011, converging with raw expected IRR as both the level and the slope of the treasury yields have decreased substantially in recent years.

[Table 2]

Table 3 reports IRR, both raw and in excess of treasury yields, on a yearly basis, for LE, LE plus 12, 24 and 36 months. We find that by increasing LE estimates by 12, 24 and 36 months, CP weighted raw expected IRRs decrease from 12.5% to 9.0%, 6.1% and 3.2%, respectively. Equally weighted raw expected IRRs decrease from 12.9% to 9.2%, 5.9% and 2.6%, respectively. These results suggest that while actual returns on these policies are materially dependent on the accuracy of the LE estimates, significant under-estimations of life expectancies still continue to produce positive expected returns to investors.[33]

[Table 3]

This variation in expected average annual IRRs over time exhibits a U-shaped pattern. During the early years of the life settlement market, there were fewer players resulting in lower competition and greater expected returns to investors. Investors may also have had concerns about the ability of medical underwriters in analyzing non-viatical policies with much longer LE of the insureds. This could have resulted in investors demanding a higher rate of return on life settlements. As the market developed with more players entering during 2003-2006, competition increased and investor confidence may have increased through greater familiarity with the asset class. This would have resulted in the bidding up for policies, resulting in lower expected returns. This bottoming of the expected returns seem to have occurred in 2006-2007. We conjecture that after witnessing the flight to quality and flight to liquidity during the 2008 crisis, the $85 billion bailout of AIG - one of world's biggest life insurers, and the collapse of Lehman Brothers, arguably investors' appetite for illiquid insurance-linked securities with negative carry and a promise of a future payment would have reduced. As a result, investors would have demanded a higher rate of return for investing in life settlements. The reduced number of policies settled and substantial increase in expected IRRs in 2010-2011 seem to corroborate this conjecture.

[32] As discussed in the Section 5, this subsample consists of policies for which we received projected cash flow information. Appendix C reports the equivalent of Table 1 for the subsample of policies for which we received projected cash flow information, after removing outliers by winsorizing 0.5% of each side of the distribution of expected IRRs. This table reports two additional values: dNDBI is the net death benefit payable to investors discounted at the expected IRR of each policy, accounting for survival probabilities. dPremium is the sum of premiums payable to the carrier discounted at the expected IRR of each policy, accounting for survival probabilities. As can be seen, this subsample of 7,811 policies is qualitatively very similar to the sample in Table 1.

[33] It is important to note that the LEs in our sample reflect the balance of third-party medical underwriters used by the investors in those policies. Other market participants may have been using a different balance of third-party underwriters and/or their own proprietary underwriting over this period and, as a consequence, their expected IRRs may have been different from those estimated in this paper.

7 Expected IRR variation across life settlement contracts

In this section, we investigate the relationship between life settlement characteristics and the associated expected IRR. If policyowners self-select among life settlement contract types on the basis of private information on life expectancy, then the expected IRR of different contract types should adjust to reflect feature-specific average mortality.

To explore how life settlement expected IRRs are related to product characteristics, we develop regression models that relate expected IRR to the characteristics of the life settlement policy and the insured. The equation, which we estimate by ordinary least squares, is

$$\begin{aligned} IRR_i =& \alpha + \beta_1\, RDB/NDB_i + \beta_2\, Convexity_i \\ &+ \beta_3\, MediumNDB_i + \beta_4\, HighNDB_i \\ &+ \beta_5\, SLS_i + \beta_6\, LEest2_i \\ &+ \beta_7\, LEest3-4_i + \beta_8\, \mathbf{X}_i + \varepsilon_i \end{aligned} \tag{3}$$

where RDB/NDB is the fraction of the NDB retained by the policyowner; for settlements without RDB this fraction is zero. $Convexity$ is the convexity of premiums (scaled by 100). $MediumNDB$ and $HighNDB$ are dummy variables for the size of NDB. $MediumNDB$ is an indicator variable that takes the value of 1 for policies with NDB between \$1 million and \$10 million while $HighNDB$ is an indicator variable that takes value of 1 for policies with NDB above \$10 million, and zero otherwise. SLS is an indicator variable that takes the value of 1 for simplified life settlement policies, and zero otherwise. $LEest2$ and $LEest3-4$ are indicator variables that take the value of 1 for policies for which we have two LE estimates and three or four LE estimates, respectively (scaled by a hundred). Finally, $\mathbf{X}$ is a vector of control variables which include the average LE estimate, age of the insured at settlement, and dummy variables for the gender of the insured and year of purchase. The latter controls for changes in demand/supply from the popularity of the asset class over time. ε is the error term.

7.1 Empirical findings

Table 4 presents results of regressions of policy expected IRR on life settlement contract characteristics as described in equation (3).

The slope coefficient on RDB/NDB ratio varies between 0.14 and 0.12 across the five models and is statistically significant at a one percent significance level. This implies that presence of RDB increases the expected IRR on the life settlements and therefore suggests that, empirically, the predictions of the cost-benefit trade-off and the bequest motive hypothesis ***H2*** dominate that of the adverse selection hypothesis ***H1*** (See Section 3). As the median and mean RDB/NDB ratio in our sample is 20.72% and 26.05%, according to model 5 these policies will have an IRR of 2.48% and 3.13% respectively greater than that on policies without RDB.

The slope coefficient on convexity premium is 0.02 across all five models and is statistically highly significant suggesting that as the convexity of premiums increases, the IRR expected by the investors also increases. This result strongly supports the premium convexity hypothesis ***H3***.

The slope coefficient varies on medium NDB policies between zero and one percent across the five models while that on high NDB policies equals three percent across all models, and are statistically highly significant. This suggests that relative to expected IRRs on policies with low NDBs (less than $1 million), the medium and high NDB policies earn up to one percent and three percent higher expected IRR, respectively. As the low NDB policies also include policies procured under the SLS program, we examine if there exist differences in expected IRRs among these two types of policies. We find that the slope coefficient on SLS policies is -0.04 across all models and is statistically highly significant suggesting that the SLS policies have a lower expected IRR relative to the non-SLS low NDB policies. This may be because the SLS policies have a much smaller mean (median) NDB of $329,000 ($250,000) compared with $465,000 ($474,000) of non-SLS low NDB policies. As SLS policies provide better diversification of unique risks relative to non-SLS low NDB policies, investors may be willing to accept a lower expected IRR on SLS policies. Taken together, the slope coefficients on medium NBD, high NBD and SLS indicator variable provide evidence in support of the diversification hypothesis ***H4*** over the liquidity constraints hypothesis ***H5***.

The slope coefficients on the number of LE estimates are negative and statistically highly significant. Life settlements with two LE estimates have 55 basis points lower expected IRR while those with three or four LE estimates have 44 basis points lower expected IRR relative to life settlements with only one LE estimate. The reduction in expected IRRs as the investor obtains more than one LE estimate lends support to the model uncertainty hypothesis ***H6***.

[Table 4]

The empirical results described above provide strong evidence in support of the cost-benefit trade-off and the bequest motive hypothesis; the premium convexity hypothesis; the diversification hypothesis; and the model uncertainty hypothesis. Contrary to the predictions of Zhu and Bauer (2013), our findings do not suggest that adverse selection is a dominant driver of expected returns across different contracts in the life settlements market. Our results, however, are consistent with empirical studies in the primary market for life and health insurance such as Cawley and Philipson (1999) and Cardon and Hendel (2001) which do not find evidence of adverse selection in the life insurance and health insurance market in the United States.

8 Concluding remarks

This paper empirically investigates for the first time the life settlement market for the first time using a large and comprehensive dataset on 9,002 sales transactions by original policyowners in the U.S. from January 2001 to December 2011 with aggregate net death benefit of $24.14 billion. Using this data, we answer many important questions. First, we document the extent by which the presence of the life settlement market makes the policyowners wishing to sell their policies better off. Second, we estimate the rates of return investors purchasing these policies could have expected to make and their sensitivity to underestimation of LE estimates. Finally, we investigate the economic drivers of expected returns across different life settlement contracts.

In our sample, we find that policyowners collectively receive an amount more than four times what they would have received had they surrendered their policies to their insurance companies. We estimate the average return investors purchasing these policies expected to earn to be 12.5% per annum, and it ranges from a high of 18.9% in 2001 to a low of 11.0% in 2005, 2006 and 2007. In recent years, the expected IRR has risen substantially to 18.3% per annum in 2011, which is 15.9% in excess of treasury yields.

