Institute of Insurance Economics

University of St.Gallen

PERFORMANCE AND RISKS OF OPEN-END LIFE SETTLEMENT FUNDS

ALEXANDER BRAUN

NADINE GATZERT
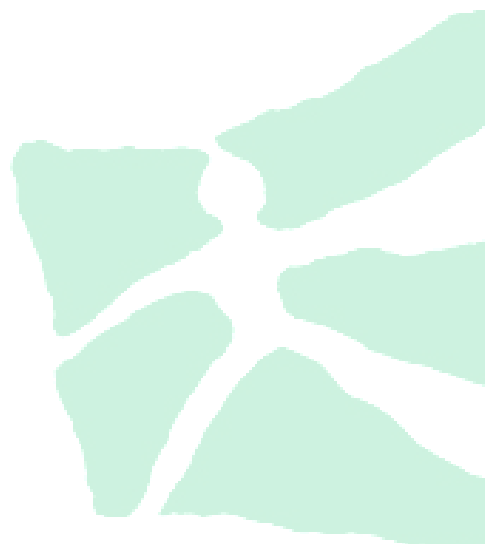
HATO SCHMEISER

Performance and Risks of
Open-End Life Settlement Funds

Alexander Braun   Nadine Gatzert   Hato Schmeiser*

Abstract

In this paper, we comprehensively analyze open-end funds dedicated to investing in U.S. senior life settlements. We begin by explaining their business model and the roles of institutions involved in the transactions of such funds. Next, we conduct the first empirical analysis of life settlement fund return distributions as well as a performance measurement, including a comparison to other asset classes. Since the funds contained in our dataset cover a large fraction of this relatively young segment of the capital markets, representative conclusions can be derived. Even though the empirical results suggest that life settlement funds offer attractive returns paired with low volatility and are virtually uncorrelated with other asset classes, we find latent risk factors such as liquidity, longevity and valuation risks. Since these risks did generally not materialize in the past and are hence largely not reflected by the historical data, they cannot be captured by classical performance measures. Thus, caution is advised in order not to overestimate the performance of this asset class.

Key words: Life settlements, Open-end funds, Performance measurement, Risk analysis
JEL Classification: G10; G22

1 Introduction

In the secondary market for life insurance, policyholders sell their contracts to life settlement providers, which usually pass them on to investors or, in some cases, hold them on their own balance sheet. Such transactions are termed "life settlements". The payment to the selling policyholder is above the surrender value of the life insurance policy offered by the primary insurer. The investor continues to pay premiums until the contract is either resold or until it matures due to death or reaching a fixed term and, in turn, receives the associated payoff. The life settlement asset class, which emerged towards the end of the last century, is not entirely new. Larger volumes of life insurance policies, primarily those of terminally ill AIDS patients, had already been traded in the so-called viatical settlements market of the 1980s. Most recently, however, the asset class has begun to attract increasing attention from the capital markets, since its return characteristics of low volatility and virtually no correlation with other asset classes are appealing to a wide range of investors. In addition, several Wall Street banks explore ways to enter this business.

---

*Alexander Braun (alexander.braun@unisg.ch) and Hato Schmeiser (hato.schmeiser@unisg.ch) are at the Institute of Insurance Economics, University of St. Gallen, Switzerland. Nadine Gatzert (nadine.gatzert@wiso.uni-erlangen.de) holds the Chair for Insurance Economics at the University of Erlangen-Nürnberg, Germany.

Since life settlements are a rather young asset class, literature on the topic is still scarce and mainly practitioner-oriented. One of the early analyses of the life settlement industry was provided by Giacalone (2001), followed by Doherty and Singer (2002), who discuss benefits and welfare gains arising from the secondary market for life insurance policies. Furthermore, Kamath and Sledge (2005) review the characteristics of the market for U.S. life settlements and the main drivers of its growth. While Ingraham and Salani (2004), Freeman (2007) and Leimberg et al. (2008) describe the decision making and due diligence process, McNealy and Frith (2006) focus on the sourcing process for life settlements and point out major product-flow constraints. In addition, Ziser (2006) and Smith and Washington (2006) focus on transactional aspects, such as the diversification of life settlement portfolios in order to reduce risks. Seitel (2006) and Seitel (2007) examine the industry from an institutional investor's and a life settlement provider's viewpoint, respectively. Other studies of market development, size, participants, regulatory environment, and future prospects include Moodys (2006), Conning & Company (2007), and Ziser (2007). In addition, a special report by Fitch Ratings (2007) identifies selected risks associated with the market. Casey and Sherman (2007) discuss whether life settlements should be regarded as a security, Gatzert et al. (2009) analyze the effects of a secondary market on the surrender profits of life insurance providers and Katt (2008) discusses direct sales without intermediaries. Finally, Gatzert (2010) provides a comprehensive overview and discussion of benefits and risks of the secondary markets for life insurance in the U.K., Germany, and the U.S.

Apart from these publications, which focus on the market conditions and their implications, the literature has presented other topics related to life settlements. Regulation and tax aspects are reviewed by Doherty and Singer (2003), Kohli (2006), and by Gardner et al. (2009). A study by Deloitte (2005) features an actuarial analysis of the value generated for the seller in a life settlement transaction. Russ (2005) examines the quality of life expectancy estimates and Milliman Inc. (2008) offers insights on mortality experience for two U.S. providers. Further publications include Zollars et al. (2003) and Mason and Singer (2008) who address the valuation of life settlements. Perera and Reeves (2006) and Stone and Zissu (2007) explore the sensitivity of life settlement returns to life expectancy estimates and possibilities of risk mitigation, respectively. Finally, Stone and Zissu (2006) as well as Ortiz et al. (2008) consider the securitization of life settlements, a likely and natural future direction for the asset class when considering that the agencies A.M. Best and DBRS have already provided their views on rating methodologies for such transactions (see A.M. Best, 2009; DBRS, 2008).

To the best of our knowledge, no empirical analysis of investment return characteristics and performance for the life settlement asset class has been conducted in the literature yet. In addition, a comprehensive analysis of its risks from an investor's perspective is still missing. A major reason for the lack of empirical work in this context is the scarcity of publicly available data on life settlement transactions. In the last few years, however, a growing number of open-end funds exclusively dedicated to investing in U.S. life settlements has emerged. These funds determine their portfolio values on a monthly basis, thus providing the possibility for a performance analysis based on time series data. Consequently, in this paper, we contribute to the literature by conducting the first empirical analysis of life settlement

fund return distributions, a general performance measurement, and a comparison to established asset classes. In addition, we put the empirical results into perspective by extensively elaborating on the risks associated with open-end life settlement funds. Our dataset has been provided by AA-Partners, a private consulting firm specialized in U.S. life settlements, and is, in its entirety, not publicly available. Since the dataset largely covers this segment of the capital markets, we believe it to be a unique opportunity to gain early insights into the return characteristics of this rather new asset class.

The remainder of the paper is structured as follows. In Section 2 we give a brief overview of the secondary market for life insurance in the U.S. and discuss key aspects of the structure and business model of life settlement funds, which are essential to an understanding of their risk profile. Section 3 is the empirical section, comprising the examination of the funds' return characteristics, the performance measurement and the correlation analysis both on an aggregate level and for the individual funds in the dataset. A discussion of the risks associated with life settlements in general and open-end life settlement funds in particular is presented in Section 4. Finally, in Section 5 we conclude.

2 Life settlements: market overview and fund business model

2.1 The U.S. life settlement market: an overview

Not many countries have a secondary market for life insurance policies, because of the dependence on a sufficiently large primary market and available target policies. The primary market in the U.S. represents the largest life insurance market worldwide, making up 24.17 percent of the global premium volume in 2007 (see SwissRe, 2007). In particular, approximately 160 million individual life insurance policies are currently in force, with an aggregate face amount of more than 10 trillion USD (see ACLI, 2007).[1] According to the U.S. Individual Life Insurance Persistency Study 2009 by the Life Insurance Marketing and Research Association (LIMRA) and the Society of Actuaries (SOA), this figure can be broken down into 51.8 percent whole life, 23.9 percent term life, 14.5 percent universal life, and 9.8 percent variable universal life policies (see LIMRA, 2009).

In the U.S. senior life settlement market, life insurance policies of insureds above the age of 65 with below-average life expectancy – typically 2-12 years – and impaired health are purchased.[2] Traded target policies mainly include lifelong contracts with death benefit payment such as universal or whole life insurance, with universal life being by far the largest segment.[3] These contracts differ in their premium

---

[1] For comparison, the U.S. equity market capitalization as of June 2010 is 12.4 trillion USD (source: S&P), U.S. government bond notional outstanding as of August 2010 amounts to 8.4 trillion USD (source: U.S. Treasury), U.S. corporate bond notional outstanding as of Q1/2010 is 7.2 trillion USD (source: Securities Industry and Financial Markets Association), global hedge fund assets under management as of Q2/2010 amount to 1.5 trillion USD (source: Credit Suisse Asset Management), and global commodity derivative notional outstanding as of December 2009 is 2.4 trillion USD (source: Bank for International Settlements).

[2] This is in contrast to the life settlement markets in the U.K. or Germany, where endowment contracts with a fixed maturity are traded. For an overview of the secondary market for life insurance, see Gatzert (2010).

[3] In the partial study of Life Policy Dynamics LLC (LPD) (2007a,b), the share of universal life among purchased policies is approximately 80-85 percent.

payment method, which may be an important criterion with regard to the attractiveness for investors. While whole life contracts have constant level premiums, universal life policies offer the possibility of flexible premium payments as long as the cash value (policyholder's reserve) remains positive. When selling the policy to a life settlement provider, the policyholder receives a payment that exceeds the surrender value but is less than the death benefit. The provider determines the offer price by subtracting the present value of expected future costs from the present value of expected future benefits associated with the contract. The actual amount depends in large part on the insureds estimated life expectancy. Thus, an important yield driver from the investors perspective is the quality of the life expectancy estimates provided by medical underwriters. Life settlement providers commonly sell the policies on to investors who continue to pay the premiums necessary to keep the policy in force and, in turn, receive the death benefit (face value) when the insured person dies.[4] Hence, while the payment amount – the face value of the policy – is known when a policy is purchased, the payment date is stochastic. The shorter the insured lives after having sold the policy, the higher the return for the investor, since only few premiums have to be paid and the death benefit is received earlier.

In line with the large primary market, the U.S. life settlement market has ample potential.[5] In its Data Collection Report 2006, the Life Insurance Settlement Association (LISA) published data it collected from 11 life settlement providers, which were estimated to represent about 50 percent of the industry. Those figures show that the annual death benefits settled increased by around 65 percent from 3.9 billion USD in 2005 to more than 6.4 billion USD in 2007, and the number of settled policies rose by 54 percent from 2,025 to 3,138 (see LISA, 2008). Other market estimates include Conning & Company (2007) (5.5 billion USD in 2005; 6.1 billion USD in 2006) and Kamath and Sledge (2005) (total market size: 13 billion USD in 2005).

2.2 Closed-end vs. open-end life settlement funds

The first life settlement funds appeared between 2002 and 2004, offering investors access to this relatively young asset class, which emerged during the late 1990s in the aftermath of the fading market for viatical settlements.[6] For most investors, an investment through funds is significantly more attractive and convenient than a direct purchase of the underlying life insurance policies due to diversification benefits and the reliance on professional expertise to determine the portfolio composition. In addition, the complex acquisition process of a life insurance policy, including legal requirements and transaction costs, are a major constraint to direct investments.

---

[4] According to a special report by Moodys (2006), life settlements are primarily purchased by institutional investors.

[5] The market volume is commonly reported in terms of the aggregated face value of purchased policies.

[6] Viatical settlements are life insurance contracts of terminally ill policyholders, which are sold in the secondary market. The viaticals business surged during the AIDS epidemic in the late 1980s (see, e.g., Fitch Ratings, 2007.

