

Mortality Experience in the Elderly in the Impairment Study Capture System

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Key Words: life insurance, elderly, mortality

Abstract

Using the dataset of the Impairment Study Capture System, we analyzed mortality experience and underwriting on policies issued at ages 70 and up. Policy issue dates were from 1990-1998 and observation ran from 5 - 12 years. There were 1430 deaths in a total exposure of over 102,000 policy-years. Nearly 2/3 of the total exposure was for females. Despite the use of expected mortality differentiated by smoking status, the mortality ration for smokers was much higher than for nonsmokers. Both the type of underwriting (paramedical and medical compared to nonmedical and simplified) and the underwriting risk class confirmed the intended effects of underwriting. Variation of mortality ratio by duration after issue did not contradict the select period slope of the 2001 VBT.

Introduction

Life insurance on elderly applicants poses a dilemma for carriers. This historically underserved market is attractive to an industry hungry for growth. However, the lack of credible experience makes it difficult to determine the proper mortality charge. Intercompany studies yield late duration mortality experience from policies issued to younger applicants many years ago. Since then, underwriting practices have changed, and general U.S. population mortality has improved. Evolution of product and market characteristics, such as the introduction of preferred risk classes, makes the data on these policies even less relevant. Despite these uncertainties, the lure of new premium has led to a considerable increase in sales at ages 70 and up in recent years. The emergence of the life settlement market has sharpened concerns about proper pricing.

What will happen in early durations on recently issued policies? The Impairment Study Capture System (ISCS) offers another perspective on the mortality experience of such cases. This report analyzes experience in this dataset.

Methods

The ISCS is an intercompany collaboration with MIB Group, Inc. and the Morbidity and Mortality Liaison Committee (MMLC). Participating companies report policy issue data and policy status to MIB. MIB matches these policies to impairment codes reported at the time of underwriting and compiles actual and expected mortality on this block of lives. The MMLC designs studies and analyzes the results. Previous MMLC studies have analyzed alcohol and liver enzymes, blood pressure, diabetes, build, and aviation and hazardous sports. Abstracts and references to prior studies and more information about MMLC are located at www.mmlc.org.

The issue dates for policies in this study ranged from 1990-1998. Policy status experience extends from 5 - 12 years of observation, to as late as 2002. Please see the appendix for a list of contributing companies.

Policy data include MIB impairment codes, age, sex, smoking status, type of underwriting, issue date, and risk class. The MMLC has chosen the 2001 VBT for expected mortality because the underlying experience is smoker specific and the exposure period is roughly the same as for ISCS data capture. Confidence intervals for actual to expected (A/E) mortality ratio (MR) use the Byar's approximation based on the Poisson distribution¹.

Results

Exposure

During the study period, 1430 deaths occurred. Total exposure for the study group is 102,507 policy-years. The gender distribution was 64% female and 36% male. The Table displays the number of deaths and total exposure by age and gender. Figures 1-3 show the exposure distribution by gender, age, smoking status, and policy duration. The study is heavily weighted to nonsmokers, women, ages 70-74 and durations 1-5.

Table

		Age			Total
		70-74	75-79	80 and up	
Female	Deaths	446	281	60	787
	Exposure (policy-yrs)	44,565	18,691	2586	65,841
Male	Deaths	395	222	26	643
	Exposure (policy-yrs)	26,041	9356	1269	36,666

