Potential Impact of Pandemic Influenza on the U.S. Life Insurance Industry

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“There is an awesome crack between unlikelihood and impossibility.”

- Richard Neustadt and Graham Allison

TABLE OF CONTENTS

EXHIBITS

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This work represents a collaborative effort of many people working together on a challenging topic. Part of the challenge arriving at conclusions lies in the lack of data, complicated further by difficulties in interpreting what little data we had available to us. Developing consensus required patience and stamina; everyone involved put in extra effort to bring this project to fruition.

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1. INTRODUCTION

The first known case of the H5N1 avian influenza virus jumping the species barrier to humans occurred in Hong Kong in 1997.[1] The outbreak was tamped down due to strong leadership by the World Health Organization (WHO) and vigorous culling of 1.5 million fowl from local poultry flocks. Despite these efforts, the virus resurfaced in 2003 and is now endemic in domestic fowl throughout Asia.

Currently, the virus has yet to develop the capacity for sustained human to human (H2H) transmission. This capability could be derived through the process of adaptive mutation (antigenic drift or shift) or reassortment (the exchange of host and avian influenza genetic material during co-infection of human or swine). According to the WHO, should efficient and sustained human to human transmission of a new influenza virus subtype occur, the requirements of a pandemic would be met.[2]

Numerous papers have been written exploring the potential impact of a pandemic on our communities, businesses and the economy as a whole. This paper focuses on the potential implications of a pandemic on the U.S. life insurance industry. Unless otherwise stated, all figures and statistics refer to the United States and all life insurance statistics refer to year-end 2005.

1.1 Background

Global pandemics have been reliably documented as occurring since the 16th century.[3] An average of three pandemics per century have occurred at intervals ranging from 10 to 50 years.[4] While there is no set timeframe for a pandemic to occur, experts agree

[1] "H5N1 Avian Influenza Timeline," *www.who.int/entity/csr/disease/avian_influenza/Timeline_24 02.pdf*, February 24, 2006.
[2] The H5N1 virus is not the only potential mechanism for an influenza pandemic, although it is currently seen as the most threatening.
[3] "Avian influenza assessing the pandemic threat," World Health Organization, January 2005, Page 23.
[4] Ibid

that it is certain that influenza pandemics will continue to take place, and it is only a matter of time before the next one does occur.[5]

Although anecdotal information can be found in the written record, statistical information on pandemic behavior is available only starting at the beginning in the 20th century. Cumulative morbidity is consistently estimated to be between 25 and 35 percent of the population for the duration of the pandemic.[6] Pandemics often occur in waves; however, there does not appear to be any discernable pattern between the number of waves, their timing or relative virulence according to Dr. Michael Osterholm of CIDRAP.[7]

The pandemic of 1918 stands out as the most virulent on record.[8] According to the official U.S. government Web site, more than 675,000 excess deaths from the flu occurred between September 1918 and April 1919 in the United States alone.[9] Author John Barry suggests the pandemic came in a series of waves stretching over a two-year period starting with a "sentinel wave" in the spring of 1918, and peaking in the last quarter of 1918 before fading away in 1920. He estimates as many as 50 percent of the total deaths occurred during the period from mid-September to early December of 1918.[10]

Health experts believe that the current H5N1 avian influenza now circulating in East Asia poses the greatest risk for meeting the conditions of a new pandemic since 1968.[11] Of all influenza viruses that circulate in birds, the H5N1 virus has caused the greatest

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[5] Osterholm, Michael, "Avian Flu: Addressing the Global Threat," Testimony before the House Committee on International Relations, December 7, 2005, p. 2.
[6] "A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues," Congressional Budget Office, December 8, 2005 p. 6.
[7] Osterholm Michael, Society of Actuaries speech, June 20, 2006.
[8] Patterson, K. David, "Pandemic Influenza 1700-1900," Rowman & Littlefield, Inc. 1986, p. 91.
[9] "Pandemics and Pandemic Threats since 1900," *www.pandemicflu.gov/general/historicaloverview.html*, Sept. 5, 2006.
[10] Barry, John M., "The Great Influenza," Viking Penguin, New York, 2004, p. 5.
[11] "Current WHO phase of pandemic alert," *www.who.int/csr/disease/avian_influenza/phase/en/index.html*, Sept 5, 2006.