As the magnitude of these expected IRRs critically depend on the accuracy of the LE estimates provided by different medical underwriters, as a robustness check, we uniformly increase all LE estimates and observe that the average expected IRR in our sample decreases from 12.5% to 9.0%, 6.1% and 3.2%, as we extend all LE estimates by 12, 24 and 36 months, respectively. Thus, in this sample, even if the LE estimates turn out to be 36 months longer than stated by the underwriters, investors, on average, would still expect positive returns.

Given these findings and the fact that the longevity risk is largely uncorrelated with other financial markets, the life settlements may provide an interesting investment opportunity for institutional investors willing to include longevity risk in their portfolio and to commit capital for the medium term.[34]

Finally, our cross-sectional analysis suggests that economic phenomenons such as the cost-benefit trade-off and the bequest motive, convexity of premiums, diversification of policy unique risk and model uncertainty risk better explain the differences in expected IRRs across contracts in our sample as opposed to the adverse selection argument proposed by Zhu and Bauer (2013).

The focus of this paper is to examine expected returns as opposed to realized returns. Challenges to the assessment of realized returns include the fact that a majority of life settlement policies have not yet matured, and there is insufficient activity and transparency in the current tertiary market to establish an accurate market discount rate for, and hence valuation of, the policies still in force. We believe that both these challenges will get attenuated over the coming years and we hope to address them as a part of our ongoing research agenda.

[34]Please note that our analysis is on a "pre-tax" basis. In general, the policyowners will need to recognize the excess of the sale price over the cost basis as taxable income. Similarly, investors will need to recognize the death benefit received in excess of the costs incurred as taxable income. Thus, life settlement market creates an additional source of revenue for tax authorities, which could be potentially used for social beneficial purposes.

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Table 1: ***Summary Statistics***

The table presents the sum, mean, median, and distribution of key sample variables across years (Panel A) and age deciles (Panel B) at the time of funding. NDB is the net death benefit. NDBI is the NDB payable to investors after subtracting the retained death benefits (RDB). RDB is present in 509 out of the 9,002 policies. CP is the total cost of purchase minus new loans/withdrawals at funding. Offer is the total cash paid to the policyowner at funding plus premiums paid to the carrier at or immediately prior to funding. CSV is the cash surrender value. dRDB is the retained death benefit discounted using the treasury yield curve, respectively, taking into account the survival probabilities of the insured. We discount the RDB taking into account both survival probabilities of the insured and the treasury yield curve prevailing at the time of funding (explained in more detail in the Section 5). Treasury yields are the monthly nominal constant maturity rate series from the Federal Reserve obtained from http://www.federalreserve.gov/releases/h15/data.htm. During the sample period, treasury yields have maturities that range from one month to 30 years. When policy cash flows occur at dates different from the maturities available on the website, we interpolate the yields using the Matlab spline function. We use the longest dated treasury yield for discounting all policy cash flows beyond that date. Dollar values are in thousands unless stated otherwise. Results are presented for the period January 2001 to December 2011.

Panel A: Across year

	Sum	Mean	Median	Year										
				2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	(billion $)													
NDB	24.14	2,681	1,000	1,608	1,657	2,013	2,150	2,213	2,243	2,732	3,268	3,545	3,421	2,572
NDBI	23.77	2,640	1,000	1,608	1,657	2,000	2,146	2,180	2,238	2,721	3,235	3,471	3,218	2,419
CP	3.43	381	160	352	370	408	431	389	330	495	465	317	226	236
Offer	2.83	315	112	234	264	312	356	360	384	408	354	211	106	146
CSV	0.77	85	1	34	64	152	132	117	148	66	44	41	32	25
RDB	0.37	41	0	0	0	14	4	33	5	11	33	75	203	152
dRDB	0.28	31	0	0	0	12	3	21	3	8	23	58	160	121
CP/NDB (%)	14.22	16.32	13.37	25.06	23.56	22.13	22.62	19.27	15.80	17.96	15.86	9.60	8.32	10.12
(Offer+dRDB)/NDB (%)	12.89	14.76	10.61	17.77	17.04	17.37	18.82	19.70	17.29	15.72	12.72	8.21	8.23	11.66
(Offer+dRDB-CSV)/NDB (%)	9.72	9.95	7.14	13.01	11.53	10.00	11.48	12.00	10.44	11.05	10.31	6.10	6.72	9.91
Offer/NDB (%)	11.74	13.64	9.82	17.77	17.04	16.89	18.40	18.82	17.21	15.28	12.00	6.25	3.74	5.78
CSV/NDB (%)	3.17	4.81	0.10	4.76	5.51	7.37	7.34	7.70	6.85	4.67	2.41	2.11	1.51	1.74
dRDB/NDB (%)	1.15	1.12	0.00	0.00	0.00	0.47	0.42	0.88	0.07	0.44	0.72	1.96	4.50	5.88
Observations	9,002			77	421	469	787	1,266	1,389	933	1,463	1,382	514	301

Table 1: ***Summary Statistics (cont.)***

Panel B: Across age deciles

	Age									
	Dec1	Dec2	Dec3	Dec4	Dec5	Dec6	Dec7	Dec8	Dec9	Dec10
	(0-67.5]	(67.5-70.3]	(70.3-72.5]	(72.5-74.1]	(74.1-75.8]	(75.8-77.9]	(77.9-79.1]	(79.1-81.0]	(81.0-83.6]	(83.6-95.5)
	(billion $)									
NDB	1,840	1,772	2,243	3,228	3,166	3,165	2,859	3,230	2,980	2,331
NDBI	1,823	1,762	2,225	3,193	3,131	3,134	2,824	3,181	2,921	2,209
CP	194	202	241	344	389	452	434	516	557	486
Offer	147	173	186	257	306	369	352	432	490	439
CSV	35	62	58	74	81	91	84	108	116	143
RDB	17	10	19	34	35	31	35	49	59	122
dRDB	10	6	12	24	23	21	26	38	48	103
CP/NDB (%)	13.15	12.31	13.06	12.75	13.95	15.89	17.90	18.68	21.08	24.54
(Offer+dRDB)/NDB (%)	10.24	9.60	10.64	10.48	12.00	14.36	16.08	18.12	20.49	25.69
(Offer+dRDB-CSV)/NDB (%)	8.12	6.89	7.20	7.61	7.75	9.10	10.55	11.24	14.24	16.84
Offer/NDB (%)	9.46	8.95	10.07	9.57	11.35	13.67	15.30	16.74	18.69	22.73
CSV/NDB (%)	2.11	2.70	3.43	2.87	4.25	5.26	5.54	6.88	6.26	8.84
dRDB/NDB (%)	0.78	0.65	0.57	0.91	0.65	0.69	0.79	1.39	1.81	2.96
Observations	906	898	899	909	889	901	920	892	896	892

Table 2: ***Internal Rates of Return***

This table presents internal rates of return (IRR), both raw and in excess of treasury yields, on a yearly basis. IRR are calculated relative to cost of purchase, and shown on a cost of purchase (CP) weighted and equal weighted basis. IRR in excess of treasury yields take into account the adequate treasury yields for the maturity of cash flows (premium and death benefit payment dates). Treasury yields are interpolated with Matlab spline function for cash flows with maturities different from the ones available. For maturities equal or above the maximum available maturity, we assume a rate equal to the rate of the maximum available maturity. Treasury yields are monthly nominal constant maturity yields series from the U.S. Federal Reserve and can be found here http://www.federalreserve.gov/releases/h15/data.htm To remove outliers, we winsorize observations by 0.5% on each side of the distribution of internal rates of return. Results are presented for the period January 2001 to December 2011.

	All	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Panel A: Internal rate of return (%)												
CP weighted	12.5	18.9	16.3	14.7	12.6	11.0	11.0	11.0	11.3	13.0	18.8	18.3
Equal weighted	12.9	19.8	17.0	15.6	13.4	11.9	11.2	11.5	11.5	12.9	17.2	17.2
Panel B: Internal rate of return in excess of treasury yields (%)												
CP weighted	8.4	14.6	12.3	11.1	8.6	6.7	6.1	6.4	7.6	9.6	15.6	15.9
Equal weighted	8.9	15.4	12.8	11.9	9.3	7.5	6.3	6.9	7.6	9.5	13.9	14.5
Observations	7,811	42	317	359	601	834	1,301	848	1,360	1,349	508	292

Table 3: ***Internal Rates of Return for Different LEs***

This table presents internal rates of return (IRR), both raw and in excess of treasury yields, on a yearly basis, for LE, LE plus 12, 24 and 36 months. IRR are calculated relative to cost of purchase, and shown on a cost of purchase (CP) weighted and equal weighted basis. IRR in excess of treasury yields take into account the adequate treasury yields for the maturity of cash flows (premium and death benefit payment dates). Treasury yields are interpolated with Matlab spline function for cash flows with maturities different from the ones available. For maturities equal or above the maximum available maturity, we assume a rate equal to the rate of the maximum available maturity. Treasury yields are monthly nominal constant maturity yields series from the Federal Reserve and can be found here http://www.federalreserve.gov/releases/h15/data.htm To remove outliers, we winsorize observations by 0.5% on each side of the distribution of internal rates of return. Results are presented for the period January 2001 to December 2011.

