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# Testing and Valuing Informational Advantage of Life Expectancy Providers

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## Extended Abstract

There has been considerable academic research on the value of information that might be produced by financial intermediaries (such as security analysts or rating agencies) in reviewing firm's disclosures, and in addition, in conducting their own disclosures on the firm. (At least) theoretically, the existence of security analysts and rating agencies as a stable factor in the long run market equilibrium already suggests that they must possess additional useful information that is hard to be observed by the general public. This is supported by academic works: While some early studies found no evidence of such informational advantage (Cragg and Malkiel, 1968; Elton and Gruber, 1972), (relatively) recent works overall suggest that security analysts add value in the capital market by empirically finding out that analysts' earning forecasts are more accurate and superior over sophisticated time series models (Brown and Rozeff, 1978; Brockett et al., 2013; Givoly, 1982). In addition to security analysts, other studies focus on the value added by rating agencies and analogously find out that new information is passed to investors via rating downgrades (Hand et al., 1992). Jorion et al. (2005) further compare rating agencies (credit analysts) with security analysts after the implementation of Regulation Fair Disclosure, and find that rating agencies possess confidential information that is no longer accessible to security analysts, and thus the information of credit ratings becomes more valuable. To sum up, information intermediaries play a valuable role in improving the overall market efficient in capital markets by generating/revealing useful information.

Within the insurance market, information asymmetry, and subsequently the *adverse selection* from the policyholders (or conversely, *advantageous selection* from the insurer) has also been well studied, both in the life & health segment and the property & casualty segment (see, e.g., Puelz and Snow, 1994, Cawley and Philipson, 1999, Chiappori and Salanié, 2000, Cardon and Hendel, 2001, Finkelstein and Poterba, 2004, Cohen, 2005, Finkelstein and McGarry, 2006, or Cohen and Einav, 2007). The evidence of asymmetric information is mixed in different insurance markets, and Cohen and Siegelman (2010) posit that these seemingly contrasting findings may be explained by a positive relationship between income and insurance coverage: A higher wealth or

income may be negatively associated with mortality risk but positively associated with insurance coverage. Thus, it is not clear whether the evidence is due to confounding factors that are not priced (wealth, risk aversion) or a “true” informational advantage. In a recent study, Bauer et al. (2014) further empirically provide evidence of the existence of asymmetric information in the secondary insurance market (life settlement market).

While all above works focus on the information asymmetry between the insurance policyholders and the insurer, it is possible that asymmetric information may originate elsewhere other than from the policyholder. One example is the existence of life expectancy providers that actively participate in the life settlement market. Within a life settlement transaction, a policyholder sells—or *settles*—her life-contingent insurance benefits for a lump sum payment, where the offered price (from the life settlement company) depends on an individualized evaluation of her survival probabilities by a third party life expectancy provider (LE provider).

Brockett et al. (2013) theoretically discuss how to incorporate information from the medical underwriter (LE provider here) into the life table when pricing life settlements, and point out that when furnishing estimates, the medical underwriters should “incorporate other medical study results on potential infirmities into their life value estimate.” This is indeed what is claimed/conducted by the LE providers in practice: The providers usually hire experienced physicians (sometimes former Chief Medical Directors of leading life insurers) to review and analyze medical files of policyholders, who combine their clinical experience with research and insurance medicine expertise when assessing the mortality prospects. In particular, they have diverse physician experts specialized in various diseases and closely monitor related medical advancements. Therefore, the LE providers function in the life settlement market just like rating agencies in the security market, in the sense that they provide information on the policyholder’s mortality prospect that are usually difficult to be accessed from the general public, and it is therefore of interest to assess the value of this informational advantage.

This research conducts the first examination on the existence of informational advantage possessed by the LE providers with regard to individuals’ mortality prospects. Our primary dataset

	Average (Std Dev)		Count
<i>Life Expectancy Estimate</i>	11.86 (4.27)	<i>Male</i>	33,299 (63.30%)
<i>Underwriting Age</i>	75.20 (7.25)	<i>Observed Deaths</i>	7,552 (14.26%)

Table 1: Summary statistics for the entire 52,603 cases; earliest observation date.

consists of 78,571 life expectancy evaluations underwritten by one of the leading U.S. LE providers, between beginning-of-year 2001 and end-of-year 2011. More precisely, for each record, aside from individual characteristics including sex, age, smoking status, and primary impairment, we are given a life expectancy estimate (LE) at a certain point in time. Here, the LE is calculated by applying a given individual mortality multiplier (frailty factor)—which is the result of the underwriting process and reflects the information on any potential future medical advancements—on a specified standard mortality table. After eliminating duplicated cases for the same individual, we have 52,603 distinct individuals in the dataset. Furthermore, Beyond LEs, we are also given realized times of death for the individuals that had died before January 1st 2012. Table 1 provides summary statistics on the LEs.

It is worth noting that one distinct feature of our dataset is that it consists all individuals evaluated by our LE provider, no matter what their final decision regarding settling is. That is, adverse selection from the policyholders in the life settlement market as identifies in Bauer et al. (2014) does not affect our analyses, since our dataset includes both policyholders who chose to settle and those not to. Therefore, it is sufficient for us to simply compare several predictive survival models that are built on our dataset: The first one will be solely based on the observable individual characteristics such as gender, sex, age, primary impairment, etc., and this represents the forecasting ability from the general public (or the life settlement company) without any medical expertise. The second model will be solely based on the life evaluations furnished by the LE provider, which

contains all information the provider has gathered and utilized for the underwritten policyholder. The last one will be a combination of the prior two, i.e. using both the individual characteristics as well as the provided life evaluations. Since we already have observed death counts, we can first conduct in-sample parameter estimation under each model, and then use them for out-of-sample survival predictions. By comparing the prediction power of each survival model, we are able to determine the existence of informational advantage of LE providers. In particular, the fact that LE providers possess superior information on mortality prospects is equivalent to model II (or III) performs statistically better compared with model I. Our survival models will be analogous to those used in the medical/biostatistics literature (see e.g. Aalen, 1989, Andersen and Vaeth, 1989, Lin and Ying, 1994, and McKeague and Sasieni, 1994).

Being able to identify the existence of asymmetric information, we can further quantify the “economic value” of such informational advantage. The life evaluation service from the LE provider comes at a considerable amount of fee charge, which adds additional cost to the life settlement company. However, the evidence of superior information from the LE provider implies that it also adds value to the life settlement company via more accurate pricing, better policy selection, and reduced risk exposure. If it is quantitatively shown that the created value surpasses the fee cost, then we can show that the LE providers play a valuable role in improving the overall market efficient and promote a healthier secondary life insurance market, just as information intermediaries do in the capital markets.

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