number of human cases of severe infection and the greatest number of deaths.[12] It has crossed the species barrier to infect humans on at least three occasions in recent years: in Hong Kong in 1997 (18 cases with six deaths), in Hong Kong in 2003 (two cases with one death) and in the current outbreaks that began in December 2003 and were first recognized in January 2004.[13] When the RFP for this project was prepared in August 2005, the World Health Organization had confirmed 57 deaths in Vietnam, Cambodia, Thailand and Indonesia. Although it is likely that mild cases and some deaths remain unaccounted for, as of April 2, 2007, the WHO reported that the number of confirmed human cases had risen to 288 and confirmed deaths to 170 for a mortality rate of 59 percent.[14]

It is also important to remember that, while H5N1 is presently the virus of greatest concern, it cannot be ruled out that the adaptive mutation of seasonal influenza or reassortment of another influenza subtype might cause the next pandemic.[15]

1.2 Scope

The purpose of this project is to create reference material to educate actuaries and other risk management professionals as to the potential impact of pandemic influenza on the U.S. life insurance industry. The goal is not to try to reproduce the results of a particular pandemic but to learn from the past and to the extent possible apply the information to today. The information developed is intended to serve as a resource for use in both assessing the potential impact of an influenza pandemic on the U.S. insured population and exploring the financial consequences to the U.S. life insurance industry should sustained H2H transmission occur.

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[12] World Health Organization. "WHO Avian Influenza Fact Sheet , www.who.int/mediacentre/factsheets/avian_influenza/en, February 28, 2007.
[13] Ibid
[14] World Health Organization. "Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO," www.who.int/csr/disease/avian_influenza/country/cases_table_2007_02_27/en/index.html.
[15] "WHO Avian Influenza Fact Sheet," op cit.

It is the work of the actuary to quantify the economic consequences of risk and explore options for risk mitigation, diversification and/or risk assumption. Since the potential virulence of pandemic influenza historically varies so widely, it is important to consider a range of outcomes rather than assume a point estimate. Although a continuum of events exists between a mild pandemic and a pandemic of the magnitude of the 1918 event, there is arguably more to learn studying the impact of a severe pandemic than there is studying the effects of a mild one. As is often the case with mathematical functions, the behavior tends to be most interesting at the extremes. Exploring the impact of a severe pandemic helps the industry to better prepare for more moderate scenarios. Pandemic preparation also assists in "all hazard" business continuity preparations for other extreme events.

1.3 Limitations

Use of this report is limited to the purpose described herein and subject to the following limitations. This research has been prepared to assist in understanding the potential implications of a pandemic on the U.S. life insurance industry. The SOA does not endorse the use of this work to predict the impact of a pandemic on a particular company or group. Parties which are interested in applying this research to individual companies using the accompanying spreadsheet tools[16] should closely examine the characteristics of their unique situation and use judgment in developing and applying assumptions regarding pandemic scenarios and company specific assumptions.

Assumptions have been developed from published literature, surveying industry experts and other sources. Life and reinsurance industry assumptions were based primarily on industry data. The pandemic scenario assumptions were selected based on published literature and informed judgment. These assumptions include and are not limited to:

[16] The accompanying spreadsheet tools can be found on the SOA Web site at *www.soa.org/research/research-life.aspx*.

Pandemic Scenario Assumptions

- Morbidity rates
- Population excess death rates
- Distribution of excess deaths by age
- Insured population mortality ratio

Life Insurance Industry Assumptions

- Exposure and distribution
- Reserves by age
- Reinsurance credit
- Impact of taxes

Reinsurance Industry Assumptions

- Exposure and distribution
- Capital and surplus
- Assets backing retroceded amounts
- Other sources of capital

Two deterministic pandemic scenarios were selected to model: a moderate scenario (comparable to 1957) and a severe scenario (comparable to 1918). These scenarios are driven by population excess death rates taken from U.S. government publications (e.g. the *Health and Human Services Pandemic Influenza Plan* [17] and the *Homeland Security Council's National Strategy for Pandemic Influenza Implementation Plan* [18]). They are intended to serve as reference points to bracket a broad range, but not necessarily all, potential outcomes.