	All	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Panel A: Internal rate of return (%)												
CP weighted	12.5	18.9	16.3	14.7	12.6	11.0	11.0	11.0	11.3	13.0	18.8	18.3
CP weighted (LE+12m)	9.0	14.3	11.8	11.0	8.9	7.7	7.0	8.4	8.4	9.6	13.8	13.9
CP weighted (LE+24m)	6.1	10.7	7.5	7.8	5.8	4.5	4.7	6.0	5.8	6.6	9.5	10.2
CP weighted (LE+36m)	3.2	7.7	3.4	4.5	3.0	1.3	1.6	3.9	3.3	3.7	5.8	7.2
Equal weighted	12.9	19.8	17.0	15.6	13.4	11.9	11.2	11.5	11.5	12.9	17.2	17.2
Equal weighted (LE+12m)	9.2	14.9	12.0	11.2	9.2	8.1	7.5	8.6	8.4	9.3	12.4	12.6
Equal weighted (LE+24m)	5.9	11.1	7.6	7.5	5.6	4.7	4.3	5.9	5.8	6.1	8.2	8.7
Equal weighted (LE+36m)	2.6	7.9	3.3	3.5	2.3	1.0	0.7	3.3	3.1	2.9	4.2	5.3
Panel B: Internal rate of return in excess of treasury yields (%)												
CP weighted	8.4	14.6	12.3	11.1	8.6	6.7	6.1	6.4	7.6	9.6	15.6	15.9
CP weighted (LE+12)	4.8	9.8	7.6	7.1	4.7	3.0	2.1	3.7	4.5	5.9	10.3	11.2
CP weighted (LE+24)	1.8	6.0	3.7	3.7	1.4	-0.3	-0.3	1.3	1.8	2.8	5.8	7.3
CP weighted (LE+36)	-1.1	2.8	0.1	0.4	-1.7	-3.0	-3.4	-0.8	-0.8	-0.3	2.0	4.0
EQ weighted	8.9	15.4	12.8	11.9	9.3	7.5	6.3	6.9	7.6	9.5	13.9	14.5
EQ weighted (LE+12)	5.0	10.3	7.7	7.4	4.9	3.7	2.6	3.8	4.5	5.6	8.8	9.7
EQ weighted (LE+24)	1.6	6.3	3.2	3.4	1.1	0.1	-0.6	1.1	1.7	2.3	4.4	5.6
EQ weighted (LE+36)	-1.7	3.0	-1.1	-0.7	-2.5	-3.3	-4.2	-1.5	-1.0	-1.1	0.5	2.0
Observations	7,811	42	317	359	601	834	1,301	848	1,360	1,349	508	292

Table 4: ***Regression: The Effect of Life Settlement Contract Characteristics***
Regressions include controls for LE, age of the insured, and indicator variables for gender of the insured and year of purchase. T-stats are in parenthesis. $MediumNDB/HighNDB$ are dummy variables for NDB size. $MediumNDB$ is an indicator variable for policies with NDB between $1 million and $10 million while $HighNDB$ is for policies with NDB above $10 million. SLS is an indicator variables for simplified life settlements. $LEest2$ / $LEest3-4$ are indicator variables for policies with two LE estimates and policies with three or four LE estimates, respectively, both scaled by 100. RDB/NDB is the ratio of retained death benefits to net death benefit. $Convexity$ is the convexity of premiums divided by 100. We report coefficients relative to the base year of 2001. ***, **, and * denote the significance of the explanatory variable at 1%, 5% and 10% confidence levels, respectively. Results are presented for the period January 2001 to December 2011.

Dependent variable	Expected IRR				
Specification	(1)	(2)	(3)	(4)	(5)
RDB/NDB	0.14***	0.12***	0.12***	0.12***	0.12***
	(17.93)	(15.69)	(15.78)	(14.99)	(14.86)
$Convexity$		0.02***	0.02***	0.02***	0.02***
		(13.62)	(13.64)	(14.07)	(14.03)
$MediumNDB$			0.01***	0.00***	0.00***
			(7.41)	(3.62)	(3.74)
$HighNDB$			0.03***	0.03***	0.03***
			(9.23)	(8.16)	(8.27)
SLS				-0.04***	-0.04***
				(-14.12)	(-14.47)
$LEest2$					-0.55***
					(-3.09)
$LEest3-4$					-0.44**
					(-2.43)
LE	YES	YES	YES	YES	YES
Age	YES	YES	YES	YES	YES
$Year$	YES	YES	YES	YES	YES
$Gender$	YES	YES	YES	YES	YES
Observations	7,732	7,732	7,732	7,732	7,732
Adjusted R^2	0.25	0.27	0.28	0.30	0.30

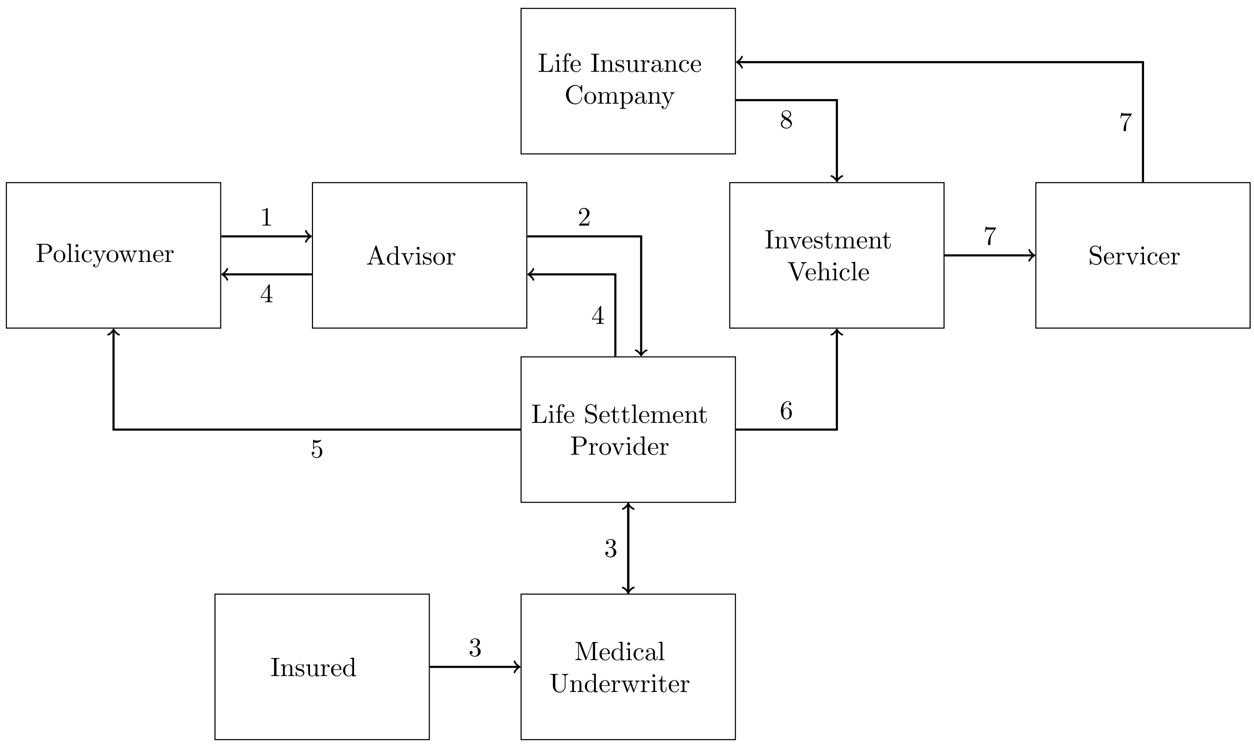
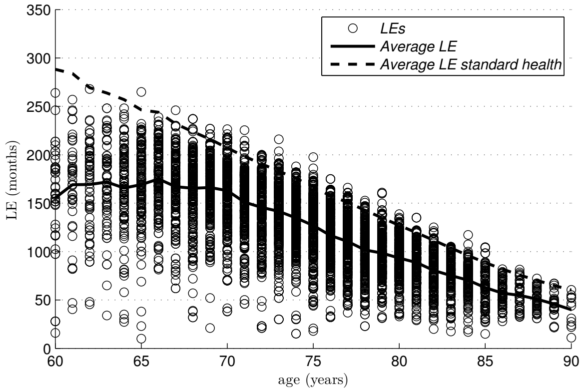
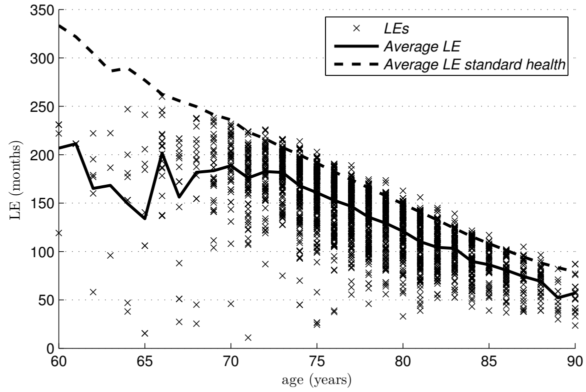