Thus, the popularity of funds investing in U.S. life settlements has grown continuously in recent years. During this period, two types of such funds have evolved.[7] Closed-end life settlement funds in the legal form of limited partnerships with a fixed maturity strongly resemble structures that are well-known from other illiquid asset classes such as investments in real estate, aircraft or ships. In these cases, the fund management company or a special-purpose subsidiary typically acts as the fund's general partner, while investors participate in the fund as limited partners. The fund shares are therefore virtually an entrepreneurial equity holding for which a premature redemption is not intended. These closed-end life settlement funds are domiciled in the country of their primary investor base, which are currently mainly Germany, the U.K., Ireland, and Luxembourg (see, e.g., Seitel, 2006; Moodys, 2006). They follow a classical buy-and-hold investment style, generally do not use leverage and have a rather moderate fee schedule, comparable to common mutual funds, where the manager receives a fixed percentage of the assets under management.[8] Another distinctive feature is the liquidity reserve most of them build up from subscription payments in order to handle liquidity risks arising from a lack of cash inflows after the final close of the fund. Money returning from maturing policies is usually distributed to the limited partners instead of reinvested. Closed-end life settlement funds provide an annual report on their operations but refrain from delivering portfolio valuations on a regular basis.

In contrast to their closed-end counterparts, open-end life-settlement funds are perpetual and generally offer ongoing subscriptions and redemptions in either monthly or quarterly intervals. Liquidity from an investor's point of view is usually restricted by notice periods between 30 and 90 days, lock-ups of up to 3 years, and so-called gates: limits on the amount which can be withdrawn in a given period. This type of life settlement fund is almost exclusively domiciled in offshore banking places and thus features a variety of legal forms consistent with local particularities. Active trading of the portfolio and leverage is possible and the fee structure is hedge fund-like with management fees of one to two percent and performance fees of up to twenty percent for which in some cases hurdle rates and high water marks apply. The death benefit proceeds from matured policies are almost exclusively reinvested in order to acquire new life settlement assets, whereas distributions to investors are rather exceptional. Taking these characteristics into account, together with targeted absolute returns of between eight and fifteen percent p.a., these funds have structural similarities to hedge funds.[9] Open-end life settlement funds provide valuations on a regular basis. Since the secondary market for life insurance policies is not as large and developed as other capital markets, the underlying of life settlement funds is essentially illiquid. Accordingly, a marking-to-market of their portfolios is usually not possible and the need for mark-to-model valuation mechanisms arises. On each valuation date, the funds employ their valuation methodology in order to determine the net asset value (NAV) of their portfolio, i.e., the value of their assets less the value of their

---

[7]The information in this section is largely based on offering memorandums as well as marketing material of a number of funds, which in some cases was publicly available on their websites, whereas in other cases was received upon request. We believe that the typology we offer adequately captures the key characteristics and main differences of these investment vehicles.

[8]A few exceptions exist with regard to these characteristics. Those resemble private equity funds, combining a limited partnership structure domiciled in an offshore banking location with the possibility to actively trade policies as well as performance fees and leverage.

[9]However, due to the characteristics of the underlying, life settlement funds are long-only.

liabilities, which then forms the basis for subscriptions and redemptions of fund shares.[10] As a result, time series of monthly NAVs for open-end life settlement funds exist and can be used to conduct an empirical performance analysis. Table 1 summarizes the main structural differences between closed-end and open-end life settlement funds.

Type	Closed-end	Open-end
Domicile	country of primary investor base	offshore banking locations
Legal form	limited partnerships	depends on domicile
Regulation	subject to national regulation	virtually unregulated
Maturity	fixed	perpetual
Subscriptions	not after final close	ongoing (usually monthly)
Redemptions	at maturity	ongoing (monthly or quarterly)
Lock-Up period	n/a	up to 3 years
Notice period	n/a	30 - 90 days
Redemption limits	n/a	common
Investment style	buy-and-hold	active trading possible
Leverage	none	possible
Fee schedule	fixed percentage of capital	management/performance fees; hurdle rates/high water marks
Liquidity reserve	common	not common
Death benefits	distribution	reinvestment
Valuations	annual report	on a monthly basis

Table 1: Closed-end vs. open-end life settlement funds

Although closed-end and open-end life settlement funds are currently quite common, it is uncertain whether both of these formats will prevail throughout the next decade. From their emergence until they become established, asset classes usually traverse an evolutionary process with regard to their wrapping, beginning with rather illiquid structures such as closed-end funds and successively migrating to more liquid ones as the market grows larger, more transparent, and increasingly standardized. The advent of derivatives as well as securitization are commonly seen as indications of a maturing asset class. Against this background, industry experts expect open-end funds to dominate the life settlement market in the future. Early signs of this development are already becoming apparent: there are a number of initiatives to promote standardization, transparency and the diffusion of information pertaining to life settlement transactions. One example is the Institutional Life Markets Association (ILMA), which was founded by institutional investors such as Credit Suisse, Goldman Sachs, and Mizuho International

---

[10]Funds can either apply the "investment method" or the "fair value method" for the ongoing valuation of their life insurance policies. The choice needs to be made on an instrument-by-instrument basis and is binding for the entire term of the contract. These methods will be described in further detail in Section 4.2.

PLC.[11] Furthermore, according to AA-Partners, half a dozen new open-end funds are currently being prepared for launch. In contrast to that, there seems to be humble activity in the closed-end segment.

2.3 The anatomy of open-end life settlement funds

To interpret empirical results for open-end life settlement funds and analyze their risk profile, it is of critical relevance that one first understands their mechanics. To the best of our knowledge, neither the structure nor the business model of open-end life settlement funds has been comprehensively described before. Consequently, the remainder of this section explains how these funds operate. For the sake of clarity it is organized based on the roles of the various involved parties. A stylized representation of an open-end life settlement fund is depicted in Figure 1.

As any other collective investment scheme, life settlement funds depend on so-called trustees, i.e., certain institutions which hold their property and facilitate their transactions. Hence, before entering business, the fund management company needs to appoint a *custodian* (depositary) in its country of domicile. The primary function of the custodian is to hold the fund's assets. In general, the custodian administers any liquid assets, such as government bonds or cash and assigns the safekeeping of life settlements to a sub-custodian in the United States. Furthermore, the custodian is responsible for the administration of the fund shares (units), for receiving and holding application money, and for redistributing funds to investors in the course of redemptions.

Whenever life insurance policies are acquired, the custodian transfers the necessary amount of money to the *sub-custodian*, which, in turn, uses it to settle transactions. With regard to policy purchases, the sub-custodian also serves as an escrow agent, facilitating the acquisition by retaining the payment for the respective life settlement in an escrow account while the transfer documents are sent to the insurance company in order to change ownership rights and beneficiaries. Once the amended documents have been returned by the insurance company, the money is released to the seller. The original life insurance contracts as well as the transfer and assignment documents are subsequently held by the sub-custodian on behalf of the fund. Whenever due, regular premiums are paid by the sub-custodian. In some cases, the sub-custodian is also responsible for building up a premium reserve account for the fund in order to be able to mitigate potential liquidity shortages.

Medical underwriters review the medical records of the insureds and, based on the information contained therein, prepare mortality profiles that comprise a summary of the medical conditions, a mortality schedule, and an estimation of the life expectancy for each insured.[12] For this purpose, they assess how certain characteristics and medical conditions affect the insureds mortality relative to a "standard" or reference mortality (see A.M. Best, 2009). The outcome is a specific multiplier (also called mortality rating) which modifies the reference mortality. Methodologies for the derivation of the multiplier as well

---

[11] For more information refer to www.lifemarketsassociation.org.

[12] The four largest medical underwriters in the U.S. life settlement market are 21st Services, AVS, EMSI, and Fasano (see Russ, 2005; Gatzert, 2010).
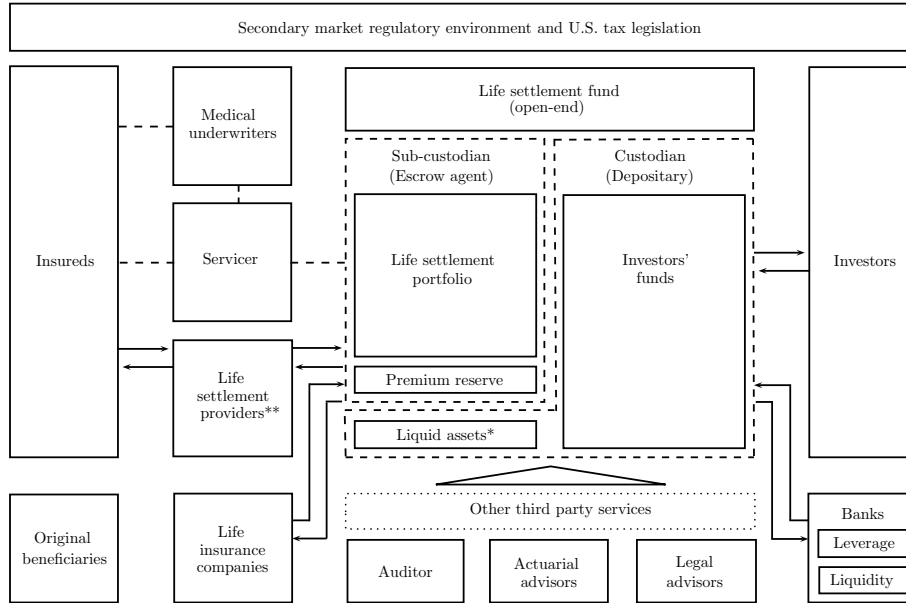
* Note that in case the fund retains any liquid assets such as government bonds or cash, those are usually held by the custodian.
** Some policy sellers are represented by life settlement brokers, who negotiate with several life settlement providers to obtain the best offer.

Figure 1: Stylized mechanics of an open-end life settlement fund

as standard mortality tables depend on the medical underwriters. However, within the last few years, many medical underwriters have opted for the Valuation Basic Tables (VBT), which are prepared by a task force of the Society of Actuaries (SOA).[13] These tables include mortality rates for ages up to ninety years over time horizons from one to twenty-five years, which have been derived from historical data and are differentiated according to simple characteristics such as smoking status and gender.[14] Although life expectancy estimates have systematically increased over the last few years, the figures provided by different medical underwriters for the same lives can vary substantially, implying a potential for misestimation (see A.M. Best, 2009; Gatzert, 2010). This has implications both for the pricing of life settlements and for the fund returns. Consequently, some funds seek to mitigate the impact of misestimation by demanding at least two life expectancy estimates and then applying the longer one or a (weighted) average of the two.

The *servicer* (tracking agent) performs a wide variety of supporting services in the context of premium and claims administration for the pool of lives in the portfolio.[15] Its goal is to ensure a smooth and on-time transfer of legal paperwork, notifications, and cash flows. The servicer notifies the trustees and provides them with disbursement instructions for the regular premium payments and maintains close contact with the insurance company to obtain the latest information on developments of each policy (e.g., cash surrender values). Moreover, it is responsible for ordering the policyholder's medical records and

---

[13]See www.soa.org.

[14]Mortality rates are commonly denoted by q_x (where x stands for the current age of the group under consideration) and measure the number of deaths per 1000 individuals of a population in a certain time period (typically one year).

[15]Note that the average fund portfolio in our dataset comprises 193 lives, while the maximum number of lives in a portfolio is 567 (see Table 2 in Section 3.1).

life expectancy estimations from the medical examiners and then archiving them. Another key duty is the tracking of the insured, i.e., the maintenance of registers with their contact details as well as the verification of their life/death status. For this purpose, the servicer relies on routines which resemble those employed in consumer loan servicing such as subscribed database services, mailings, and telephone calls. In addition, it matches social security numbers to death indices on a regular basis. Whenever the servicer becomes aware of the death of a policyholder, it immediately informs the fund manager and the trustees and obtains the death certificate. After the signed insurance claim package has been provided by the trustee, the servicer forwards it to the insurance company and follows up until the claim is paid so as to facilitate the prompt collection of death benefits.