[17] U.S. Department of Health and Human Services, "HHS Pandemic Influenza Plan," November, 2005, p. 18.

[18] Homeland Security Council, "National Strategy for Pandemic Influenza Implementation Plan," May, 2006, p. 1.

Similar to deterministic scenarios used in cash flow testing, probabilities have not been ascribed to the selected scenarios; there is no way of determining the virulence of a pandemic until it occurs. Some experts believe that the mortality in an H5N1 pandemic could be in excess of the selected severe scenario; there are others who believe that a pandemic is far from imminent and, when it does occur, will be milder than the selected moderate scenario. It is likely that different scenarios will emerge if the next pandemic derives from an H5N1 reassortment versus an adaptive mutation of currently circulating seasonal influenza.

Reliance is placed on published and unpublished sources of industry data cited in this document. To the extent these sources are incorrect, estimates of the economic impact may likewise be incorrect. Using different assumptions will produce different results. Individual companies which replace aggregate industry data with company specific data may avoid some of the shortcomings inherent in using aggregate industry estimates. Companies that use this research and accompanying spreadsheet tools to perform their own risk analysis are encouraged to carefully review the assumptions and methodology contained herein with the assistance of a qualified actuary to ensure appropriate implementation.

Some important elements affecting the full economic impact of a pandemic to the insurance industry have not been estimated quantitatively, including but not limited to the impact on asset values, gains on release of payout annuity reserves, cost of guarantees on variable products and potential liquidity and disintermediation risks. A pandemic will have significant economic consequences for the United States and global economies. It is important that the actuary consider the potential economic consequences and their implications to an insurance company.

The level of business continuity planning will affect a company's ability to weather a pandemic, perhaps materially. A discussion of business continuity and disaster recovery planning at the individual company level is beyond the scope of this paper.

2. EXECUTIVE SUMMARY

The purpose of this project is to create reference material to educate actuaries and other risk management professionals as to the potential impact of pandemic influenza on the U.S. life insurance industry. The research objective is not to reproduce the results of a particular pandemic, but to learn from the past and to the extent possible apply the information to today. The information developed is intended to serve as a resource for use in both assessing the potential impact of an influenza pandemic on the U.S. insured population and exploring the financial consequences to the U.S. life insurance industry should sustained H2H transmission occur.

The core of the paper is quantifying the potential impact of selected pandemic scenarios on the life insurance industry. The methodology used is a deterministic approach looking at the industry in aggregate. Gross claims for individual and group lines are estimated and then various adjustments (release of reserves, credit for reinsurance and impact of taxes) are subtracted from the gross to arrive at net claims. The analysis of the reinsurance credit under the severe scenario is particularly important to direct writers, as reinsurer capitalization may be stressed at the high end of the selected scenario range.

Assumptions have been developed in three primary areas: pandemic scenario assumptions, life insurance industry assumptions (direct writers) and reinsurance industry assumptions. Pandemic scenario assumptions encompass morbidity, excess death rates due to pneumonia and influenza (P&I)[19] and the distribution of those excess deaths by age. Starting with U.S. government figures used for planning purposes,[20] two scenarios, a moderate scenario based on 209,000 general population excess deaths and a severe scenario based on 1.9 million excess deaths, were developed. These figures are comparable to the excess death rates experienced in 1957 and 1918

[19] Deaths attributable to the pandemic influenza waves in excess of baseline seasonal influenza deaths.
[20] U.S. Department of Health and Human Services, "HHS Pandemic Influenza Plan," November, 2005, p. 18.

pandemics respectively grossed up for today's population; they do not include the potential impact of interventions (medical and otherwise) not available during previous pandemics.[21] This is an assumption that individuals and firms will want to carefully consider, as opinions vary widely regarding the health care system and stability of just-in-time supply chains.