Figure 1: ***Life Settlement Transaction***

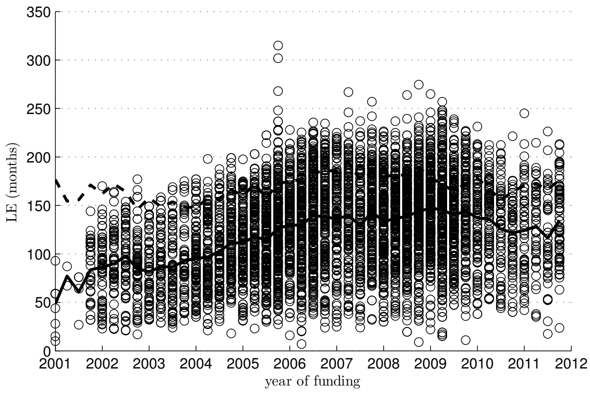
The figure describes the steps involved and illustrates the interactions among the main players in a typical life settlement transaction. In (1) the policyowner approaches an advisor. In (2) the advisor submits the policy to a life settlement provider. In (3) the life settlement provider submits the insured's medical records to a medical underwriter who provides a life expectancy report for each insured. In (4) the life settlement provider values the policy and makes an offer to purchase. In (5) the life settlement provider purchases the policy. In (6) the life settlement provider sells the policy to an investment vehicle. In (7) the servicer facilitates premium payments from the investment vehicle to the life insurance company, optimizes policy performance, monitors the insurance company to assure that the policies are administered consistently with the contract language, and monitors and processes death claims. In (8) the investment vehicle receives the net death benefit from the life insurance company. A life settlement transaction may also include other parties such as insurance agents, life settlement brokers, escrow agents, trustees, collateral managers and tracking agents.



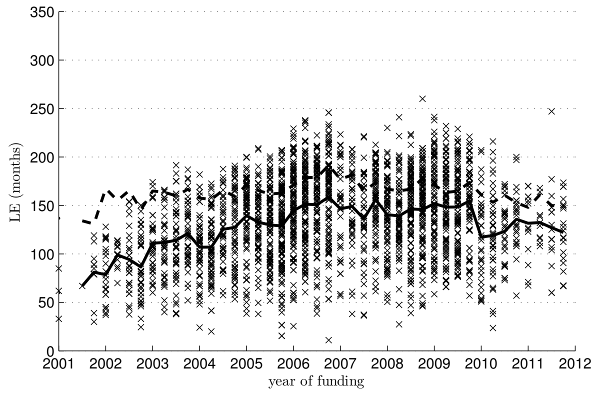
(a) Males by age



(b) Females by age



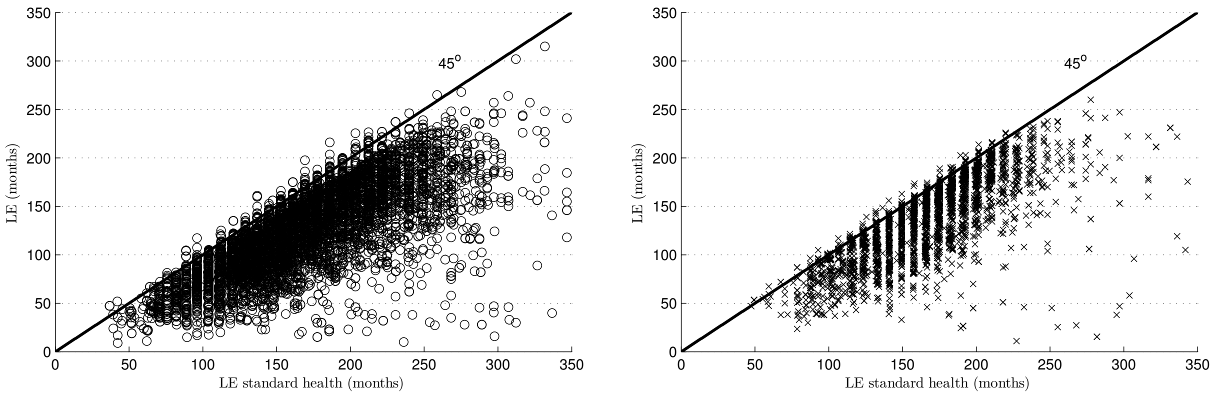
(c) Males by year of funding



(d) Females by year of funding

Figure 2: ***Life Expectancy Estimates, by Gender, Age and Year of Funding***

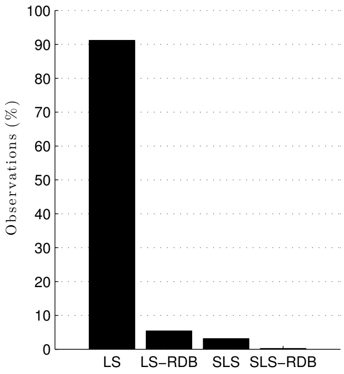
This figure presents life expectancy (LE) estimates for each insured male and female (circle and cross scatter points, respectively), by age and year of funding (top and bottom panels, respectively). In addition, the figure plots average LEs (lines) and the average LE assuming that the insureds are of standard health (dashed lines). LE is the average life expectancy estimate across the available medical underwriter estimates. LE under standard health is implied from the mortality tables of the U.S Society of Actuaries, given age, gender, smoking status, year of funding (using 2001 and 2008 mortality tables) and a mortality multiplier of 1 (standard health). Each observation is on a per policy basis and we split joint policies into two individual observations. The results are presented for the period January 2001 to December 2011.



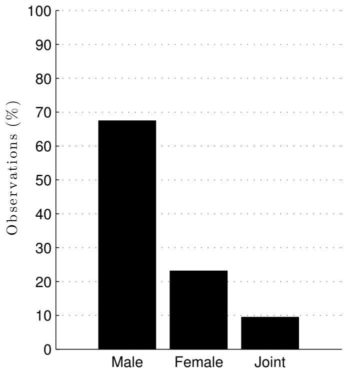
(a) Males

(b) Females

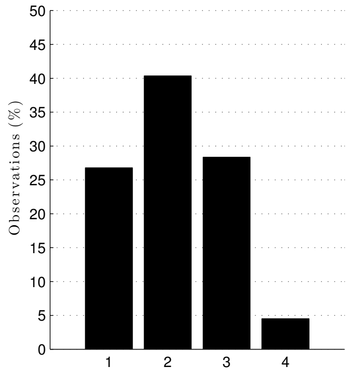
Figure 3: ***Life Expectancy Estimates versus Life Expectancy under Standard Health***
This figure presents life expectancy (LE) estimates versus LE under standard health for males and females (circle and cross scatter points, respectively). LE is the average life expectancy estimate across the available medical underwriter estimates. LE under standard health is implied from the mortality tables of the U.S Society of Actuaries, given age, gender, smoking status, year of funding (using 2001 and 2008 mortality tables) and a mortality multiplier of 1 (standard health). Each observation is on a per policy basis and we split joint policies into two individual observations. The results are presented for the period January 2001 to December 2011.