Life settlement providers (life settlement companies) source life insurance contracts from policyholders or licensed brokers in order to pass them on to the funds. For this purpose, the funds usually set certain investment criteria, which reflect the cornerstones of their portfolio diversification approach. Life settlement providers can also act as investment advisors, pitching life settlements to the manager and participating in the policy-picking and portfolio structuring process. Whereas some funds rely on a so-called single-source approach, thus exclusively collaborating with just one life settlement company, others deliberately maintain business relationships with several. Such a multi-source approach is meant to improve the funds' access to life settlement assets, especially in times of greater product-flow constraints or less active markets (see, e.g., McNealy and Frith, 2006). An important aspect to be considered with regard to life settlement providers are their incentives to act in the interest of investors. Since their fees are paid upfront and generally depend on number and volume of the policies rather than their long-term investment performance, the degree of diligence that can be expected from life settlement providers during the acquisition process is questionable.[16] More specifically, to increase their chance of prevailing in the competitive bidding process for a policy they could, e.g., be tempted to avoid medical underwriters which issue rather conservative life expectancy estimates, since those would be associated with a lower offer price. Once acquired, the policy is then resold by the life settlement provider to the fund whose investors ultimately have to bear the risk of a misestimated life expectancy.

In addition, the general mechanics of open-end life settlement funds are usually complemented by third-party service providers. *Auditors* advise on accounting and tax implications, inspect the funds' balance sheets and income statements, and issue annual reports with their opinion of the funds' financial situation. Moreover, *actuarial advisors* assist with the pricing of transactions as well as the valuation of life settlements in the portfolio and review actuarial models used by the funds. Similarly, *legal advisors* offer counseling with regard to the legal form, draft all the contracts, and ensure the completeness of documentation packages in addition to compliance with the applicable legislation and regulation. *Banks* are involved either by providing medium- to longer-term debt financing, which some funds use to leverage their investments, or through a liquidity facility, which is commonly employed to bridge life settlement

---

[16]This is quite similar to the incentive problem that ultimately led to the demise of the U.S. subprime market where the common practice of instantly selling-on initiated mortgages to third parties, such as investment banks (originate-to-distribute), created a lack of long-term financial incentives and instigated originators to an extreme relaxation of lending standards.

purchases or premium payments in the absence of other cash inflows. Finally, *life insurance companies* originally issued the policies and must be notified about the transfer of ownership. They continue to receive the premiums after the sale has been completed and pay out the death benefits to the fund's sub-custodian after the insured has passed away.

3 Empirical analysis

3.1 Data and sample selection

We obtained our data on open-end life settlement funds from AA-Partners AG, a Zurich-based investment boutique specialized in this asset class.[17] Analogously to providers of hedge fund data, AA-Partners maintains an extensive network in the life settlement industry, through which it is in a position to collect performance data directly from fund managers. Using a variety of sources, it carries out regular cross-checks and verifications of its fund database to ensure correct classification, reliability and representativeness. The original dataset comprises monthly NAVs of 17 open-end funds, which, according to AA-Partners, largely cover this market.[18] Each fund is USD denominated, subject to an independent audit conforming to international standards and almost all are purely dedicated to investing in U.S. senior life settlements, i.e., mixed strategy funds are excluded.[19] In our view, this dataset is a valid opportunity for an empirical analysis, as we are not aware of any other sources of such comprehensive time series data for life settlement funds.

Table 2 provides additional information with regard to inception, size, fee structure, and liquidity profile of the fund shares.[20] While the oldest fund in the dataset began operations in late 2003, other funds emerged just as recently as 2007/2008. This suggests that the asset class has gradually attracted the attention of the investment industry throughout the last decade. Interestingly, the funds are quite different in size as reflected by investment volumes, number of policies in the portfolio, and the sum of face values. This can be an important factor with regard to potential policy availability issues which will be discussed in Section 4.5. While there is some variation in the fee structures, most funds seem to charge a management fee of around two percent and a performance fee of around twenty percent. The majority of life settlement funds in the dataset offers subscriptions and redemptions on a monthly basis with a notice period of 30 days. Furthermore, several funds partially protect themselves against excessive cash outflows by imposing redemption gates and lock-up periods on their investors.

Since the market is still in an early stage of its development, not all of the funds feature time series of sufficient length for statistical inference. To capture the risks and returns of open-end life settlement

---

[17]AA-Partners acts as an independent third party advisor with regard to investment solutions for U.S. life settlements. Its main services include investment advice related to open-end funds, valuation of life settlement portfolios, market research, and data collection. See www.aa-partners.ch for more information.

[18]The dataset consists of single funds. To our knowledge, life settlement fund of funds do currently not exist.

[19]However, one fund has a minor position in U.K. endowment policies and another one holds a small fraction of viatical settlements.

[20]For confidentiality reasons the fund names have been substituted with numbers.

funds as comprehensively as possible, we have created a custom index, beginning with the oldest fund, which appeared in December 2003. Whenever the inception date of another fund is reached, it is added to the index and whenever the return time series of a fund ceases prematurely (e.g., due to suspended reporting or liquidation), it drops out of the index. The index time series ends in June 2010 and comprises 79 monthly returns. At any point in time, the returns of all index constituents are equally weighted.[21] A further analysis of the individual funds will be conducted in Section 3.4. In addition to the custom life settlement index, we have selected broad indices as representatives for various other asset classes in order to conduct performance comparisons and correlations analyses.[22] In this context, the U.S. stock market is represented by the S&P 500 while the FTSE U.S. Government Bond Index as well as the DJ U.S. Corporate Bond Index have been selected as proxies for the respective bond markets. Furthermore, the HFRI Fund Weighted Composite Index serves as a broad measure for the hedge fund universe, while real estate returns are provided through the S&P/Case-Shiller Home Price Index (Composite of 20).[23] Finally, the S&P GSCI, a recognized measure of general commodity price movements, is used as indicator for the global commodity markets. The selection is completed by the S&P Listed Private Equity Index. Since congruent time series are required for our analysis, the scarcity of available life settlement fund data constrains the choice of time period and return interval for the other asset classes. Hence, monthly index returns from December 2003 to June 2010 have been collected for those as well.[24] Wherever available, total return indices have been used to account for coupons and dividends, which would otherwise not be reflected in prices. Table 3 summarizes the sample characteristics.

As with hedge fund data, our sample suffers from certain biases, which have to be considered when interpreting the empirical results in the following section.[25] Self-selection bias arises from the rather opaque nature of the funds which, in contrast to mutual funds, are not obliged to disclose return data to the public. This bias is likely to be particularly large if non-reporting funds significantly underperform their reporting counterparts. However, we are aware of 17 funds that essentially make up the market. Of these 17 funds, only two suspended their reporting during the time period under consideration. Hence, we consider this bias not to be material.[26]

In addition, survivorship bias arises when funds, which ceased to exist, are not included in a database. If these funds terminated operations as a result of poor performance, the available data is likely to overstate historical returns and understate risk. AA-Partners knows of three funds, which were shut down,

---

[21] Note that this approach of calculating the index assumes an investor with a naïve diversification approach, assigning the same target portfolio weight to all available life settlement funds at any point in time. We believe this procedure to be an adequate way of reflecting the development of an open-end life settlement fund portfolio between 2003 and 2010.

[22] Indices can be considered to be sufficiently diversified portfolios. Thus, an analysis based on indices is well suited to examine the risk-return profile of aggregate asset classes.

[23] We deliberately chose the S&P/Case-Shiller Index instead of publicly listed Real Estate Investment Trust (REIT) indices, since the latter are strongly influenced by general stock market dynamics and due to this noisiness only partly reflect the performance of the true underlying real estate assets. This phenomenon with regard to REITs has been described by Giliberto (1993) and Ling et al. (2000).

[24] The data has been downloaded from the Bloomberg database.

[25] For a more detailed discussion of these biases, see L'Habitant (2007).

[26] Self-selection bias cannot be quantified as the returns for non-reporting funds remain unobservable.

	Fund 100	Fund 101	Fund 102	Fund 103	Fund 104	Fund 105	Fund 201	Fund 202	Fund 203
Currency	USD	USD	USD	USD	USD	USD	USD	USD	USD
Inception	Apr 03	June 06	Aug 03	June 07	Nov 05	Dec 03	Jan 05	July 06	Feb 05
Volume (mm)	385	950	428	102	466	62	31	494	unknown
Sum of face values (mm)	770	2367	720	362	619	108	98	unknown	unknown
No. of policies	261	567	447	183	406	65	126	unknown	unknown
Management fee	0.75%	1.95%	2.00%	2.00%	1.50%	1.50%	1.50%	2%	1.75%
Performance fee	n/a	20.00%	n/a	20%	75%	n/a	n/a	n/a	25%
Hurdle Rate	n/a	10.00%	n/a	9.00%	8.00%	n/a	n/a	n/a	8%
Style	passive	passive	passive	passive	passive	passive	passive	passive	passive
Subscriptions	monthly	monthly	monthly	monthly	monthly	monthly	weekly	monthly	monthly
Redemptions	monthly	monthly	monthly	monthly	monthly	monthly	weekly	monthly	Monthly
Notice Period	30 days	30 days	30 days	90 days	45 days	30 days	30 days	30 days	30 days
Redemption fees	n/a	year 2: 4% year 3: 4% year 4: 3% year 5: 3%	10%, decreasing by 0.33% per month	year 2: 8% year 3: 7% year 4: 4% nil after	5%, decreasing by 1% per year	year 1: 7% year 2: 5.5% year 3: 4% year 4: 2.5% year 5: 1%	5%, decreasing by 1% per year	7% until year 8, 4% after	deferred sales charge (5 years)
Lock-up Period	n/a	1 year	n/a	1 year	n/a	n/a	n/a	3 years	1 year
Redemption limits (gates)	10% of outstanding shares p.a.	n/a	20% of outstanding shares p.a.	30(60)% of investment in year 2(3)	10% of shares per redemption date	10% of shares per redemption date	n/a	20% p.a.	20% p.a.

Table 2: Life settlement funds in the original dataset

	Fund 204	Fund 205	Fund 208	Fund 210	Fund 212	Fund 216	Fund 217	Fund 514
Currency	USD	USD	USD	USD	USD	USD	USD	USD
Inception	March 04	Dec 04	Nov 06	July 04	Dec 07	Jan 07	Jan 08	June 06
Volume (mm)	unknown	10	57	100	8	43	5	178
Sum of face values (mm)	unknown	45	283	178	20	130	20	344
No. of policies	unknown	40	113	242	17	58	8	179
Management fee	1.75%	1.50%	1.25%	0.30%	1.25%	2.00%	2.00%	0%
Performance fee	20%	20%	15%	n/a	10%	20%	20%	30%
Hurdle Rate	6%	n/a	7%	n/a	10%	8%	n/a	6.5%
Style	passive	passive	passive	passive	passive	active	passive	passive
Subscriptions	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly
Redemptions	monthly	quarterly	monthly	monthly	monthly	quarterly	quarterly	monthly
Notice Period	30 days	60 days	90 days	30 days	30 days	90 days	90 days	90 days
Redemption fees	year 1: 8.6% year 2: 8.6% year 3: 7.5% year 4: 6% year 5: 5%	3%	17.5%, decreasing by 2.5% per year	year 1: 3% year 2: 2% year 3: 1% nil after	n/a	2% after first year	n/a	8%, decreasing by 1.6% per year
Lock-up Period	6 months	n/a	n/a	n/a	n/a	1 year	1 year	n/a
Redemption limits (gates)	10% p.a.	n/a	20% p.a.	n/a	5% p.a.	10% of total assets p.a.	10% of total assets p.a.	20% p.a.