Figure 1

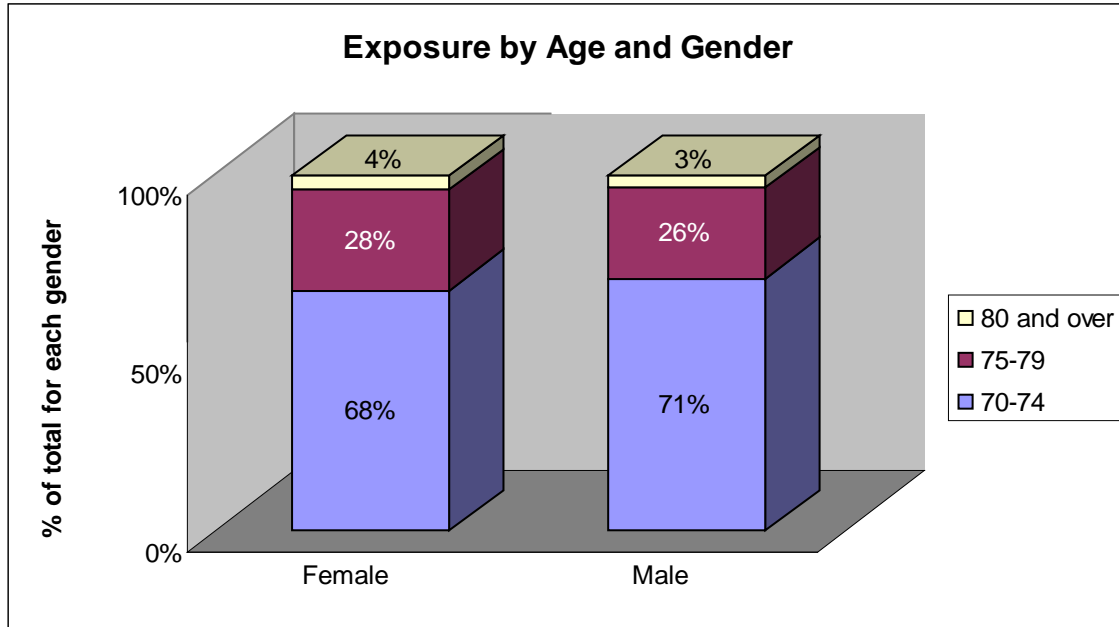


Figure 2

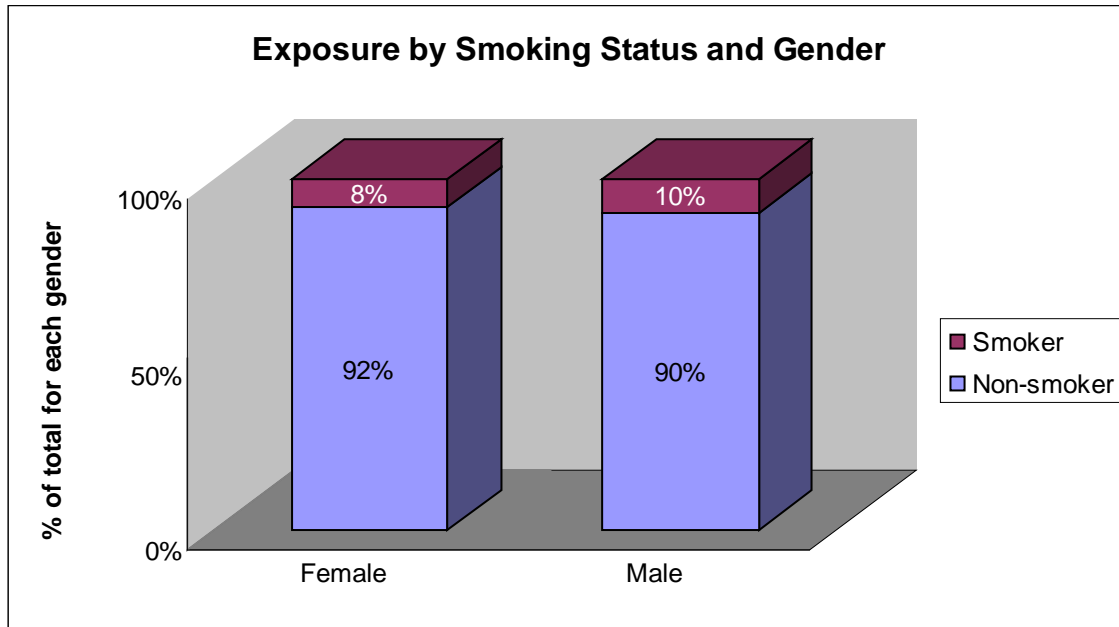
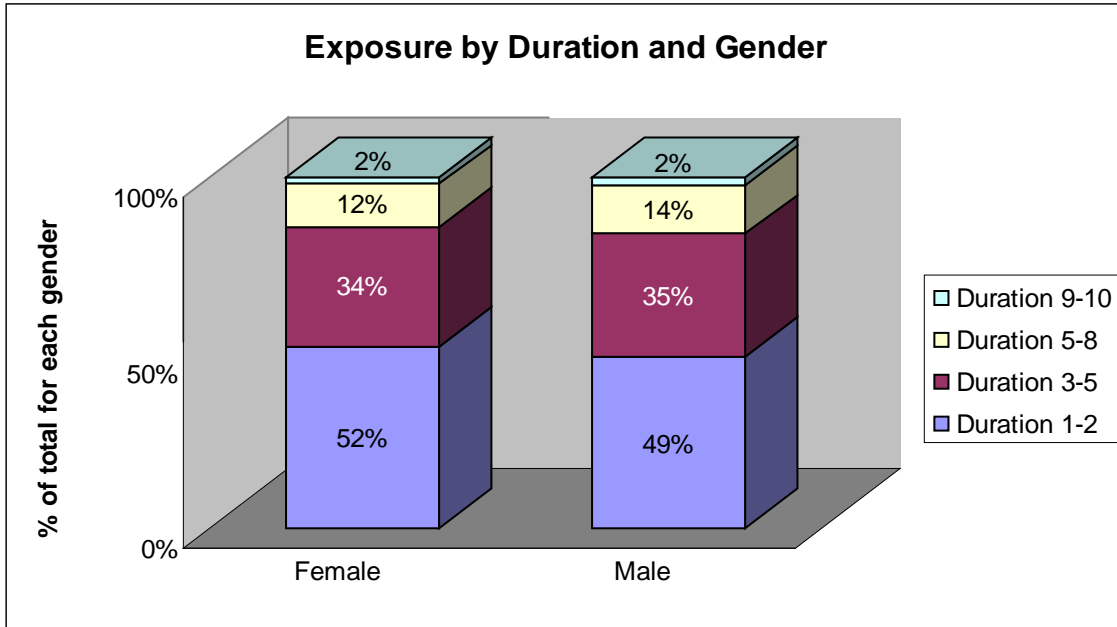