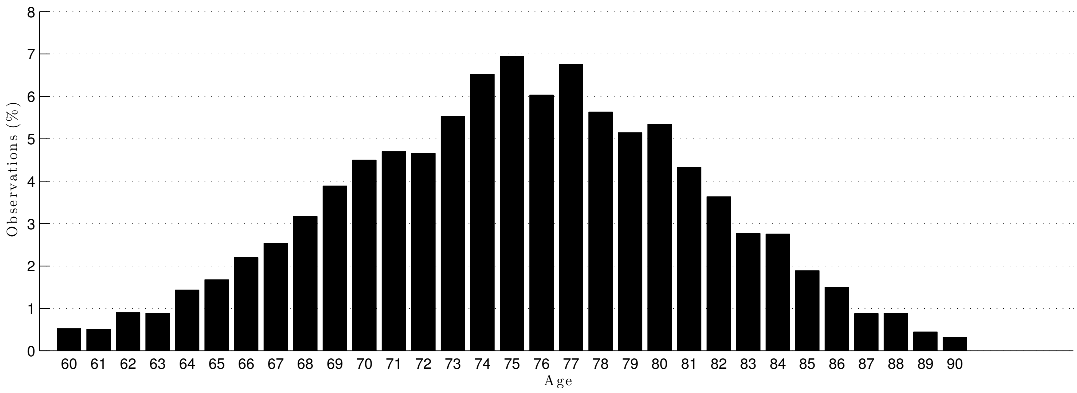
(a) Settlement type



(b) Gender



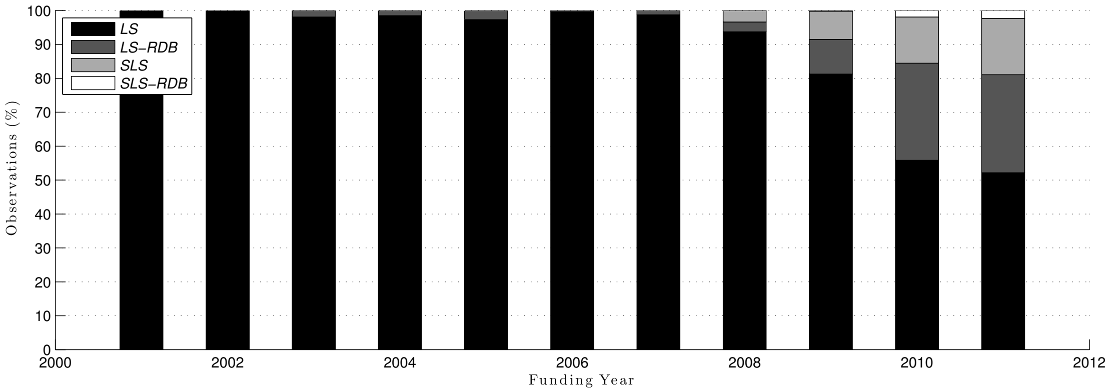
(c) No. of LE estimates



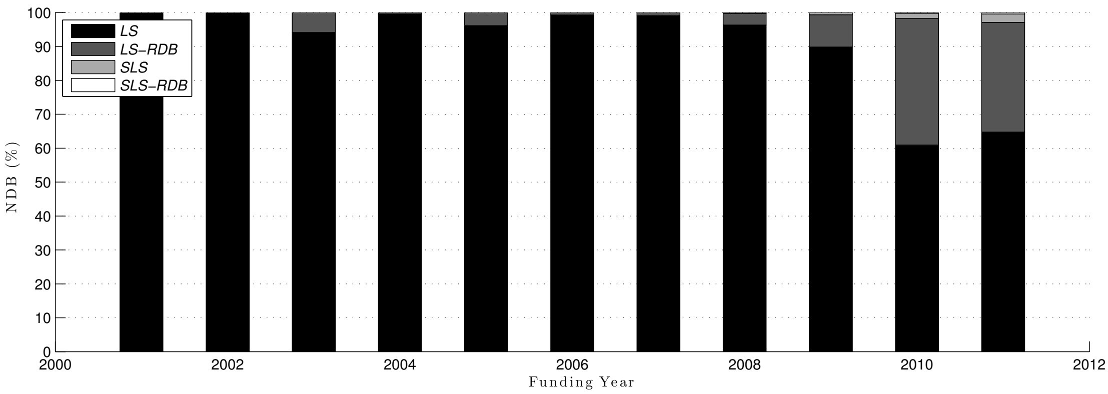
(d) Age at funding

Figure 4: ***Cross-Sectional Distribution of Policies***

This figure presents the distribution of policies across (a) settlement type (standard life settlement (LS), standard life settlement with retained death benefit (LS-RDB), simplified life settlement (SLS) or simplified life settlement with retained death benefit (SLS-RDB)), (b) gender, (c) number of life expectancy estimates and (d) age at funding. For the purpose of this illustration, each observation is on a per policy basis. The results are presented for the period January 2001 to December 2011.



(a) Observations



(b) NDB

Figure 5: ***Settlement Types Across Year of Funding***

This figure shows the relative (a) number of policies and (b) net death benefit for different life settlement types, across year of funding, where the settlement type may be a standard life settlement (LS), standard life settlement with retained death benefit (LS-RDB), simplified life settlement (SLS) or simplified life settlement with retained death benefit (SLS-RDB).

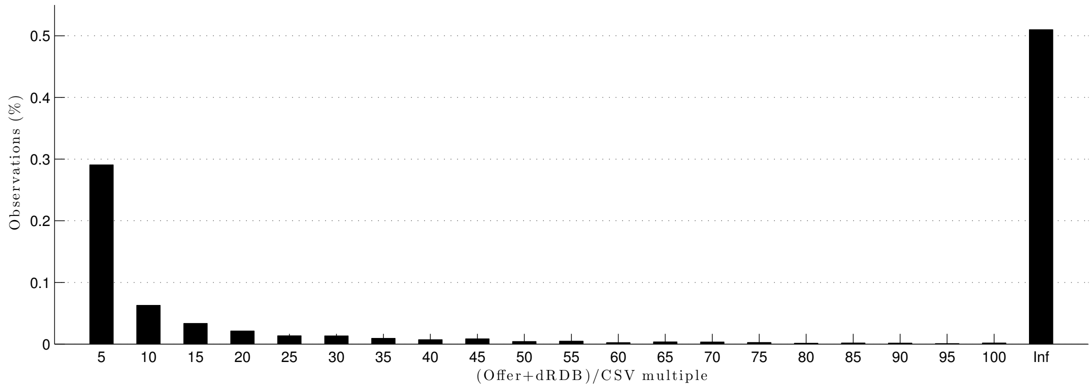
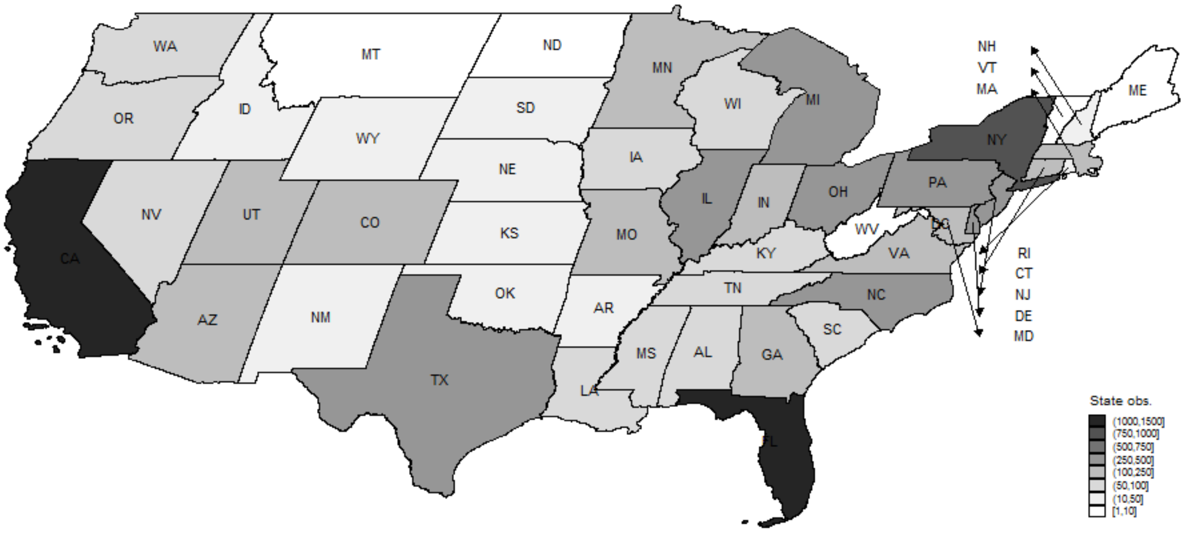
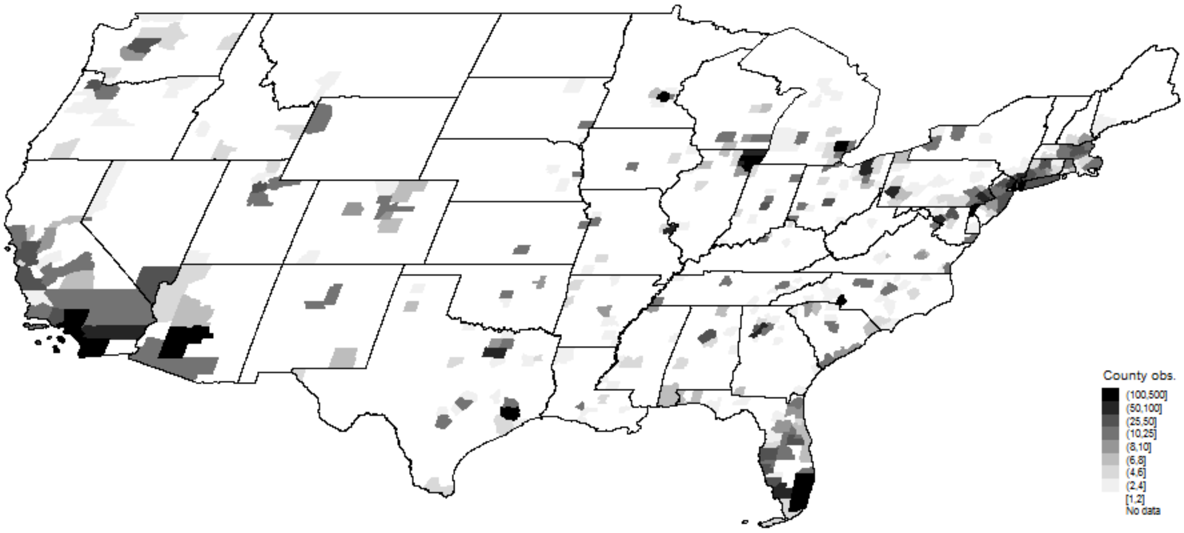