Table 2: Life settlement funds in the original dataset - continued

but have never been part of their database.[27] Apart from that, two of the 17 funds in our dataset are currently being liquidated and the final proceeds to investors are unknown at this time. According to AA-Partners, those liquidation proceeds can be expected to be considerably smaller than the last NAV published by the funds. These considerations imply that survivorship bias could, to some extent, be an issue in the context of our empirical analysis. Since the return time series of those funds which were not included in the database as well as the liquidation proceeds for the two terminated funds are not available to us, it is not possible to measure and consequently explicitly control for survivorship bias.

Finally, illiquidity bias is an issue with regard to life settlement funds. Life settlements are highly illiquid assets. Thus, a marking-to-market is difficult due to the absence of regularly quoted market prices. Accordingly, the fund managers have considerable flexibility when determining NAVs, which they could use to smooth monthly returns. This bias is of major importance as we will see in the detailed risk analysis of the funds in Section 4.

Observed variables	8 indices (see Appendix for additional information)
Selection criterion	Broad market indices, i.e. diversified asset portfolios (as representative as possible for each asset class)
Return interval	monthly returns
Sample period	December 2003 - June 2010 (79 data points)
Source of data	AA-Partners AG for life settlement funds Bloomberg for indices of other asset classes

Table 3: Sample details

3.2 The return distribution of open-end life settlement funds

Based on the fact that the main underlying risks are biometric in nature rather than originating from the broader capital markets, academics and practitioners have repeatedly emphasized that life settlements should offer attractive returns paired with a conservative risk profile and are uncorrelated with other asset classes (see, e.g., Stone and Zissu, 2007). In order to verify this, we conduct the first empirical analysis of this asset class.[28] We begin with a characterization of the empirical return distributions, which forms the basis for subsequent comparisons. Figure 2 plots the performance of all previously mentioned asset classes, except commodities and private equity, between December 2003 and June 2010.[29] All time

---

[27]Due to the over-the-counter character of the market for open-end life settlement funds, data collection is a very challenging and time consuming task. Even institutions with extensive connections into the life settlement industry, such as AA-Partners, are unable to obtain return data in certain cases.

[28]To our knowledge, the scarcity of NAV data did not allow for any earlier empirical analysis.

[29]The S&P GSCI as well as the S&P Listed Private Equity Index with their comparatively high volatility have been excluded from this figure in order to enhance the readability. Please refer to Table 4 for the respective data.
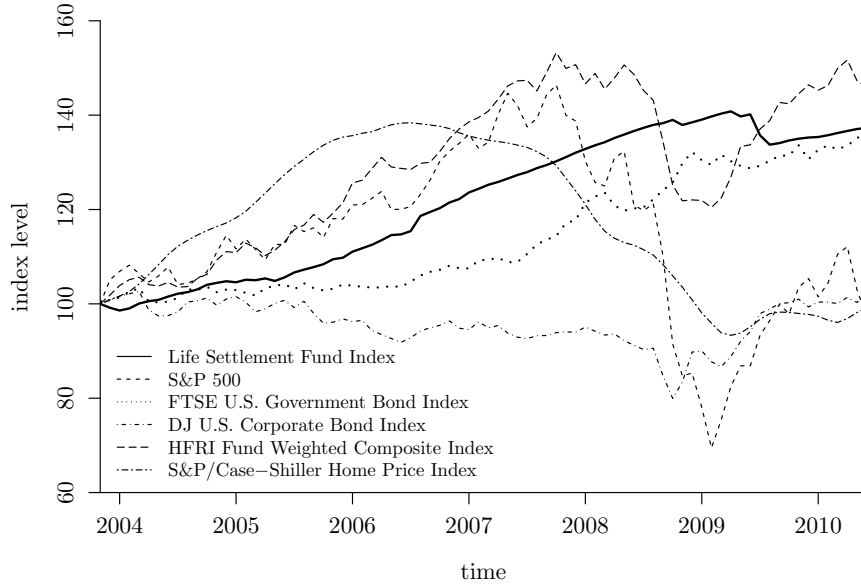
Figure 2: Life settlements in comparison to other asset classes (12/2003 - 06/2010)

series have been indexed to 100 at the beginning of the period under consideration, thus reflecting the development of the value of a hypothetical investment of 100 USD over time.

At a first glance, the graph of open-end life settlement funds looks excellent. It dominates both bond indices at almost every point in time and has only been exceeded by stocks and real estate until the subprime crisis in the U.S. struck in summer 2007 and spread into the global capital markets in 2008. Over the whole period, only a hedge fund investment would have yielded a higher value. These observations are also reflected in the figures characterizing the return distribution, which can be found Table 4. The portfolio of life settlement funds represented by our custom index exhibits generally respectable positive returns and very low volatility. Furthermore, it has only suffered a comparatively moderate drawdown[30] during the financial crisis of 2007 - 2009. With the substantial quantity of 37.30 percent, life settlement funds generated the third highest total return of all analyzed asset classes from December 2003 to June 2010. Only hedge funds (45.90 percent) and government bonds (37.38 percent) provided higher total returns over this period. Apart from corporate bonds, which yielded a mere 2.00 percent, the remaining asset classes even exhibited negative total returns. An investment in stocks, for example, would have lost 2.60 percent of its original value.

Studying the means of the monthly return distributions reveals a similar pattern. With 0.40 percent (4.85 percent p.a.), open-end life settlement funds had a higher mean return than all other asset classes

---

[30]That is, a loss incurred over a certain time period.

except for hedge funds (0.50 percent; 5.98 percent p.a.) and government bonds (0.41 percent; 4.91 percent p.a.). While private equity (0.37 percent; 4.44 percent p.a.) and commodities (0.25 percent, 2.95 percent p.a.) also exhibited positive mean returns over the period under consideration, those of the remaining asset classes were close to zero. Moreover, life settlement funds were by far the least volatile investment, as represented by their return standard deviation of 0.66 percent (2.28 percent p.a.). Even government bond returns with a standard deviation of 1.10 percent (3.80 percent p.a.) were almost twice as volatile, let alone stocks, commodities and private equity, where the multiplier is more than six, eleven, and thirteen, respectively. Maximum and minimum returns are furthest apart for the asset classes with the highest volatilities, i.e., private equity, commodities, and stocks, while the empirical return distribution for life settlements merely spans 5.94 percent from a maximum of 2.79 percent to a minimum of -3.15 percent.

The remarkable impression provided by the portfolio of life settlement funds is further bolstered by taking into account the small number of negative returns: only 9 during the whole examination period of 79 months (see row 11 of Table 4). All remaining asset classes experienced many more negative months, ranging from 26 to 33. However, the life settlement fund return distribution exhibits the comparatively largest negative skewness (-1.97) and positive excess kurtosis (12.66), implying a long and heavy left tail. These values for the third and fourth moments lead to an exceptionally high Jarque-Bera test statistic (578.55), meaning the null hypothesis of normality has to be rejected on all reasonable significance levels.[31]

3.3 Performance measurement and correlation analysis

To elaborate on the special risk return profile of open-end life settlement funds, we apply four common performance measures.[32] Apart from the probably most classic performance measure in finance literature, the Sharpe Ratio, we calculate the Sortino Ratio, the Calmar Ratio and the Excess Return on Value at Risk (VaR) for the asset classes under consideration.[33] Based on these indicators, we establish a rank order for all asset classes with positive excess returns.[34] The results are displayed in the lower part of Table 4. With a Sharpe Ratio of 0.3327, life settlement funds clearly rank first with a considerable distance to the second-ranked government bonds (0.2039). Hedge funds (0.1589), private equity (0.0211), and commodities (0.0079) on ranks 3, 4, and 5 also feature a positive Sharpe Ratio, which, however, in the latter case is close to zero. Negative Sharpe Ratios for the remaining investment alternatives reflect their poor performance over the analyzed time period, falling short of a possible investment at the risk-free rate. Looking at their Sortino Ratio of 0.4580 and Excess Return on VaR of 0.2889, we gather the same picture: life settlement funds outperformed the runners-up government bonds and hedge funds by far.[35]

---

[31] Although for almost all other asset classes, the null hypothesis under the Jarque-Bera test is rejected on the one percent significance level as well, their test statistics are considerably smaller.

[32] The definitions for these performance measures can be found in the Appendix.

[33] The average 1-month U.S. Treasury Bill rate between December 2003 and June 2010 has been used as a proxy for the risk-free interest rate r_f. The rates can be accessed on www.ustreas.gov. With regard to the Sortino Ratio, we choose r_f as the threshold return τ. In addition, the Excess Return on VaR is based on the 95 percent VaR.

[34] The applied performance measures are not meaningful for negative excess returns since, in that case, a higher value of the risk measure in the denominator leads to a better result (less negative ratio).

[35] Our results are in line with the findings of Eling and Schuhmacher (2007) for hedge funds in that all employed performance measures lead to almost the same rank order.

	Life Settlement Fund Index	S&P 500	FTSE U.S. Government Bond Index	DJ U.S. Corporate Bond Index	HFRI Fund Weighted Composite Index	S&P/ Case-Shiller Home Price Index	S&P GSCI	S&P Listed Private Equity Index
Total return over the period	37.30%	-2.60%	37.38%	2.00%	45.90%	-0.84%	-4.97%	-1.90%
Mean return	0.40%	0.07%	0.41%	0.04%	0.50%	0.00%	0.25%	0.37%
annualized	4.85%	0.78%	4.91%	0.53%	5.98%	-0.03%	2.95%	4.44%
Standard deviation	0.66%	4.39%	1.10%	1.95%	1.97%	1.27%	7.77%	8.74%
annualized	2.28%	15.20%	3.80%	6.75%	6.84%	4.40%	26.91%	30.26%
Maximum	2.79%	9.39%	3.24%	7.63%	5.15%	1.99%	19.67%	30.54%
Minimum	-3.15%	-16.94%	-2.75%	-6.43%	-6.84%	-2.79%	-28.20%	-30.33%
Skewness	-1.97	-1.08	-0.21	0.11	-1.11	-0.50	-0.64	-0.43
Excess Kurtosis	12.66	2.48	0.75	4.05	2.65	-0.61	1.41	3.91
Jarque-Bera test	578.55 ***	35.74 ***	2.45	54.18 ***	39.41 ***	4.58	11.92 ***	52.83 ***
No. of negative months	9	30	26	33	26	39	33	27
Sharpe Ratio (rank)	0.3327 (1)	-0.0274	0.2039 (2)	-0.0726	0.1589 (3)	-0.1479	0.0079 (5)	0.0211 (4)
Sortino Ratio (rank)	0.4580 (1)	-0.0340	0.3282 (2)	-0.0978	0.2207 (3)	-0.1762	0.0104 (5)	0.0283 (4)
Calmar Ratio (rank)	0.0695 (2)	-0.0071	0.0813 (1)	-0.0220	0.0458 (3)	-0.0673	0.0022 (5)	0.0061 (4)
Excess Return on VaR (rank)	0.2889 (1)	-0.0140	0.1970 (2)	-0.0553	0.1174 (3)	-0.0825	0.0049 (5)	0.0130 (4)

Significance Levels: *** = 1%, ** = 5%, * =10%.

Table 4: Descriptive statistics for the index return distributions (December 2003 - June 2010)

	Life Settlement Fund Index (I)	S&P 500 (II)	FTSE U.S. Gov. Bond Index (III)	DJ U.S. Corp. Bond Index (IV)	HFRI Fund Weighted Comp. Index (V)	S&P/CS Home Price Index (VI)	S&P GSCI (VII)	S&P Listed Private Equity Index (VIII)
(I)	1.0000	-0.1231	-0.0414	-0.2683 **	-0.0606	-0.1679	-0.0292	-0.0834
(II)		1.0000	-0.2575 **	0.3487 ***	0.8015 ***	0.2982 **	0.3877 ***	0.8779 ***
(III)			1.0000	0.3639 ***	-0.3795 ***	-0.2681 **	-0.2361 *	-0.2228 *
(IV)				1.0000	0.3603 ***	0.0427	0.1057	0.2794 **
(V)					1.0000	0.2712 **	0.5866 ***	0.7665 ***
(VI)						1.0000	0.2442 *	0.3149 ***
(VII)							1.0000	0.4124 ***
(VIII)								1.0000

Significance Levels: *** = 1%, ** = 5%, * =10% (correlation t-test, 77 degrees of freedom).