Sometimes described as a "mortality curve," the distribution of excess deaths by age is another important driver.[22] Two excess death distribution patterns were developed based on historical data and judgment: a "U" curve (excess deaths primarily at very young ages and at ages 65-plus) and a "V\" curve (excess deaths at the very young ages and a spike at ages 20-40). These distributions were applied to the moderate and severe scenarios respectively. However, one can quickly and accurately estimate the impact of a particular pandemic scenario on an insured lives portfolio using an assumption of flat extra excess deaths per thousand.

Industry assumptions include the number of insureds and average face amounts by age. In addition, the reserve release and reinsurance credit percent must be estimated. The reinsurance credit is based on an estimate of reinsurance claims for the scenario and adjusted for available reinsurer capital and surplus. All of these items, net of the impact of tax loss carry-forwards, are used to estimate net claims for the moderate and severe pandemic scenarios presented in Table 1.

[21] Almost all "then versus now" comparisons are encouraging, in theory. The weight of evidence suggests that if a novel virus as pathogenic as the 1918 strain were to reappear today, a substantial proportion of the potential 1.9 million fatalities could be prevented with aggressive public health and medical interventions. See Morens, David and Fauci, Anthony. "The 1918 Influenza Pandemic: Insights for the 21st Century," *The Journal of Infectious Diseases*, April, 2007, p. 1025.

[22] Strictly speaking a mortality curve is the plot of mortality rates by age, usually from all causes. In this context we are talking about a distribution of excess P&I deaths by age, not an all-cause mortality curve typically used by actuaries.

Table 1

U.S. Direct Life Insurance Industry
Estimated Net Claims
(Billions of Dollars)

	Moderate Scenario	Severe Scenario
Individual	$ 1.3	$ 34.3
Group	1.5	30.0
Total	2.8	64.3
2005 Claims	$ 107.6	$ 107.6
% Claims	2.6%	59.8%
2005 Surplus	$ 255.7	$ 255.7
% Surplus	1.1%	25.1%
2005 RBC	$ 62.5	$ 62.5
% of RBC	4.5%	102.9%

Under the moderate scenario, net claims attributable to direct writers total $2.8 billion. According to the 2006 ACLI Life Insurers Factbook, life benefits paid in 2005 were $107.6 billion while capital and surplus was placed at $255.7 billion. Thus, a mild or even a moderate pandemic similar to 1957 would not stress the industry's capitalization. More important concerns might arise from business continuity issues.

Under the severe scenario, taking full tax credit for operating losses, life insurance net claims are approximately $64.3 billion. The 2005 statutory based capital and surplus of $255.7 billion represents an aggregate risk based capital (RBC) ratio of 409 percent of the authorized control level.[23] The $64.3 billion in claims represents a reduction of

[23] RBC uses statutory accounting practices and is calculated based on year-end figures intended to measure risk assumed by a company in a quantitative way. Companies whose statutory surplus levels fall below 200 percent RBC are placed under ever stricter regulatory oversight measures. Companies that approach this threshold are typically under some sort of distress with negative rating agency implications.

approximately 25 percent of the industry's capital, leaving an average remaining RBC of 306 percent.

It is clear that the industry as a whole can weather even a severe pandemic on the scale of 1918. Based on these assumptions, and a mix of business comparable to the industry, companies with less than 100 percent of RBC would be at an increased risk of insolvency. However, in 2005 there were only 14 companies with an RBC of less than 100 percent,[24] representing less than .1 percent of the total industry assets.

It is important to note different companies will present different risk characteristics based on their unique mix of business as well as their geographic distribution. There remain other items which this paper does not quantify which may have a material impact on these results. Some of these considerations include potential impact on asset values, liquidity and disintermediation risks, the duration of the claims surge, gains on release of payout annuity reserves, the cost of guarantees on variable products and post-pandemic mortality levels.