Figure 6: ***(Offer+dRDB)/CSV multiple***

This figure shows the distribution of the ratio of Offer plus dRDB to CSV. The x-axis labels are the upper bound of the range of multiples included in each bar, while the lower range is the label of the previous bar. Offer is the total cash paid to the policyowner at funding plus premiums paid to the carrier at or immediately prior to funding. CSV is the cash surrender value. dRDB is the retained death benefit discounted at the treasury yield curve, taking into account the survival probabilities of the insured. Treasury yields are the monthly nominal constant maturity rate series from the U.S. Federal Reserve obtained from http://www.federalreserve.gov/releases/h15/data.htm. During the sample period, treasury yields have maturities that range from one month to 30 years. When policy cash flows occur at dates different from the maturities available on the website, we interpolate the yields using the Matlab spline function. We use the longest dated treasury yield for discounting retained death benefits beyond that date. Results are presented for the period January 2001 to December 2011.

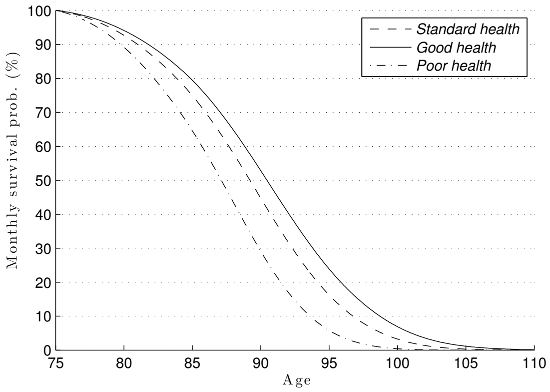


(a) States

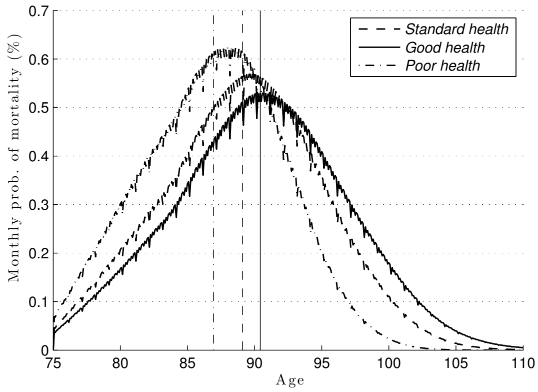


(b) Counties

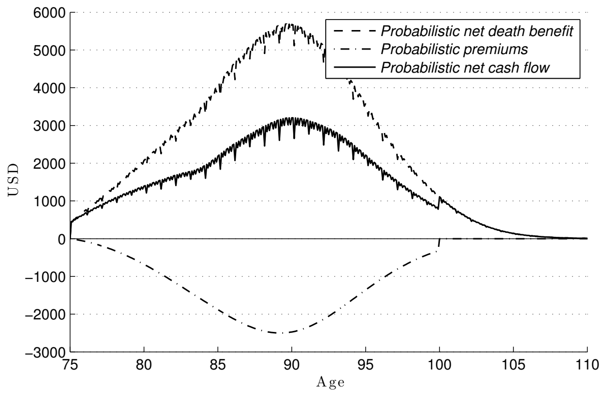
Figure 7: ***Distribution of Policyowners across States and Counties***
The figure shows the distribution of policyowners across (a) states and (b) counties in the United States. Individual policies are matched with ZIP code coordinates. States and counties are shaded according to number of policies per state and county, respectively (see legend). ZIP code coordinates are from the ZIP Code Tabulation Areas from the 2012 TIGER/Line® Files, while state and county shapefiles are from the 2012 TIGER/Line® Shapefiles, both at the United States Census Bureau, and can be found here: http://www.census.gov/geo/maps-data/data/tiger-line.html.



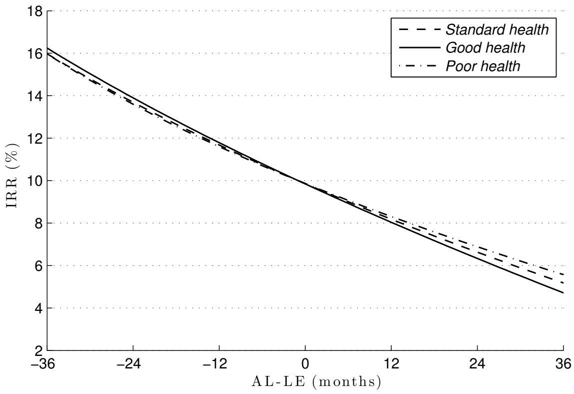
(a) Cumulative probability of survival



(b) Mortality probability



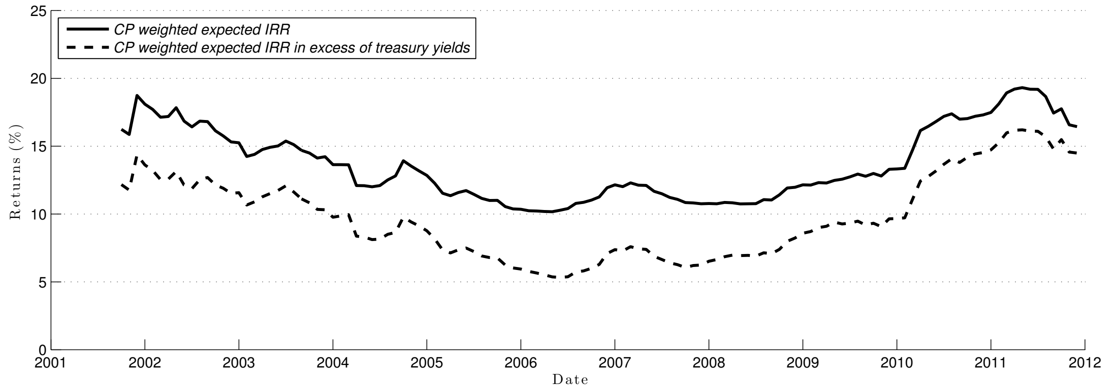
(c) Probabilistic monthly cash flows



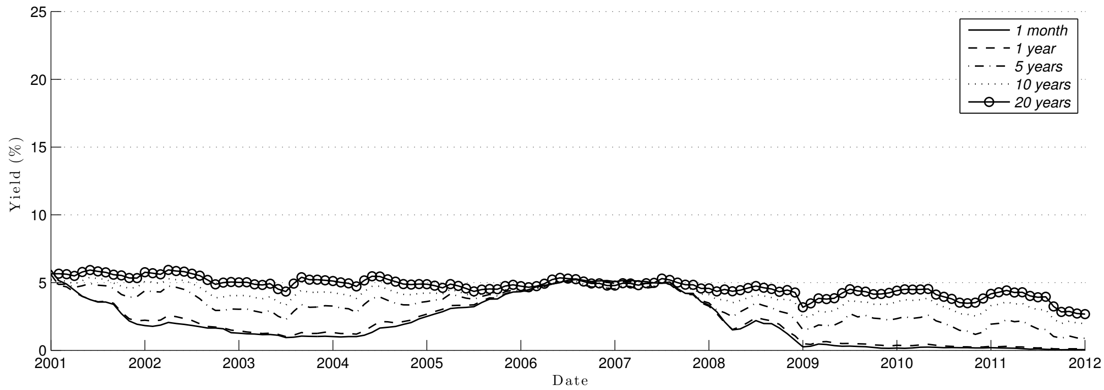
(d) IRR for different AL-LE realizations