Table 5: Correlation Matrix

The performance ranking based on the Calmar Ratio is a slight exception. With a value of 0.0695, the life settlement fund index ends up on the second position, just behind government bonds (Calmar Ratio of 0.0813).

Certainly, the choice of the time period for the analysis including the financial crisis 2008/2009 negatively influences the image of almost all established asset classes. Nevertheless, two important factors should be considered. First, as mentioned in Section 3.1, the choice of time period was not arbitrary but determined by the availability of data for the life settlement fund market. Second, the rather weak performance of some of the indices representing the other asset classes under consideration underscores even more strongly how extraordinary these empirical observations for life settlements are. This finding should trigger additional questions as to why this asset class has seemingly been able to withstand the major dislocations in the world's capital markets.

Finally, to complete the empirical analysis on the portfolio basis, we examine the correlation structure between life settlement funds and the other indices in our sample. Table 5 displays the correlation matrix as well as the significance levels for the correlation t-test. Only one of the tested Bravais-Pearson correlation coefficients between the returns on the custom life settlement fund index and the other indices turned out to be statistically significant. In particular, life settlement fund and corporate bond returns seemed to be negatively correlated during our examination period. Overall, it appears as if life settlements rightly have the reputation of being virtually uncorrelated with other asset classes.[36] To put further

---

[36]To be more precise, we cannot reject the null hypothesis that life settlement returns are uncorrelated with the returns of the other asset classes.
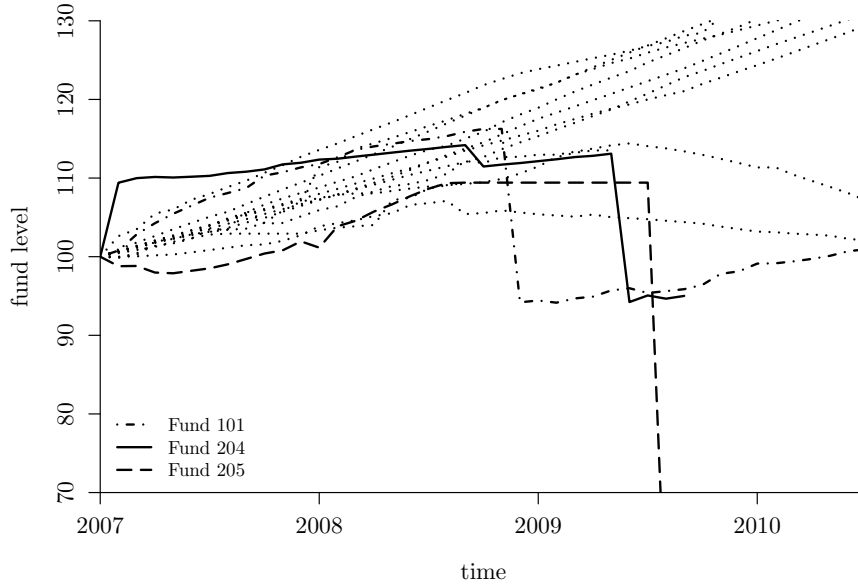
Figure 3: Individual life settlement funds in comparison (01/2007 - 06/2010)

emphasis on this result, we provided the correlation coefficients among the remaining asset classes. Apart from two exceptions involving corporate bonds, those are all significantly different from zero. Particularly, all correlations of the HFRI Fund Weighted Composite Index with the traditional asset classes are highly significant, raising doubts about the suitability of hedge funds as a means for portfolio diversification. Life settlement funds, on the contrary, seem to offer excellent diversification qualities.

3.4   Analysis of individual funds

Due to the extraordinary performance of the life settlement fund index revealed in the previous section, we deem it necessary to conduct further analyses on a disaggregate level. Thus, we examine return distributions and performance for the individual life settlement funds in the sample. To ensure congruent time series, we selected the period from January 2007 until June 2010.[37] This enables us to include as many funds from the original dataset as possible, while still retaining a total of 42 monthly returns in the time series. As a consequence, we removed three funds, which did not yet exist in January 2007. Also note that due to various reasons (see fund status in Table 6) the time series for some of the remaining 14 funds stop before June 2010. The results for each fund are reported in Table 6, Table 7 provides some summary statistics, and Figure 3 displays the development of an investment of 100 USD in each of the

---

[37]For the fund performance figures to be comparable, they need to be calculated based on congruent time periods. Although the chosen period is relatively short, it helps to understand two important questions: Does the performance of certain individual funds considerably differ from the results we observed for the index (portfolio of funds) in the previous section? Did the financial crisis have an impact on individual funds (this did not really seem to be the case on the aggregate level)?

	Fund 100	Fund 101	Fund 102	Fund 104	Fund 105	Fund 201	Fund 202
Fund status	active	active	active	active	active	merged	active
Sample size (months)	42	42	42	42	42	28	42
Total return over the period	31.85%	0.96%	37.27%	35.97%	32.49%	n/a	7.11%
Mean return	0.66%	0.07%	0.76%	0.73%	0.67%	0.46%	0.17%
annualized	7.94%	0.89%	9.09%	8.81%	8.08%	5.47%	1.99%
Standard deviation	0.52%	3.05%	0.10%	0.14%	0.55%	0.58%	0.71%
annualized	1.81%	10.56%	0.35%	0.47%	1.90%	2.02%	2.47%
Maximum	2.62%	2.05%	0.92%	1.05%	3.95%	3.03%	2.26%
Minimum	-0.94%	-18.97%	0.54%	0.46%	0.25%	0.00%	-1.57%
Skewness	1.02	-6.22	-0.34	0.37	5.46	3.42	0.27
Excess Kurtosis	6.13	39.76	-0.97	0.32	32.45	14.46	0.98
No. of negative months	1	3	0	0	0	0	15
Sharpe Ratio (rank)	1.0060 (6)	-0.0202	6.1371 (2)	4.3835 (5)	0.9782 (7)	0.5472 (9)	0.0419 (10)
Sortino Ratio (rank)	n/a	-0.0209	n/a	n/a	n/a	n/a	0.0635 (1)
Calmar Ratio (rank)	n/a	-0.0033	n/a	n/a	n/a	n/a	0.0190 (1)
Excess Return on VaR (rank)	n/a	-0.2239	n/a	n/a	n/a	n/a	0.0354 (1)

Table 6: Descriptive statistics for the return distributions of individual life settlement funds (January 2007 - June 2010)

	Fund 203	Fund 204	Fund 205	Fund 208	Fund 210	Fund 216	Fund 514
Fund status	suspended reporting	liquidated	suspended reporting	active	active	active	active
Sample size (months)	20	32	38	42	42	42	42
Total return over the period	n/a	n/a	n/a	31.14%	33.74%	2.05%	29.43%
Mean return	0.45%	-0.10%	-1.89%	0.65%	0.69%	0.05%	0.62%
annualized	5.41%	-1.16%	-22.71%	7.77%	8.34%	0.59%	7.39%
Standard deviation	0.46%	3.48%	9.36%	0.11%	0.11%	0.43%	0.07%
annualized	1.61%	12.05%	32.42%	0.37%	0.37%	1.49%	0.24%
Maximum	1.70%	9.41%	2.68%	0.88%	0.88%	1.10%	0.76%
Minimum	-0.12%	-16.68%	-51.12%	0.47%	0.40%	-1.57%	0.44%
Skewness	1.67	-3.04	-4.70	0.65	-0.70	-0.66	-0.78
Excess Kurtosis	2.37	19.12	22.78	-0.17	0.62	4.50	0.51
No. of negative months	1	4	8	0	0	20	0
Sharpe Ratio (rank)	0.6761 (8)	-0.0669	-0.2167	4.8178 (4)	5.1965 (3)	-0.2027	6.7865 (1)
Sortino Ratio (rank)	n/a	-0.0886	-0.2259	n/a	n/a	-0.2442	n/a
Calmar Ratio (rank)	n/a	-0.0139	-0.0397	n/a	n/a	-0.0555	n/a
Excess Return on VaR (rank)	n/a	-0.1773	-0.3397	n/a	n/a	-0.2429	n/a

Table 6: Descriptive statistics for the return distributions of individual life settlement funds (January 2007 - June 2010) - continued

life settlement funds over the considered time period. While we observe a solid growth in value for most funds, there are some exceptions that differ from the pack.

In particular, we notice that Fund 202 and Fund 216 experienced a comparatively larger number of negative months and Fund 101, Fund 204, as well as Fund 205 exhibited a large drawdown. The magnitude of this remarkable negative monthly return is -18.97 percent, -16.68 percent, and an enormous -51.12 percent for Fund 101, Fund 204, and Fund 205, respectively. As a result, the return volatilities (standard deviations) of 3.05 percent, 3.48 percent, and 9.36 percent for these three funds are much higher than the average of 1.41 percent and the variation in maximum and minimum returns as well as skewness and excess kurtosis across all individual funds appears substantial (see Table 7). The highest maximum return of 9.41 percent (Fund 204) in one month compares to a mere 0.76 percent for Fund 514. More alarming for investors, however, is the discrepancy in minimum returns. While those are equal to or greater than zero for 7 of the 14 funds and Fund 102 still generated 0.54 percent in its worst month, the previously mentioned devastating drawdown of Fund 205 (-51.12 percent) marks the lower bound of the range. Industry experts point out a variety of explanations for the sudden collapse in the NAVs of Fund 101, 204, and 205. The introduction of the 2008 VBT tables by the Society of Actuaries (SOA) is certainly an important determinant in this regard. In comparison to the 2001 release, which had been widely applied in the life settlement industry, life expectancies associated with the new tables are generally longer. In some cases, these differences necessitated substantial policy devaluations. Another important factor is the turmoil in the wake of the financial crisis, which significantly intensified in September 2008 after the bankruptcy of Lehman Brothers and the AIG bail-out. Due to the great extent of uncertainty in the capital markets, many open-end life settlement fund investors began to redeem their fund shares. In combination with a lack of subscriptions, these excessive redemptions resulted in a liquidity shortage for some funds. Particularly those with a substandard cash management were suddenly forced to sell policies at fire sale prices in order to avoid complete distress. Finally, those funds, which opted for fair value accounting of life settlements, had to substantially write down their assets to reflect the changed market environment in late 2008 and early 2009.[38]

Since notable discrepancies between individual funds seem to exist, careful selection of the fund manager can be crucial. This finding is supported by the four performance measures we discussed earlier.[39] For instance, we observe negative Sharpe Ratios for the Funds 101, 204, 205, and 216, implying an average monthly return below the risk-free rate. In addition, the positive Sharpe Ratios of the remaining funds range from 6.7865 down to 0.0419, a figure that is worse than those for government bonds, corporate

---

[38] The different valuation methods and their consequences for the evolution of fund NAVs over time are explained in more detail in the following section.

[39] The average 1-month U.S. Treasury Bill rate between January 2007 and June 2010 has been used as a proxy for the risk-free interest rate. Note that for most funds, Sortino Ratios are unavailable since returns did extremely rarely or not at all drop below the threshold, i.e., the risk-free rate. Thus, the Lower Partial Moment in the denominator is either very close to or exactly zero and the ratio consequently meaningless or not defined. Additionally, Calmar Ratios have been omitted whenever the lowest return in the series was positive (or negative but very close to zero), rendering a drawdown-based measure pointless. Finally, for those life settlement funds with no more than a single negative return, an informative 95 percent VaR cannot be derived and therefore Excess Returns on VaR are not available.