[24] American Council of Life Insurance. *Life Insurers Fact Book,* 2006, p. 28.

3. QUANTIFYING THE IMPACT

This section examines the life insurance industry as it relates to quantifying pandemic exposure. The methodology for the calculations is outlined first, followed by a discussion of the drivers for the pandemic scenarios and assumptions for the direct and reinsurance industries. Results are presented on a gross basis, with adjustments for reserve release, reinsurance credits and taxes subsequently netted out. Other considerations which this study did not quantify, but may have a material impact on value, are discussed.

3.1 Methodology

A deterministic approach for developing the estimates has been used. Mortality rates are segmented into quinquennial ages 0 to 84; ages 85 plus have been aggregated. These age groupings were chosen as they were a good fit with data from the various sources utilized, with minimal interpolation or extrapolation required. The methodology used is the same for both individual and group life. With quinquennial age groupings and a limited number of variables and assumptions, the results produced are reasonable and robust compared to existing published estimates.[25]

First, gross claims are projected with no adjustment for release of reserve, reinsurance credit or tax offset. Next, net claims are calculated based on assumptions of reserves per thousand by age, the reinsurance credit and a tax offset. The reinsurance credit is based on an estimate of reinsurance claims for the scenario and claims surge capacity.[26] Individual and group lines of business are modeled separately.

3.1.1 Gross Claims Calculation

Following is an explanation of page 3 of Exhibits 3, 4, 7 and 8 (the Individual and Group Exhibits), Gross Claims found in the EXHIBITS section of this paper.

[25] See Pugh, Howell, "Pandemic: The Cost of Avian Influenza," *Contingencies*, September 2005 and Weisbart, Steven, "Pandemic: Can the Life Insurance Industry Survive the Avian Flu," January 17, 2006.
[26] Reinsurer capital and surplus, assets backing retroceded and an estimate of capital available from other sources.

The insured population is estimated based on LIMRA data of insurance ownership[27] and U.S. census data from April 2000 projected to July 1, 2004. The LIMRA data is not grouped quinquennially so judgment is applied to distribute the ownership percentage by age. To ensure consistency, the insured ownership as a percentage of the total U.S. population was tied back to the aggregate LIMRA figure (approximately 37 percent for both individual and group).

The face amount in force by age band is then calculated by multiplying the average face amount times the number of individuals insured. The face amount in force is validated by comparing the calculated amount to NAIC inforce data.

The general population morbidity, mortality and excess deaths per thousand by age are based on the excess death curve for the scenario selected. These assumptions are discussed later in Section 3.2, Pandemic Scenario Assumptions.

The general population excess deaths are calculated by multiplying the census population by the excess deaths per thousand by age group. The insured excess deaths are calculated by multiplying the number of individual policy or certificate holders by the assumed insured population excess deaths per thousand (the insured population mortality ratio times the general population excess deaths per thousand). Gross excess claims is the product of the estimated number of deaths times the estimated face amount.

3.1.2 Reinsurance Analysis

Following is an explanation of page 2 of Exhibits 3, 4, 7 and 8 (the Individual and Group Exhibits), Reinsurance Analysis found in the EXHIBITS section of this paper.

[27] Retzloff, Cheryl D., "Trends in Life Insurance Ownership among U.S. Individuals," *LIMRA International*, 2005, p. 17.

The reinsurance analysis estimates the reinsurance credit for direct writers based on the assumed reinsurance distribution by age, the pandemic scenario and the reinsurance credit percent.

The reinsurance distribution by age is based on data provided by three of the top five U.S. life reinsurers; it is not broken out by group and individual lines. Reinsurance ceded by age is estimated by multiplying the total amount of reinsurance in force by the assumed age distribution. The reinsurance ceded is then multiplied by the assumed insured population excess deaths per thousand based on the pandemic scenario to arrive at reinsurance claims.

The reinsurance credit is the result of the gross reinsurance claims times the reinsurance credit percent (described in Section 3.1.4).