Figure 3

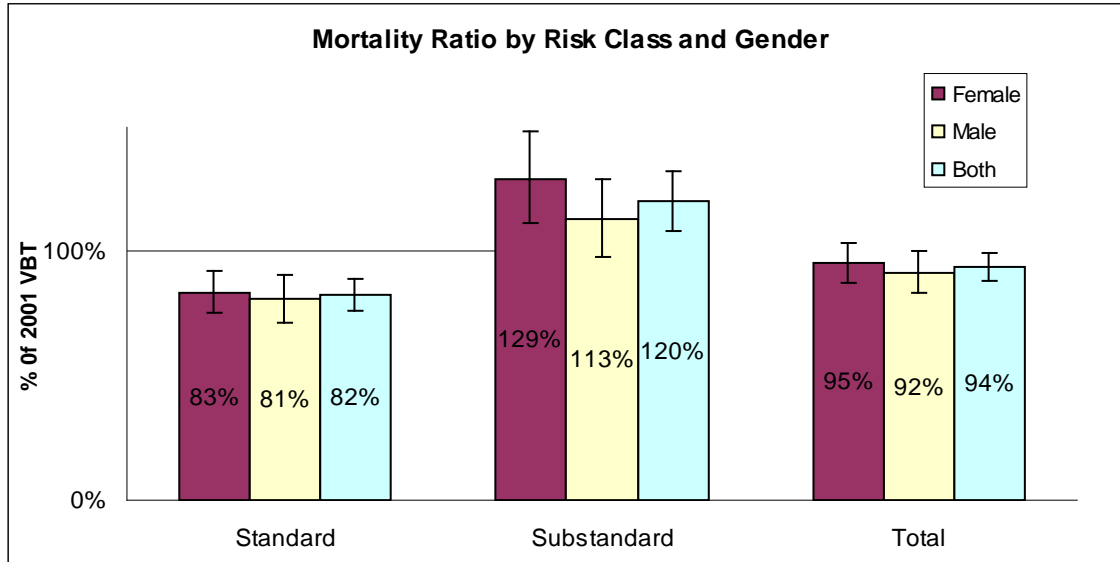


No single impairment code comprised sufficient experience to draw any conclusions about impairment-specific underwriting performance. Instead, this report combines all impairment codes in order to examine overall underwriting performance and insured mortality levels in the elderly. By policy year, 26% of exposure was coded for normal ECG or chest x-ray alone, 44% for a single impairment, and 29% for multiple impairments.