Figure 8: ***Valuation Example***

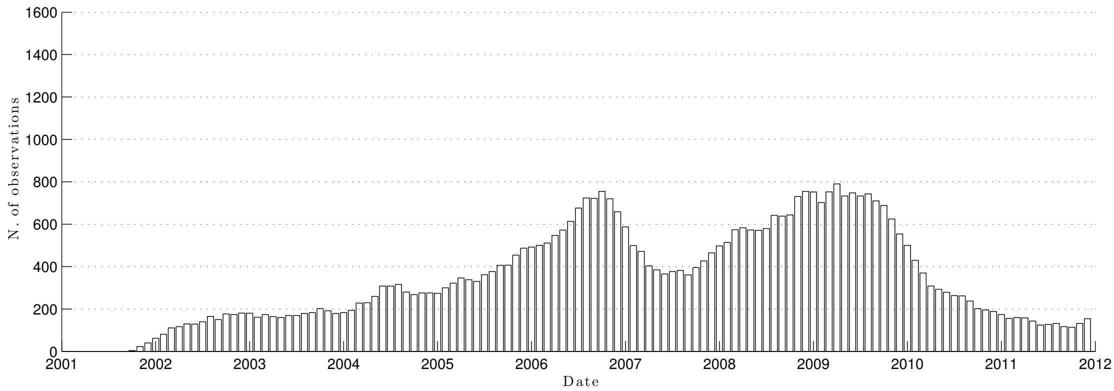
This figure presents (a) the cumulative probability of survival and (b) the mortality probability distribution for a 75 year old male non-smoker in standard, good and poor health. These health states are equivalent to a life expectancy (LE) of 14, 16 and 12 years, respectively or a mortality multiplier of 1, 0.8 and 1.5, respectively. The figure also plots (c) the probabilistic net death benefit, probabilistic premiums and probabilistic net cash flow of a policy with a net death benefit (NDB) of \$1 million, an increasing monthly premiums schedule of $NDB \times 50\% \times \textit{monthly death rate}$, up to age 100 and zero thereafter, and an insured in standard health. A policy with these characteristics would be approximately valued at \$168,040 using a discount rate of 10%. (d) plots the internal rates of return (IRR) for different realizations of actual life duration (AL) duration relative to LE estimate, given a cost of purchase equal to this value. This example uses the 2008 valuation basic table (VBT) for non-smoker males from the U.S. Society of Actuaries.



(a) Internal rates of return



(b) Treasury yields



(c) Volume

Figure 9: ***Expected Internal Rates of Return, Treasury Yields and Volume***

This figure plots the (a) cost of purchase (CP) weighted expected internal rates of return (IRR), both raw and in excess of treasury yields, averaged over the previous quarter, (b) treasury yields of selected maturities, and (c) number of policies funded over the previous quarter. Internal rates of return in excess of treasury yields take into account the adequate treasury yields for the date of cash flows (premium and death benefit payment dates). Treasury yields are interpolated with Matlab spline function for cash flows with maturities different from the ones available. For maturities equal or above the maximum available maturity, we assume a rate equal to the rate of the maximum available maturity. Treasury yields are monthly nominal constant maturity yields series from the Federal Reserve and can be found here http://www.federalreserve.gov/releases/h15/data.htm. To remove outliers, we winsorize observations by 0.5% on each side of the distribution of expected IRRs. The results are presented for the period January 2001 to December 2011.

Appendix A: Abbreviations

AIG - American International Group, Inc

CP - Net total cost of purchase

CSV - Cash surrender value

dRDB - Discounted present value of retained death benefits

EY - Ernst & Young LLP

IRR - Internal rate of return

LE - Life expectancy

STOLI - Stranger originated life insurance

LS - Standard life settlement

LS-RDB - Standard life settlement with retained death benefit

NDB - Net death benefit

NDBI - Net death benefit to investors

RDB - Retained death benefit

SLS - Simplified life settlement

SLS-RDB- Simplified life settlement with retained death benefit

SOA - U.S. Society of Actuaries

VBT - Valuation basic table

Appendix B: The life settlement market

Overview

This section provides an overview of the life settlement and life insurance markets. It considers policyowners, life insurance companies and investors who purchase these policies.[35]

The secondary market for life insurance has been historically small and predominantly present in the United States, Germany and the United Kingdom. The market developed in the 80's with the introduction of viatical settlements, which focus on insureds with life expectancies of less than two years. These were mostly HIV patients who sold their policies to pay for medical treatment. In contrast, the life settlement market is focused on larger policies, older lives and longer life expectancies.

According to the American Council of Life Insurers (2011) there was $18.4 trillion worth of life insurance in-force in 2010 in the United States. The value (number) of policies purchased increased from $2.51 trillion (33 million) in 2000 to $2.81 trillion (29 million) in 2010. With no definitive study on the size of the market, Conning Research & Consulting (2011) estimates the annual total NDB of policies settled in the U.S. increased from $2 billion in 2002 to $12.2 billion in 2007, and decreased to $3.8 billion in 2010.

Although the life settlement market is at an early stage of development, it has important implications for the primary life insurance market. The American Council of Life Insurers (2011) reports that lapse rates among individual policies, weighted by face value, have decreased from 7.1% to 5.4% from 2000 to 2010 while, over the same period, surrender rates among individual policies have decreased from 2.2% to 1.4%. Although we do not have direct evidence, we can conjecture that the presence of the life settlement market may have contributed to this fall, either through life settlement transactions taking policies to maturity or through the pre-emptive actions of life insurance companies.[36]

It is conceivable that the insurance companies may be responding to a reduction in lapsation over time as policyowners choose to settle by raising premiums, which would adversely affect not only all existing policyowners, but also the decision of prospective buyers of policies in the primary market for insurance. Although we are not able to say if this is the case or not, we would like to note that most U.S. states have adopted a form of the Life Insurance Illustration Regulation which requires that a qualified "Illustration Actuary" certifies each year that their products are not lapse supported under a defensible set of assumptions regarding future lapses and expenses. However, when an Illustration Actuary tests for lapse support, they are testing the impact of lapsation of insureds in standard health. In the case of life settlements, the market is selecting insureds in poor health and reducing their lapse rates.

Other life settlement related publications

There exist a few publications highlighting the different implications of life settlements. On the positive side, Doherty and Singer (2003) describe, inter alia, the benefits that accrue to policyowners from an

[35]For a comprehensive introduction to the life settlement market with some details on the deals executed in recent years, see Aspinwall et al. (2009), Bhuyan (2009) and Cohen (2013). For differences in key characteristics of the secondary markets in the United Kingdom, Germany vis-a-vis United States, see Gatzert (2010). For a description of life settlement securitization process, see Rosenfeld (2009), Aspinwall et al. (2009) and Cowley and Cummins (2005).

[36]For example, through the increase in accelerated death benefits (i.e., living benefits with reduced death benefits), guarantees on cash value performance and living benefits.

active secondary market in life insurance policies. The authors argue that, without a secondary market, the insurance companies enjoy a monopsony power over policyowners wishing to surrender their life insurance policies. Although competition in the primary life insurance market results in reasonably competitive surrender values for insureds with standard health, these do not adequately compensate owners of policies with impaired lives. The flexibility offered by the secondary market enables the policyowner to respond to changes in life situation more effectively, thereby increasing the value of the policy even further.

On the negative side, Deloitte Consulting LLP and The University of Connecticut (2005) highlight that although the policyowners obtain a "life settlement value" that is in excess of the CSV, it is less than the "intrinsic economic value" of their policies. Their definition of intrinsic economic value is based on the assumption that the policyowner retains the policy and pays the related premiums until maturity. The future cash flows are then discounted at a risk free rate, assumed to be 5%. We believe that a risk free rate is not the appropriate discount rate and therefore their estimate of intrinsic economic value is not reflective of a true market value. This is because their discount rate does not include any risk premium for the uncertain timing of maturity, the relative illiquidity of the asset class and the opportunity cost of not being able to access the asset's value during the insured's lifetime. Moreover, like in any other market, intermediaries in the life settlement market also need to be compensated for their efforts. As there are no major barriers to entry in the life settlement market, over time one expects competitive forces to drive down the transaction costs.