3.1.3 Net Claims

Following is an explanation of page 1 of Exhibits 3, 4, 7 and 8 (the Individual and Group Exhibits), Net Claims found in the EXHIBITS section of this paper.

The net claims calculation takes the gross claims from page 3 and adjusts them for release of reserve, reinsurance credit and tax offsets.

The reserve per thousand is based on data provided by various insurance companies. The reserve distribution for a particular company would be different from the data presented here. The reserve release is calculated by multiplying the gross claims times the reserve per thousand divided by one thousand. The reserve release per thousand varies by scenario but the credit for individual is materially higher than the credit for group. Net claims before taxes is thus gross claims minus the reserve release minus the reinsurance credit calculated on page 2.

For going concerns there is typically a tax offset for net operating losses (NOL). Although it is expected that the majority of companies would be able to deduct losses of the magnitude of even a severe pandemic over time, individual companies would need to carefully assess their own tax situation and arrive at their own conclusions. In this exercise, net claims after taxes reflect a full credit for the immediate application of the entire NOL on an undiscounted basis.

3.1.4 Reinsurance Credit Percent

Following is an explanation of Exhibits 5 and 9, the Reinsurance Credit Percent Calculation found in the EXHIBITS section of this paper.

The reinsurance credit percent is an estimate of the percentage of reinsurance claims that will be covered based on the pandemic scenario assumptions and estimated claims surge capacity in the U.S. life reinsurance market. It reflects the current degree of consolidation and capitalization of the U.S. reinsurance market as well as assets backing offshore retrocessions.

Reinsurance exposure is estimated for reinsurers[28] and allocated between retained and offshore based on information from the 2005 NAIC One Source Data. Reinsurance claims are subsequently allocated in proportion to this exposure.

Claims surge capacity is calculated separately for retained and offshore business. Capital and surplus backing retained exposure is calculated from One Source, while assets backing retroceded amounts are derived from the Schedule S database. Capital available from other sources for retained business was placed at 50 percent of capital and surplus. This figure attempts to quantify the intangibles of reserve redundancies, existing securitized mortality risks,[29] funds available from capital markets (capital

[28] Reinsurers as identified in the 2005 Munich American Re study sponsored by the Society of Actuaries versus direct writers who assume blocks of business or otherwise participate in the reinsurance market.
[29] Catastrophe and XXX bonds

raise/securitization/debt issue) and potential capital infusion from parent companies and U.S. P&C affiliates. This figure was not estimated for offshore reinsurers.

Uncovered exposure (allocated claims minus claim surge capacity) is calculated separately for retained and offshore to determine total uncovered exposure. The reinsurance credit percent is 100 percent minus (total uncovered exposure divided by total excess claims).

3.2 Pandemic Scenario Assumptions

The process of developing the assumptions which drive the pandemic scenarios is described in this section. The morbidity rate, population excess death rate, excess mortality distribution by age and insured population mortality ratio form the basis of the specific pandemic scenario. Population excess death rates by age are applied to the census population and insured population excess death rates by age are applied to the insured population to calculate general population deaths and insured deaths respectively.

3.2.1 Morbidity

The severity of a pandemic is not a function of the attack rate or transmissibility of the virus (both of which appear to be relatively constant between pandemics) but of its virulence; e.g., its ability to produce severe illness requiring hospitalization or death.[30]

For this reason, less time is spent analyzing the morbidity of a pandemic. Morbidity estimates are thought to be consistent between pandemics and typically range from 25 to 35 percent. Accurate morbidity figures are harder to come by than death rates because while deaths are recorded as part of the public health record, incidence of disease generally is not. Researchers may rely more on anecdotal evidence for morbidity rates or local studies established during the event to collect data. This explains why one may see different sources citing the same number of excess deaths

[30] "National Strategy for Pandemic Influenza Implementation Plan," op. cit., p. 110.

for a particular pandemic but different numbers for the attack rates and mortality rates for those infected.