Mortality results

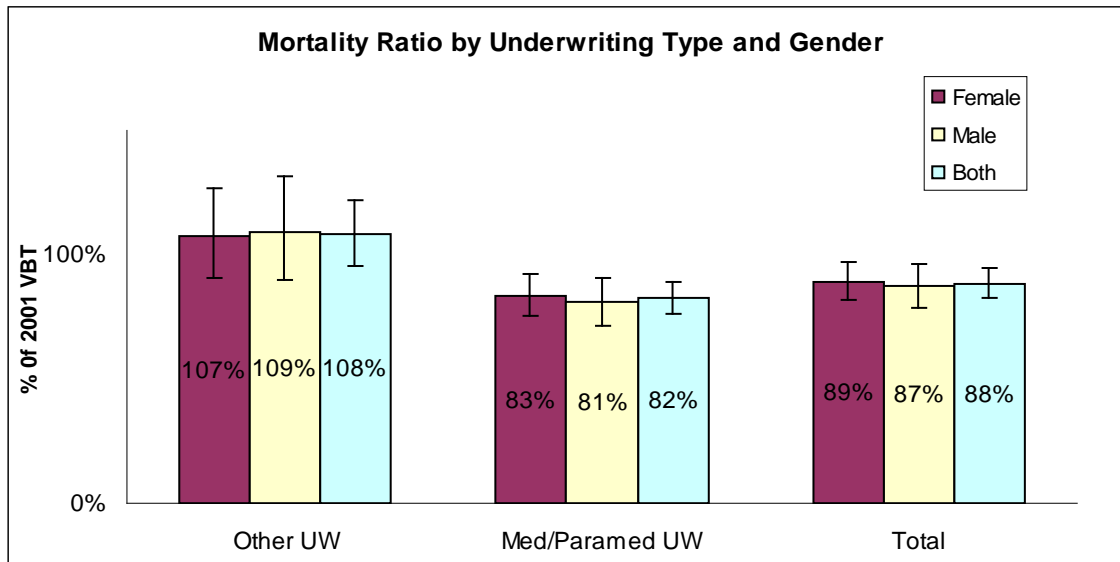
Cases issued substandard include the entire range of table ratings and flat extra ratings that companies placed. The dataset does not capture the exact rating, only whether the risk class is standard or substandard. Thus, we examined the MR to analyze whether underwriting actions generate appropriate experience. Figure 4 illustrates that cases issued standard have MR 82%, significantly better than 100% of the table, while substandard cases have worse mortality, 120% of 2001 VBT. This result is consistent for both male and female insured lives. The substandard group includes both flat extra and table ratings, of all magnitudes.

Figure 4



The ISCS population includes several different levels of underwriting: medical, paramedical, non-medical, simplified, and not underwritten. In order to reduce this heterogeneity and associated differences in mortality, we grouped medical/paramedical policies and compared them to policies with less intensive underwriting. Figure 5 shows that for policies issued in the standard risk class, medical/paramedical underwriting produced a mortality ratio (MR) of 82% of the 2001 VBT, while policies with other forms of underwriting showed a mortality ratio of 108% of the VBT. All further results are limited to medical/paramedical underwriting, which comprised 74% of the total exposure.