	Mean	Standard deviation	Maximum	Minimum
Mean return (%)	0.29%	0.69%	0.76%	-1.89%
Standard deviation (%)	1.41%	2.53%	9.36%	0.07%
Maximum return (%)	2.38%	2.25%	9.41%	0.76%
Minimum return (%)	-6.32%	14.41%	0.54%	-51.12%
Skewness	-0.26	3.00	5.46	-6.22
Excess Kurtosis	10.21	13.40	39.76	-0.97

Table 7: Descriptive statistics for 14 life settlement fund return distributions

bonds, and hedge funds over the same time period.[40] Furthermore, it should be noted that the current status of four of the analyzed funds is an alarming sign. Fund 203 and Fund 205 suspended their reporting during the period under consideration, Fund 201 was merged with Fund 103 (which had been excluded from the analysis in this section due to its short time series and is currently being liquidated), and Fund 204 has been terminated. Consequently, the performance figures derived from the available data for these funds can be expected to be still upward biased.[41]

Overall, according to the empirical analysis of the life settlement index return profile, the asset class indeed appears to be an interesting investment opportunity, offering solid returns comparable to those provided by government bonds, complemented by an extraordinary low volatility as well as virtually no correlation with other asset classes. Nevertheless, an examination on the individual fund instead of the index level revealed anomalies. Although half of the funds under consideration did not experience a single negative month and, even for the weaker performers such an occasion appears to be rare relative to the established asset classes, a negative month – if it actually occurs – can in fact cause a serious (Fund 101 and Fund 205) or even fatal drawdown (Fund 204). While the observed performance of life settlement funds could be a result of the market being inefficient and providing arbitrage opportunities because many investors have not yet discovered the asset class' attractiveness, a more likely explanation is that considerable risks embedded in those funds are largely not reflected in historical performance data. Therefore, we will conduct an in-depth risk analysis in the following section, taking into account the structural insights that we elaborated on in Section 2.3.

---

[40]Sharpe Ratios (01/2007 - 06/2010) of the other asset classes for comparison purposes: stocks: -0.1057; government bonds: 0.4760; corporate bonds: 0.0851; hedge funds: 0.0741; real estate: -0.6212; commodities: -0.0466; private equity: -0.0875.

[41]This was already pointed out in the discussion of potential biases in Section 3.1.

4 Risks of open-end life settlement funds

4.1 Overview

During the recent financial crisis, investments with attractive returns and presumably low risk, such as higher rated tranches of so-called subprime residential mortgage-backed securities turned out to be very risky, whereas those risks, which finally materialized, had not been reflected by ex ante risk analyses.[42] In combination with our empirical results, this raises a degree of suspicion. Hence, in the following section, we focus on latent risks associated with the asset class and, in particular, open-end life settlement funds.[43] Since most of the risks can hardly be quantified, one needs to rely on a comprehensive qualitative risk analysis. The discussion offers an explanation for the observed unusual performance of open-end life settlement funds. We identify the following key risk drivers in descending order of their severity, as determined by their expected detrimental impact on an investment in life settlement funds: valuation risk, longevity risk, liquidity risk, policy availability risk, operational risk, credit risk, and changes in regulation and tax legislation.

4.2 Valuation risk

The most severe risk factor associated with life settlement funds is arguably valuation risk. As described in Section 2.2, the valuation of a life settlement portfolio is commonly conducted on a mark-to-model basis. This means that due to the absence of objective market values, fund shares are dealt based on model values determined by the fund management, even though it is not clear whether the assets can in fact be sold at those values. In addition, not all models are reviewed by an actuarial advisor, implying the necessity of a profound actuarial know-how of the fund management.

The Financial Accounting Standards Board (FASB) guidelines for life settlements distinguish two valuation approaches: the investment method and the fair value method (see FASB, 2006). While, in both cases, initial measurement is based on the purchase (transaction) price, the NAV development of a life settlement fund materially depends on the methodology used for subsequent measurement. The purchase price is agreed upon by the counterparties of a life settlement transaction. Through the life settlement provider, the fund typically submits an offer to the policyholder, which he or she can accept or reject. The offer price is commonly calculated as the present value of expected future payoffs less the present value of expected premium payments and other costs. However, the discount rate in this context is not derived from a term structure but determined by the internal rate of return the fund aims to achieve on the investment, which is generally a function of its cost of capital (see, e.g., Zollars et al., 2003). The key factor

---

[42]See, e.g., studies by the Senior Supervisors Group (2008), the Financial Stability Forum (2008), and the International Institute of Finance (2008).

[43]Note that most of these risks arise from the characteristics of the underlying life settlement assets. Consequently, closed-end life settlement funds as described in Section 2.2 are generally exposed to them as well. Due to structural differences, however, closed-end funds are better equipped to cope with some of the risk factors explained in this section. Liquidity reserves, the absence of leverage, and the fact that investors are locked in until maturity, e.g., mitigate the impact of liquidity risks. Similarly, closed-end funds are less likely to run into policy availability issues and the associated pricing pressure, since, after the so-called ramp-up period, they do not need to permanently acquire new policies.

in determining the expected cash flows from a life insurance contract is an insureds life expectancy. After the initial examination, further life expectancy estimates are carried out at each fund's own discretion.

When using the investment method, the initial recognition of the policy in the books is given by the purchase price plus initial direct costs (legal costs, commissions paid, etc.). Further valuation has to be conducted by capitalizing any continuing costs such as premiums to keep the policy in force. Gains may only be recognized in case of a policy resale or in case of the insured's death, and are then given by the difference between the sales proceeds or the death benefit payment and the carrying amount of the life settlement contract. In contrast, a loss must be recognized for impairments, i.e., if there is updated information available, indicating that the expected policy payoff does not suffice to cover the carrying amount of the contract plus all projected undiscounted future premiums. This can occur if an increase in the life expectancy becomes evident or if the creditworthiness of the primary insurer deteriorates substantially. As an alternative, the FASB proposes the fair value method, where the initial value of a life settlement investment is also determined by the purchase price and, after that, ongoing valuation is based on the fair value, i.e., the sales price that the asset is likely to achieve in the market less transactions costs, with value changes being directly recognized in periodic earnings. However, due to the illiquid nature of life settlements, a mark-to-market approach is typically not practicable. Thus, it is prevalent to estimate fair values by marking-to-model. Since these valuation models are based on extensive assumptions and there is little oversight as to their validity, the fair value method implies a largely subjective assessment.

Overall, the solid performance that could be observed in Section 3 is likely to be all but a mere by-product of the accounting oriented valuation methodology for life settlements implied by the widespread investment method. This approach leaves room for large price movements only if death benefits are received or life expectancy estimates are renewed and differ significantly from the original ones. In all other cases, one should observe an almost linear growth path. Hence, it is quite likely that most funds, which displayed more stable returns over the considered time period, tend to avoid the fair value method. However, although life settlements are acquired at a large discount of their face value and the purchase price tends to understate the fair value on the transaction date, the investment method still involves the risk of an incorrect purchase price due to model errors or misestimated life expectancy (see Perera and Reeves, 2006). If the whole industry would be obliged to dispose the investment method and switch to fair values, life settlement fund returns would probably become considerably more volatile than suggested by our empirical observations over the last years. Moreover, the fair value method is associated with a further pitfall. Since fund managers are in a position to change their mark-to-model estimation methodology over time, they could on the one hand smooth returns and on the other hand evaluate fund shares at fire sale prices in the case of extensive redemptions by investors. Based on these considerations, erroneous valuation is, as already mentioned in Section 3.4, a likely cause for the major drawdowns in the time series of Fund 101, 204, and 205.

4.3 Longevity risk

Another key risk factor is longevity risk, which describes the possibility that the insured lives longer than originally expected. To measure the sensitivity of senior life settlement portfolios to changes in mortality rates and longevity risk, also called life extension risk, Stone and Zissu (2006) propose to use a life expectancy duration. The more the actual lifetime exceeds the expected lifetime, the less valuable the policy becomes for the fund and its investors. The reason is that initial pricing assumptions turned out to be incorrect in that premium payments have to be made longer and the death benefit is received later than expected. Longevity risk is particularly important in its systematic form, i.e., if the life expectancy of the whole portfolio is simultaneously prolonged. The discovery of a cure or a mitigating treatment for a common illness, e.g., implies a substantial increase in the correlation between those lives in the portfolio, which had been suffering from that particular disease (see Perera and Reeves, 2006). To cope with longevity risk, life settlement funds diversify their portfolios across different types of diseases, purchase insurance coverage (if available) or employ innovative risk management tools such as longevity swaps.

Assessing the quality of life expectancy estimates is challenging and results are rarely disclosed to the public. According to Milliman Inc. (2008), which examined the mortality experience data of two providers gained from filings with the Texas Department of Insurance, the actual number of deaths recorded from 2004 to 2006 was only 60 percent of those that had been expected. This provides an indication of the fundamental longevity risk that is inherent in life settlement portfolios. Realized investor returns in this case are likely to be considerably smaller than originally projected. In line with these findings, A.M. Best (2009) described how five year old portfolios showed signs that the life expectancy estimates had historically been too short and that since 2005, medical underwriters have issued more conservative ones. Furthermore, as indicated by industry experts, some of the largest medical underwriters, which have been able to steadily expand their influence in the market, seem to systematically underestimate life expectancies. Thus, the importance of longevity risk should not be misjudged, particularly against the background of the potential incentive problems of life settlement providers, which were discussed in Section 2.3. It should be of central interest to investors with which medical underwriters fund managers cooperate and whether they require more than one life expectancy estimate to be at least partially protected against major errors in medical underwriting. Taking these considerations into account, it may well be that a large number of insureds in the portfolios of Fund 101, 204, and 205 turned out to live much longer than initially expected, forcing the funds to realize substantial losses on the respective life settlement assets.

4.4 Liquidity risk

After the initial sale of fund shares, there are in principle two sources of cash inflows on the fund level: new subscriptions and death benefit payments – neither of which occur on a regular basis or are easy to forecast. In addition, open-end funds typically reinvest death benefits in order to purchase new policies or use them to pay due premiums. Some fund managers maintain a position in liquid assets, a reserve

account, or can draw on short-term debt financing through a liquidity facility.[44] Cash outflows, in contrast, occur on a regular basis due to premium payments, redemptions, and potentially interest plus repayment in case the fund is leveraged. In combination with the illiquid nature of the underlying, this implies that life settlement funds are fairly vulnerable to becoming liquidity strained. The consequences for investors could be devastating. If a fund falls short of sufficient cash to cover due redemptions, it has no choice but to sell off assets to make up for the missing amount unless a reserve account has been set up or short-term debt financing is attainable. Then again, the fund will probably not be able to sell life settlements from its portfolio at an acceptable value at short notice due to the mediocre permanent trading activity in the market as well as the complexity and length of the transactions. Moreover, a distressed life settlement fund is highly likely to default on the ongoing premium payments of at least some of its policies, causing them to lapse. Evidently, these risks increase disproportionately with the degree of leverage applied by a life settlement fund since it also has to bear the debt service. The same is true if policies are premium financed, i.e., if the fund takes out loans to fund premium payments. As with hedge funds, some life settlement funds partially protect themselves against the problem of illiquid assets and excessive redemptions by imposing lock-up periods, gates, and redemption fees. As a last resort, most fund managers reserve the right to suspend redemptions. While these measures reduce liquidity risk at the fund level, they clearly hamper liquidity of the fund shares at the investors' level and should thus be carefully factored into an investment decision if one does not want to find his money locked into a life settlement fund in major distress. Inevitably, the major dislocations in the capital markets during the peak of the financial crisis in 2008 have led to an imbalance between subscriptions and redemptions, which revealed severe liquidity issues of a number of funds. This is another likely cause for the observed losses of Fund 101, 204, and 205.