Two insurance industry reports, Fitch Ratings (2007) and Moody's (2006), raise a number of criticisms of the life settlement industry. Many of the concerns raised in these reports are related to the increasing efficiency of the life settlement market to fully optimize the value of guarantees and options embedded in life insurance. The Moody's report states that "many policies and product designs are not fully self-supporting", meaning that such products rely on a minimal amount of policy lapses prior to payment of any death benefit. The Fitch report cautions that "direct financial risk to insurers comes primarily from actual lapse and mortality experience diverging from pricing assumptions." The Fitch report focuses much of its attention on a lack of an insurable interest between the policyowner and the insured, noting that most U.S. states have laws requiring such insurable interest. The report fails to point out that such insurable interest is generally only required at the inception of the insurance policy and that the property rights of policyowners to sell their policies has long been established in U.S. law.[37] The Fitch report also questions whether it is in an insured's best interest to allow "strangers" to have a financial interest in their early demise. As noted in the Moody's report, such "strangers" are primarily institutional in nature, who are rational investors and arguably view life settlements as an asset class with its own risk-return characteristics.

Regulation

In the U.S., as with the insurance industry generally, the re-sale of life insurance policies is regulated and supervised at the individual state level. According to the Life Insurance Settlement Association,

[37] The legal basis for the life settlement market dates back to the 1911 ruling by the Supreme Court in Grigsby v. Russell (Vol. 222 U.S. 149, 1911), which upheld that "insurable interest" only needs to be established at the time a policy becomes effective. However, the life settlement market only grew after the Health Insurance Portability and Accountability Act was signed into law in 1996. This Act confirmed the right of the owner of the life policy to transfer ownership interest to a third party having no insurable interest in the life of the originally insured.

42 states and Puerto Rico currently have some form of regulation in place regarding these operations.[38] This regulation focuses on protecting policyowners by imposing licensing, disclosure and other requirements on life settlement brokers and providers. Investments in life settlements are regulated by the U.S. Securities Exchange Commission, where its jurisdiction allows, and life insurance state regulators.[39]

Regulators and market participants have also expressed recent interest in the life settlement market. The United States Government Accountability Office (2010) report measures the size of the market during 2006-2009 and documents that policyowners received $5.62 billion more than the amount they would have received had they surrendered their policies to their insurance companies during this period. This report also highlights regulatory differences across U.S. states and it recommends to the U.S. Senate the harmonization of regulation for the market to offer policyowners a consistent and minimum level of protection across states. The Life Settlements Task Force (2010) examines emerging issues in the life settlement market and makes recommendations to the Securities and Exchange Commission for the market to offer greater protection to investors in life settlement policies.

It is interesting to note that in the U.K., regulation exists that requires insurers to inform policyowners who are considering surrendering their policy of potential settlement alternatives which may offer them a value greater than the CSV of the policy.[40] While such regulation does not currently exist in the U.S., Gallo (2001) contends that policyowner advisors may be liable if they fail to disclose to their clients the availability of life settlement alternatives when reviewing the retention, sale or transfer of life insurance policies. Thus, it appears that both regulators and fiduciaries have clearly recognized the potential for the life settlement market to improve the welfare of policyowners.

[38] For more information see Life Insurance Settlement Association's website: http://www.lisa.org/.

[39] See Life Settlements Task Force (2010), a report to the Securities Exchange Commission on the regulation of life settlement investments. The Securities Exchange Commission's jurisdiction is limited to variable products and/or non-institutional investors.

[40] See Financial Services Authority (2002).

Appendix C: Summary statistics for IRR subsample

Table .1: ***Summary Statistics for IRR Subsample***

This table reports the equivalent of Table 1 (see Table 1 for legend) for the subsample of polices for which we received projected cash flow information, after removing outliers by winsorizing 0.5% of each side of the distribution of expected internal rate of return (IRR). This table reports three additional values: dNDBI is the net death benefit payable to investors (NDBI) discounted at the expected IRR of each policy, accounting for survival probabilities. Premium is the sum of premiums payable to the carrier. dPremium is the Premium variable discounted at the expected IRR of each policy, accounting for survival probabilities. Since the purchase of a life settlement comes with an obligation to pay the premiums until the maturity of the policy, the total expected outlay on the part of the investor equals CP plus dPremium.

Panel A: Across Year

	Sum	Mean	Median	Year										
				2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	(billion $)													
NDB	20.88	2,673	1,000	2,077	1,780	1,887	1,962	2,315	2,231	2,434	3,142	3,481	3,422	2,619
NDBI	20.55	2,631	1,000	2,077	1,780	1,885	1,958	2,272	2,226	2,424	3,110	3,416	3,224	2,463
dNDBI	6.57	841	361	648	598	605	677	783	694	837	1,054	1,045	832	666
CP	2.80	359	152	414	370	382	390	394	325	417	440	303	227	241
Offer	2.21	283	100	275	261	276	279	300	369	346	335	202	107	150
CSV	0.51	65	0	26	58	95	69	46	136	69	45	40	32	25
RDB	0.33	42	0	0	0	2	5	43	5	10	32	65	198	155
dRDB	0.25	32	0	0	0	2	3	27	3	8	22	50	156	123
Premium	8.94	1,144	454	564	523	556	691	893	964	984	1,406	1,720	1,467	1,103
dPremium	3.76	482	184	234	228	223	288	389	369	420	614	742	605	425
CP/NDB (%)	13.43	15.54	12.63	22.10	21.40	21.26	22.40	19.05	15.72	17.50	15.65	9.51	8.37	10.22
(Offer+dRDB)/NDB (%)	11.77	13.44	9.66	15.02	15.14	15.74	17.25	16.06	16.70	15.48	12.54	7.96	7.96	11.79
(Offer+dRDB-CSV)/NDB (%)	9.33	9.59	6.90	13.07	10.11	9.51	11.77	12.58	10.42	10.41	10.00	5.88	6.53	9.99
Offer/NDB (%)	10.59	12.28	8.67	15.02	15.14	15.53	16.70	14.91	16.66	15.03	11.83	6.18	3.74	5.86
CSV/NDB (%)	2.44	3.85	0.00	1.96	5.03	6.23	5.49	3.48	6.28	5.07	2.54	2.07	1.43	1.79
dRDB/NDB (%)	1.18	1.16	0.00	0.00	0.00	0.21	0.55	1.14	0.04	0.45	0.72	1.78	4.22	5.92
Observations	7,811			42	317	359	601	834	1,301	848	1,360	1,349	508	292

Table .1: ***Summary Statistics for IRR Subsample (cont.)***

Panel B: Across Age Deciles

	Age									
	Dec1	Dec2	Dec3	Dec4	Dec5	Dec6	Dec7	Dec8	Dec9	Dec10
	(0-67.5]	(67.5-70.3]	(70.3-72.5]	(72.5-74.1]	(74.1-75.8]	(75.8-77.9]	(77.9-79.1]	(79.1-81.0]	(81.0-83.6]	(83.6-95.5)
	(billion $)									
NDB	1,893	1,713	2,233	3,259	3,179	3,157	2,920	3,158	2,947	2,417
NDBI	1,876	1,703	2,219	3,225	3,145	3,122	2,879	3,102	2,878	2,287
dNDBI	404	415	619	848	918	998	981	1,127	1,188	1,038
CP	194	184	240	337	371	427	421	485	521	467
Offer	144	154	178	250	275	333	321	386	439	402
CSV	33	53	47	58	55	75	60	80	89	113
RDB	17	10	14	34	35	35	41	57	69	129
dRDB	10	6	9	22	21	24	30	43	55	110
Premium	675	690	1,010	1,417	1,381	1,364	1,271	1,358	1,314	1,040
dPremium	209	231	379	511	548	571	559	641	667	570
CP/NDB (%)	12.59	11.90	12.90	11.94	13.25	15.40	17.30	18.22	20.25	23.48
(Offer+dRDB)/NDB (%)	9.54	8.97	9.86	9.63	10.71	13.24	14.93	16.83	19.35	23.70
(Offer+dRDB-CSV)/NDB (%)	7.64	6.71	7.27	7.26	7.53	8.90	10.41	11.00	14.03	16.67
Offer/NDB (%)	8.83	8.33	9.35	8.66	10.04	12.49	14.03	15.30	17.24	20.56
CSV/NDB (%)	1.90	2.26	2.59	2.37	3.18	4.34	4.52	5.83	5.33	7.02
dRDB/NDB (%)	0.71	0.64	0.51	0.97	0.67	0.75	0.90	1.52	2.11	3.14
Observations	843	832	820	804	778	776	758	763	731	706