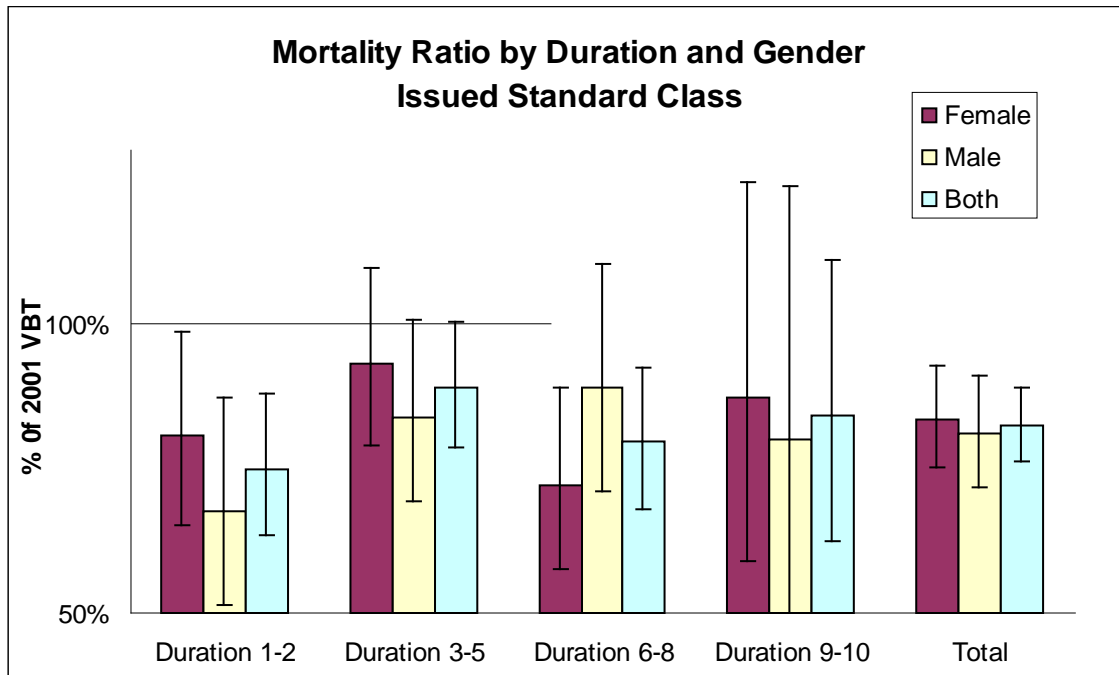
Figure 5



One of the main concerns in measuring mortality in the elderly is the choice of expected mortality table. To examine the suitability of 2001 VBT, we determined actual/expected mortality by duration in policies issued in the standard risk class. We excluded

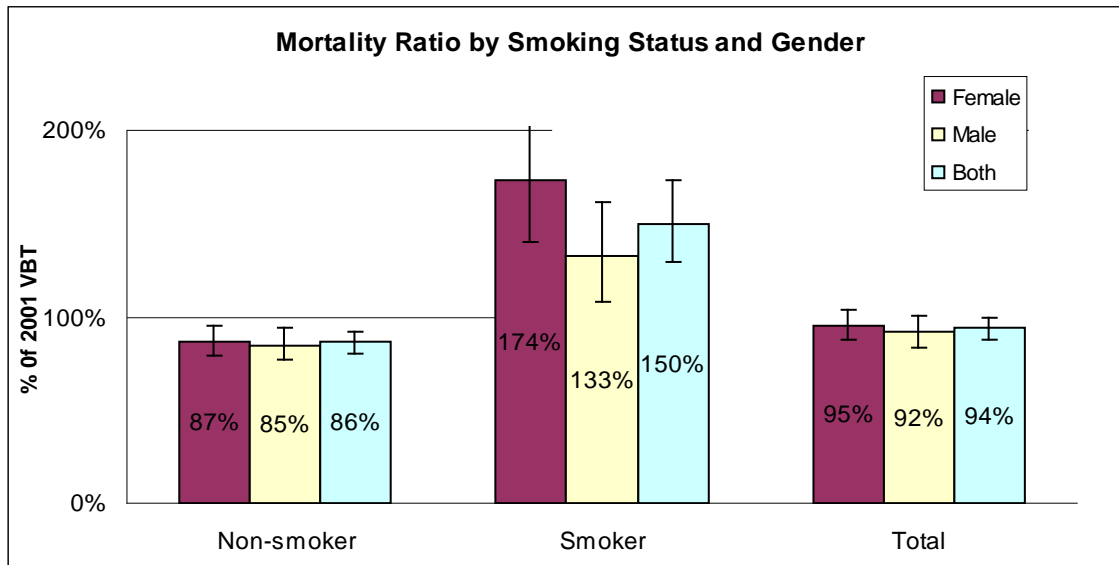
substandard policies because accurate A/E ratios require the actual rating class, which ISCS does not capture. Figure 6 shows the A/E results. In duration 1-2, and for the total study, MR is statistically significantly lower than 100% of 2001 VBT. After durations 1-2, the confidence intervals are wide because few deaths occurred and exposure is low. MR remains roughly constant through all durations, suggesting that 2001 VBT slope is not substantially wrong.