4.5 Policy availability risk

Along with valuation, longevity, and liquidity risk, there is also availability risk and competitive pricing pressure, because the secondary market is limited by the size of the primary market as well as the number of available target policies. Evidently, the identification of suitable policies is a critical success factor for an investment in life settlements (see Moodys, 2006). In addition, funds will have to consider the number of contracts and the policy mix in their portfolios, including different types of diseases and different primary insurers to diversify risks. Target policies typically satisfy specific criteria such as a reduced policyholder life expectancy of on average 113 months, a high face value of on average 1.8 million USD, and a policyholder age of approximately 76 years. Moreover, ideally the insured would have otherwise surrendered the policy (see Milliman Inc., 2008). Such contracts are not plentiful. According to Moodys (2006), around one percent of the permanent policies in force in the U.S. market match the characteristics commonly targeted by life settlement funds. This is one reason for the fact that only about fifteen to twenty-five percent of the policies presented to life settlement providers are actually purchased (see, e.g., McNealy and Frith, 2006). Other reasons include the inability of the policyholder to qualify for renewed coverage and the failure of the transaction partners to agree on the purchase price. It is imperative

---

[44]The reader is referred to the structural overview in Section 2 to identify these sources of liquidity.

to take these potential availability constraints into account, since the supply-demand-situation on the life settlement market substantially influences acquisition prices. Problems for the funds can occur if a large inflow of capital into the asset class is not met by a sufficient supply of adequate policies or if the market activity in general freezes. The resulting competitive pressure implies a reduction in achievable returns due to higher purchase prices. Furthermore, even for fund managers which have performed well to date, there may be adverse changes in the portfolio composition if the number of valuable life settlement investment opportunities noticeably decreases. In such a scenario, it is of importance whether a fund runs a single or multi-source approach with regard to life settlement providers since those fund managers with access to a larger number of life insurance policies are likely to be in a better position when supply in general is short. Apart from that, fund size can play an important role because smaller funds may find it easier to source enough policies that fit their investment criteria and offer an attractive risk-return perspective. Larger funds, on the contrary, could face situations where they need to relax their policy picking standards to be able to invest all of their investor money. Since market participants have not reported any supply shortages during the last two years, it is rather unlikely that Fund 101, 204, and 205 experienced drawdowns due to constrained policy availability. Nevertheless, investors should bear this potential risk in mind.

4.6 Operational risks

Among the less severe but still noteworthy risk factors are operational risks: insured fraud risk, litigation or legal risks, and operational risks originating from third-party service providers. Insured fraud risk could mean a misrepresentation of one's health status in order to achieve a higher price for the policy. In rare cases the policyholder also might not disclose all original beneficiaries or fraudulently sell the same policy to multiple buyers. Furthermore, insureds may use sales proceeds to improve their living standard and medical care, which can increase their life expectancy and, in turn, reduce investor returns.

Litigation and legal risks can arise due to the high complexity of contractual agreements, despite the fact that sales processes are becoming increasingly standardized. Life insurance companies may possibly contest the policy and refuse to pay the death benefit, e.g., due to lack of insurable interest. In addition, payments are typically held back if the insureds body is missing. This can be done by insurers for up to seven years (see Perera and Reeves, 2006). Furthermore, former beneficiaries could initiate lawsuits, accusing life settlement firms of unethical sales practice or invalid transfer with the intent to claim the death benefit for themselves. As a consequence, the payment may be substantially delayed or not transferred at all. In such a case, legal expenses may even exceed the return from the policy.

Further operational risks arise from the reliance on third-party service providers. The tracking agent, for instance, might fail to service the policy properly such that the insured's death is reported late or he cannot be located posthumously, thus delaying the collection of death benefits. However, most servicers are insured up to some amount against such operational risks. A further important risk factor with respect to the involved third parties is fraud. In particular, life settlement providers may collude with brokers in

order to discourage competitive bids. In 2006, one of the largest life settlement companies, Coventry First, was sued by New York Attorney General Eliot Spitzer and accused of bid-rigging to keep policy purchase prices low. The provider was believed to have made secret payments to life settlement brokers in exchange for which they allegedly suppressed competitive bids from other life settlement companies. The lawsuit was settled in October 2009 with Coventry First paying an additional 1.4 million USD to policyholders to adequately compensate them for the appropriate market value of their life insurance policies. Furthermore, the company agreed to pay 10.5 million USD to the state of New York to end the litigation. As a corollary of this settlement, no fine or penalty was issued against Coventry. Another prominent case is Mutual Benefits Corporation, which was alleged to have made substantial misrepresentations to investors in its marketing material, prospectuses, as well as through its network of sales people and failed to disclose focal information over several years. In particular, life expectancy estimates for a large number of its policies were fraudulently assigned at the discretion of its directors. As a consequence, around 90 percent of the policies needed to be maintained significantly beyond their life expectancy estimates, inflicting high losses on investors. In the particular cases of Fund 101, 204, and 205, however, we deem it unlikely that losses occurred due to a manifestation of operational risk factors.

4.7 Credit risk

Life settlement funds also face credit risk due to a potential default of primary insurers. Although such a credit event was thought to be virtually impossible before the financial crisis, the AIG bail-out in 2008 provides evidence that the default of an insurer, no matter what ultimately causes it, can be an issue. Yet, since the average rating of the insurance companies in the portfolios of our sample funds is "AA" and policyholders' claims rank most senior in the case of insolvency, we believe that credit risk has been irrelevant at least in the past with regard to the problems of Fund 101, 204, and 205. In addition, in the unlikely case of an insurer default, there are still state-dependent insurance guarantee funds in the U.S., which provide protection to policy owners.[45]

4.8 Changes in regulation and tax legislation

Finally, there is a risk of adverse amendments to regulatory frameworks and tax legislation. Until recently, regulation of the U.S. life settlement market was partially lax and inconsistent (see Fitch Ratings, 2007). While this has changed, regulation still varies by state. Few states do not regulate transactions at all, other states regulate viatical transactions but not senior life settlements, and still others require that brokers and providers be licensed (see Gatzert, 2010). One often discussed problem in the United States is stranger-originated (or investor-initiated) life insurance (STOLI), as it contradicts the principle of insurable interest which had already been established in the early 19th century before it was confirmed by the U.S. Supreme Court in 1911 in Grigsby v. Russell (see Katt, 2008). The principle of insurable interest distinguishes insurance from speculation. It was designed to protect the insured, since, if allowed

---

[45]However, in most cases an insurance guarantee fund would probably not cover the full death benefit of the policies due to the high face values in the case of senior life settlements. In addition, to the best of our knowledge, there has not been a precedent yet. Hence, it is not clear from a legal point of view, whether an insurance guarantee fund would need to pay for life settlement fund investors.

to purchase insurance on the lives of strangers, the holder of the policy has a financial interest in the death of the insured. The main feature of a STOLI process is that the policy is not initiated by the policyholder, but by an investor or third-party lender who provides the insured with cash to cover the premium payments and ultimately receives the death benefit (see, e.g, Fitch Ratings, 2007; Ziser, 2007; Gatzert, 2010). STOLI must be distinguished from the common practice of non-recourse premium financing, which allows policyholders who do have an insurable interest to fund their premium payments with a loan that is collateralized by the insurance policy (see Freedman, 2007).

To introduce transparency and clear rules in the market, the National Association of Insurance Commissioners (NAIC) proposed the Viatical Settlements Model Act, which would ban life settlements of non-recourse premium financed policies during the first five years of the contract (see, e.g, Fitch Ratings, 2007; Ziser, 2007; Gatzert, 2010). In November 2007, the National Conference of Insurance Legislators (NCOIL) introduced the Life Settlement Model Act, which does not include the five-year ban proposed by the NAIC, but explicitly defines STOLI as a fraudulent life settlements act (see NCOIL, 2007). In addition, the NCOIL proposal prohibits premium financing companies from owning or being financially involved in policies they finance (see Gatzert, 2010). The fragile legal status of STOLI appears to have an impact on the demand by institutional investors in that they generally avoid purchasing premium financed policies (see Beyerle, 2007). Overall, both proposals by NAIC and NCOIL are still criticized and may be refined, thus implying ongoing uncertainty in respect to the regulatory treatment of life settlements (see, e.g., Freedman, 2007). Another risk factor relates to tax legislation. As Fitch Ratings (2007) points out, the absence of insurable interest between policyholder and beneficiary may affect tax advantages associated with life insurance. Moreover, in 2009 the U.S. Internal Revenue Service (IRS) determined that death benefit payments to foreign life settlement investors will be subject to withholding tax. Although these aspects distinctly affect the market's legal environment, we believe that adverse changes in regulation and tax legislation did not cause the distress of Fund 101, 204, and 205.

5   Summary and conclusion

We comprehensively analyze open-end funds dedicated to U.S. senior life settlements, explaining their business model and the roles of institutions involved in the transactions of such funds. In addition, we contribute to the literature by conducting the first empirical analysis of life settlement fund return distributions as well as a performance measurement, including a comparison to established asset classes. Since the funds contained in our dataset largely cover this young segment of the capital markets, representative conclusions can be derived. Based on these findings, we elaborate on the risk profile of life settlement assets in general and open-end life settlement funds in particular.

Although our empirical results suggest that life settlements generally offer attractive returns paired with low volatility and are uncorrelated with other asset classes, we find substantial latent risks associated with the funds, such as liquidity, longevity and valuation risks. Since these did generally not materialize in the past and are hence largely not reflected by the historical data, they cannot be captured by classical performance measures. Therefore, investors should not be misled by a superficial first impression of the

asset class. Caution is advised and the expected return on life settlement funds should be regarded as a compensation for investors who decide to bear those risks.

It is advisable to perform extensive due diligence on life settlement funds, focusing on valuation methodology, cash management, asset pipelines as well as business partners. Wherever possible, independent third parties such as auditors and rating agencies can be involved for cross-checking and to deliver additional information such that the investor is able to balance the expected returns against a comprehensive qualitative assessment of latent risks before deciding on the portfolio weight he would like to allocate to life settlement funds. Nonetheless, our results also illustrated that – within reasonable limits – life settlements certainly provide a suitable means for diversification as they seem to be genuinely uncorrelated with the broader capital markets.

6 Appendix

6.1 Index descriptions (from index providers)

- **Life Settlements Index:**
  A custom index of open-end life settlement funds. This index is an equally weighted portfolio consisting of all available funds at any point in time. The aim of the index is to track the development of a portfolio of life settlement funds between 12/2003 and 06/2010 as adequately as possible.

  Bloomberg Ticker: -

  Further information: -

- **S&P 500:**
  The S&P 500 is widely regarded as the best single measure of the U.S. equities market and includes 500 leading companies in the major industries of the U.S. economy. Although the S&P 500 focuses on the large cap segment of the market, with approximately 75 percent coverage of U.S. equities, it is also well suited to assess the total market.

  Bloomberg Ticker: SPX <Index> <Go>

  Further information: www.standardandpoors.com

- **FTSE U.S. Government Bond Index:**
  FTSE Global Government Bond Indices comprise central government debt from 22 countries, denominated in the domestic currency or Euros for Eurozone countries. These are total return indices, taking into account the price changes as well as interest accrual and payments of each bond.

  Bloomberg Ticker: FGGVUSP5 <Index> <Go>

  Further information: www.ftse.com/Indices

- **DJ U.S. Corporate Bond Index:**
  The Dow Jones Corporate Bond Index is an equally weighted basket of 96 recently issued investment-grade corporate bonds with laddered maturities. The objective of this index is to capture the return of readily tradable, high-grade U. S. corporate debt.

  Bloomberg Ticker: DJCBP <Index> <Go>

  Further information: www.djindexes.com/mdsidx

- **HFRI Fund Weighted Composite Index:**

  The HFRI Monthly Indices are designed to reflect hedge fund industry performance by means of equally weighted composites of constituent funds. They range from the industry-level view of the HFRI Fund Weighted Composite Index, which encompasses over 2000 funds, to the increasingly specific-level of sub-strategy classifications. Fund of Funds are not included.

  Bloomberg Ticker: HFRIFWI <Index> <Go>

  Further information: www.hedgefundresearch.com

- **S&P/Case-Shiller Home Price Index (Composite of 20):**

  The S&P/Case-Shiller Home Price Indices are designed to gauge the value growth of residential real estate in various regions across the United States. The underlying methodology to measure house price movements has been developed in the 1980s and is still considered to be the most accurate way to measure this asset class.

  Bloomberg Ticker: SPCS20 <Index> <Go>

  Further information: www.standardandpoors.com

- **S&P GSCI (USD, Total Return):**

  The S&P GSCI provides investors with a reliable and publicly available benchmark for investment performance in the commodity markets. The index is designed to be tradable, readily accessible to market participants, and cost efficient to implement. The S&P GSCI is widely recognized as the leading measure of general commodity price movements and inflation in the world economy.

  Bloomberg Ticker: SPGSCITR <Index> <Go>

  Further information: www.standardandpoors.com

- **S&P Listed Private Equity Index (USD, Total Return):**

  In the last few years increasing numbers of private equity businesses have listed on stock exchanges to meet investor requirements for liquidity and transparency. The S&P Listed Private Equity Index is comprised of 30 leading listed private equity companies that meet size, liquidity, exposure, and activity requirements. It is designed to provide tradable exposure to the leading publicly listed companies in the private equity space.

  Bloomberg Ticker: SPLPEQTR <Index> <Go>

  Further information: www.standardandpoors.com

6.2 Performance measures

The Sharpe Ratio (see Sharpe, 1966) is given by

$$\text{Sharpe Ratio}_i = \frac{\mu_i - r_f}{\sigma_i}, \tag{1}$$

where μ_i is the average monthly return on asset i, r_f is the risk free monthly interest rate and σ_i represents the standard deviation of monthly returns. The Sharpe Ratio has often been criticized because of its apparent inability to capture all characteristics of non-normal return distributions. Thus it is viewed as a misleading indicator for the risk return profile of certain investments (see, e.g., Amin and Kat, 2003). Consequently, complementary performance indicators utilize alternative risk measures in order to avoid the alleged problems associated with the Sharpe Ratio. One of these measures is the Sortino Ratio (see Sortino and Van Der Meer, 1991), which employs the Lower Partial Moment of order 2 (LPM$_2$) instead of the standard deviation, i.e.,

$$\text{Sortino Ratio}_i = \frac{\mu_i - \tau}{\sqrt{LPM_{2i}(\tau)}}. \tag{2}$$

The nth order LPM for asset i is defined as:

$$\text{LPM}_{ni}(\tau) = \frac{1}{T} \sum_{t=1}^{T} \max\left[\tau - r_{it}, 0\right]^n.$$

In general, Lower Partial Moments quantify risk through negative deviations from a certain threshold return τ (e.g., the mean return, the risk free interest rate or 0). The order n governs the weighting for this downside risk and should therefore be higher, the more risk averse the investor is (see Fishburn, 1977). Other modern performance measures are based on drawdown, i.e., the loss incurred over a certain time period. The Calmar Ratio, which has become common among practitioners, particularly in the context of hedge fund performance measurement, is given by:

$$\text{Calmar Ratio}_i = \frac{\mu_i - r_f}{-MD_i}. \tag{3}$$

It relates excess return over the risk free interest rate to the maximum drawdown MD_i, which represents the lowest return over the period under consideration and is typically negative.

Finally, performance measures can also be based on Value at Risk figures. The Value at Risk for an asset i (VaR_i) is the loss over a certain period, which is only exceeded with a prespecified probability $(1 - \alpha)$, i.e., the α-quantile of the return distribution under consideration. One such indicator is Excess Return on Value at Risk:

$$\text{Excess Return on VaR}_i = \frac{\mu_i - r_f}{VaR_i}. \tag{4}$$

References

A.M. Best (2009). Life Settlement Securitization. *Available at www.ambest.com.*

American Council of Life Insurers (ACLI) (2007). Life Insurers Fact Book. *Available at www.acli.com.*

Amin, G. S. and Kat, H. M. (2003). Hedge Fund Performance 1990-2000: Do the "Money Machines" Really Add Value? *Journal of Financial & Quantitative Analysis*, 38(2):251–274.

Beyerle, H. (2007). Amerikanische LV-Policen: Der Zweitmarkt wird Mainstream, Magazin LV-Zweitmarkt. *Fondszeitung, November 2007*, pages 16–21.

Casey, B. T. and Sherman, T. D. (2007). Are Life Settlements a Security? *Journal of Structured Finance*, 8(4):55–60.

Conning & Company (2007). Conning Research: Annual Life Settlement Volume Rises to $6.1 Billion in 2006. *Available at www.conning.com.*

DBRS (2008). Rating U.S. Life Settlement Securitizations, Research Report. *Available at www.dbrs.com.*

Deloitte (2005). The Life Settlements Market, An Actuarial Perspective on Consumer Economic Value, Research Report with the University of Connecticut.

Doherty, N. A. and Singer, H. J. (2002). The Benefits of a Secondary Market for Life Insurance Policies. *Working Paper, Wharton Financial Institutions Center.*

Doherty, N. A. and Singer, H. J. (2003). Regulating the Secondary Market for Life Insurance Policies. *Journal of Insurance Regulation*, 21(4):63–99.

Eling, M. and Schuhmacher, F. (2007). Does the Choice of Performance Measure Influence the Evaluation of Hedge Funds? *Journal of Banking & Finance*, 31(9):2632–2647.

Financial Accounting Standards Board (FASB) (2006). Accounting for Life Settlement Contracts by Third-Party Investors, FSP FTB 85-4-1. *Available at www.fasb.org.*

Financial Stability Forum (2008). Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience, April 7, 2008.

Fishburn, P. C. (1977). Mean-Risk Analysis with Risk Associated with Below-Target Returns. *American Economic Review*, 67(2):116–126.

Fitch Ratings (2007). Fatal Attraction: Risks in the Secondary Market for Life Insurance, Special Report Insurance. *Available at www.fitchratings.com.*

Freedman, M. (2007). STOLI: Fact and Fiction - Combating STOLI without Violating Consumer Rights. *California Broker, December 2007.*

Freeman, M. B. (2007). Lurking Pitfalls: Due Diligence in Life Settlements Transactions. *Journal of Structured Finance*, 13(2):83–86.

Gardner, R., Welch, J., and Covert, N. (2009). Tax Aspects of Life Settlement Arrangements. *Journal of Financial Planning*, 22(2):32–34.

Gatzert, N. (2010). The Secondary Market for Life Insurance in the U.K., Germany, and the U.S.: Comparison and Overview. *Risk Management & Insurance Review*, 13(2):279–301.

Gatzert, N., Hoermann, G., and Schmeiser, H. (2009). The Impact of the Secondary Market on Life Insurers' Surrender Profits. *Journal of Risk and Insurance*, 76(4):887–908.

Giacalone, J. A. (2001). Analyzing an Emerging Industry: Viatical Transactions and the Secondary Market for Life Insurance Policies. *Southern Business Review*, 27(1):1–7.

Giliberto, S. M. (1993). Measuring Real Estate Returns: The Hedged REIT Index. *Journal of Portfolio Management*, 19(3):94–99.

Ingraham, H. G. and Salani, S. (2004). Life Settlements as a Viable Option. *Journal of Financial Service Professionals*, 58(5):72–76.

International Institute of Finance (2008). Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations, July 2008.

Kamath, S. and Sledge, T. (2005). Life Insurance Long View-Life Settlements Need Not Be Unsettling, Bernstein Research Call, March.

Katt, P. C. (2008). A Life Settlement Mosaic. *Journal of Financial Planning*, 21(3):34–36.

Kohli, S. (2006). Pricing Death: Analyzing the Secondary Market for Life Insurance Policies and its Regulatory Environment. *Buffalo Law Review*, 54:101–142.

Leimberg, S. R., Weinberg, M. D., Weinberg, B. T., and Callahan, C. J. (2008). Life Settlements: Know When to Hold and Know When to Fold. *Journal of Financial Service Professionals*, 62(5):61–72.

Life Insurance Marketing and Research Association (LIMRA) (2009). U.S. Individual Life Insurance Persistency, A Joint Study Sponsored by LIMRA and the Society of Actuaries. *Available at www.soa.org*.

Life Insurance Settlement Association (LISA) (2008). Data Collection Report 2006, Life Settlement Focus. *Available at www.lisassociation.org*.

Life Policy Dynamics LLC (LPD) (2007a). 2006 U.S. Life Settlement Market Analysis, Presentation on March 12, 2007.

Life Policy Dynamics LLC (LPD) (2007b). 2007 Preliminary U.S. Life Settlement Market Analysis, Presentation on September 17, 2007.

Ling, D. C., Naranjo, A., and Nimalendran, M. (2000). Estimating Returns on Commercial Real Estate: A New Methodology Using Latent-Variable Models. *Real Estate Economics*, 28(2):205–231.

Mason, J. R. and Singer, H. J. (2008). A Real Options Approach to Valuing Life Settlements Transactions. *Journal of Financial Transformation*, 23:61–68.

McNealy, S. and Frith, M. H. (2006). Life Settlements: Product-Flow Opportunities and Constraints. *Journal of Structured Finance*, 12(2):30–34.

Milliman Inc. (2008). Life Settlement Characteristics and Mortality Experience for Two Providers, Milliman Research Report, April 2008. *Available at www.milliman.com.*

Moodys (2006). Life Settlements: Where Life Insurance Meets the Capital Markets, Moodys Special Report No. 96492.

National Conference of Insurance Legislators (NCOIL) (2007). Life Settlements Model Act. *Available at www.ncoil.org.*

Ortiz, C. E., Stone, C. A., and Zissu, A. (2008). Securitization of Senior Life Settlements: Managing Interest Rate Risk with a Planned Duration Class. *Journal of Financial Transformation*, 23:35–41.

Perera, N. and Reeves, B. (2006). Risk Mitigation for Life Settlements. *Journal of Structured Finance*, 12(2):55–60.

Russ, J. (2005). Wie gut sind die Lebenserwartungsgutachten bei US-Policenfonds? *Working Paper, University of Ulm.*

Seitel, C. L. (2006). Inside the Life Settlement Industry: An Institutional Investor's Perspective. *Journal of Structured Finance*, 12(12):38–40.

Seitel, C. L. (2007). Inside the Life Settlement Industry: A Provider's Reflections on the Challenges and Opportunities. *Journal of Structured Finance*, 13(2):70–75.

Senior Supervisors Group (2008). Observations on Risk Management Practices during the Recent Market Turbulence, March 6, 2008.

Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business*, 39(1):119–138.

Smith, B. B. and Washington, S. L. (2006). Acquiring Life Insurance Portfolios. *Journal of Structured Finance*, 12(2):41–45.

Sortino, F. A. and Van Der Meer, R. (1991). Downside risk. *Journal of Portfolio Management*, 17(4):27–31.

Stone, C. A. and Zissu, A. (2006). Securitization of Senior Life Settlements: Managing Extension Risk. *Journal of Derivatives*, 13(3):66–72.

Stone, C. A. and Zissu, A. (2007). The Return on a Pool of Senior Life Settlements. *Journal of Structured Finance*, 13(2):62–69.

SwissRe (2007). World Insurance in 2006: Premiums Came Back to Life. *Sigma 4/2007*.

Ziser, B. (2006). Life Settlements Today: A Secret No More. *Journal of Structured Finance*, 12(2):35–37.

Ziser, B. (2007). An Eventful Year in the Life Settlement Industry. *Journal of Structured Finance*, 13(2):40–43.

Zollars, D., Grossfeld, S., and Day, D. (2003). The Art of the Deal - Pricing Life Settlements. *Contingencies, January/February*, pages 34–38.