Figure 6



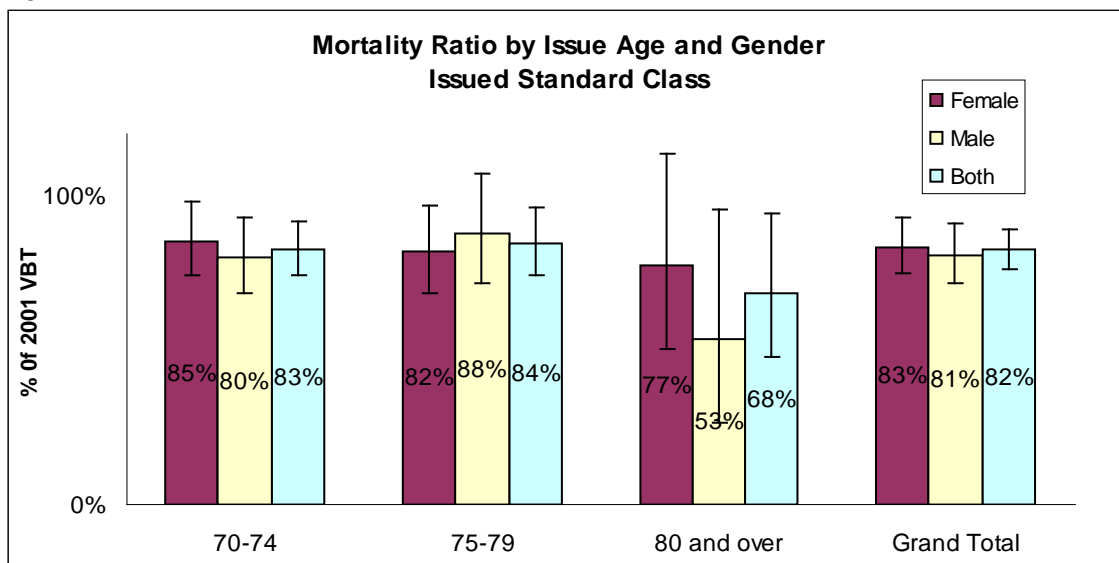
An advantage of 2001 VBT is the availability of smoker distinct tables. Figure 7 shows the MR of our dataset by smoking status. Against the smoker expected, elderly smokers show MR significantly higher than 100% of 2001 VBT, in marked contrast to nonsmoker MR.

Figure 7



Another concern in underwriting this age group is the efficacy of risk selection at the highest ages. Figure 8 shows MR by issue age and gender. Against the 2001 VBT benchmark, there is a suggestion that experience might be a little better above age 80.

Figure 8



Discussion

ISCS has its drawbacks. The data do not identify individual policyholders, so it is possible that some of the experience overweights multiple policies on a single person. It is unlikely that such cases represent enough of the sample to modify any of the

observations. MIB codes and policy status descriptors are crude indicators of important underwriting variables. Participation from MIB member companies is sadly limited. Nevertheless, the ISCS studies including the present report permit a look at relatively recent industry experience with insight into important aspects of risk classification that has no parallel.

This examination of cases issued over age 70 suggests several points.

- Although the elderly market is growing, and some carriers issue policies to age 85 and occasionally beyond, in force experience remains concentrated at ages 70-74.
- Women over age 70 in the general population outnumber men, but males traditionally represent the majority of life insurance sales. In this study, nearly 2/3 of all experience is female, much more than we expected. Mortality experience is similar in both genders.
- Elderly select period experience is particularly rare. Considerable controversy surrounds the judgment of the most appropriate mortality assumption in this group. In our dataset, MR measured against 2001 VBT showed no obvious relationship to policy duration or issue age. The data suggest the possibility that MR is lower above age 80. One might expect this given the increasing conservatism in the actions of underwriters at extreme ages. Our study suggests that 2001 VBT slope is not seriously wrong. Unfortunately, this conclusion is not terribly robust due to our small sample.
- MR markedly differed between smokers and nonsmokers. The nonsmoker group includes former smokers, some of whom have recent and prodigious smoking history. That effect would blur the true magnitude of excess mortality of smokers. Despite the use of smoker-specific expected mortality, smoker MR is much higher in this study. Perhaps 2001 VBT smoker mortality understates the true mortality for this group.
- Proper risk selection in the elderly is difficult. Our study provides reassurance that industry risk classification performance is effective. More intensively underwritten cases (medical and paramed) exhibited lower mortality than those with nonmedical and simplified underwriting. Cases issued substandard exhibited clearly worse mortality than standard cases, just as underwriters intend and regulators demand. Strictly speaking, the justification the ISCS extends applies only to contributing companies.

Appendix

The MMLC and its affiliated organizations thank the following companies for contribution of data. Without their generous commitment, this work would not be possible.

Allstate Insurance Company
American United Life Insurance Company (OneAmerica)
MONY Life Insurance Company (AXA-Equitable)
Canada Life Assurance Company
Guardian
Hartford Life Insurance Company
Lutheran Brotherhood (Thrivent Financial for Lutherans)
Manulife Financial (John Hancock)
Lincoln National Life Insurance Company (Lincoln Financial)
Northwestern Mutual Life Insurance Company
State Farm Life Insurance Company
Sun Life Assurance Company of Canada
The Great-West Life Assurance Company
Veterans Life Insurance Company
Western-Southern Life Insurance Company
Woodmen of the World

¹ Breslow and Day (1989) *Statistical Methods in Cancer Research, Volume 2 – The Design and Analysis of Cohort Studies*. Oxford University Press, New York: International Agency for Research on Cancer. P71