3.2.2 Population Excess Deaths

The virulence of a pandemic is typically measured by the hospitalization rate and excess deaths per thousand. The excess deaths per thousand are of primary interest for this research. Excess deaths are typically measured as pneumonia and influenza deaths in excess of the baseline for some period prior to the pandemic.

Reasonably reliable mortality and morbidity statistics are available for the three 20th century pandemics: 1918 (severe, 675,000-plus excess deaths), 1957 (moderate, 70,000-plus excess deaths) and 1968 (mild, 34,000-plus excess deaths).[31] In the documented history of influenza pandemics, the 1918 pandemic is considered the most severe. Given improvements in modern medicine, reduction in overall disease burden and improvements in sanitation and general living conditions, it seems reasonable to believe that the estimated excess deaths per thousand in 1918 would serve as an upper bound for the excess deaths per thousand should a pandemic occur today.

However, there are factors today which might affect the general population death rate negatively. The vulnerability of our society has changed dramatically with population growth, changing demographics, globalization and other concomitant variables. The influenza virus itself is constantly surprising scientists. While popular reporting may lead the lay reader to believe there is basic understanding as to what occurred in 1918, scientists still cannot answer even basic questions about the defining characteristics of the 1918 pandemic. The causes of the multiple waves, the signature shape of the excess death curve and the extraordinarily high rate of mortality still remain largely unexplained.[32] Although it has been identified as avian in origin, even the source of the

[31] *www.pandemicflu.gov/general/ - impact*, Sept. 6, 2006.
[32] Morens, David and Fauci, Anthony. "The 1918 Influenza Pandemic: Insights for the 21st Century," *The Journal of Infectious Diseases*, April, 2007, p. 1018.

1918 virus remains a mystery, much less the mechanism by which it adapted to humans. [33]

Just as in catastrophe modeling there are 100-year and 500-year events,[34] there is a possibility of another pandemic exceeding the boundaries of the 1918 event. There is certainly historical precedent for this. Each period of globalization has opened up populations to new public health perils.[35] As urbanized Europeans spread out to new lands, they brought diseases with them to populations that had no immunity. Some populations they encountered experienced mortality rates as high as 99 percent with diseases such as smallpox.[36] While society has developed "herd immunity" to certain diseases, the H5 subtype has not previously been recorded in the human population; there is, in fact, no precedent for what might occur if sustained H2H transmission of H5N1 were to occur.

The cumulative mortality rate for confirmed cases of H5N1 has been hovering at 60 percent, although it is likely that mild cases and some deaths go unreported. Based on a 2007 WHO study of cases with onset dates between 2004 and 2006, 89 percent of the patients were younger than 40.[37] The disease has demonstrated evidence of "cytokine storm," an immune system response gone fatally awry resulting in Acute Respiratory Distress Syndrome (ARDS). These characteristics are similar to some of the most disturbing aspects of the 1918 pandemic, which showed an affinity for young, healthy lungs.

Although the mechanism is uncertain, with H5N1 it may be because this age group is in close proximity with the fowl and breathing dust particles deep into the lungs where it

[33] Taubenberger, Jeffry and Morens, David. "1918 Influenza: the Mother of All Pandemics," Emerging Infectious Diseases, January 2006, pp. 18.
[34] Estimated boundary points for modeling low frequency, high severity events such as hurricanes and earthquakes.
[35] Hilts, Philip, "Rx for Survival," The Penguin Press, New York, 2005, p. 3.
[36] Diamond, Jared, "Guns, Germs, and Steel," W. W. Norton & Co., New York, 1997, p. 92.
[37] World Health Organization. "Weekly Epidemiological Record," *www.who.int/wer/2007/wer8206/en/index.html*, February 9, 2007.

finds the receptors required to attach and reproduce.[38] It is assumed by most experts that for sustained H2H transmission to occur, the H5N1 virus would have to adapt to cells higher in the lung to give it purchase,[39] a substantial step. It is also expected that the virulence would need to subside significantly to develop this capability. To quote more than one expert, "Dead birds don't fly," which is to say that it is difficult for a disease to spread widely if the hosts die too quickly.[40]

When all is said and done, there is no way of knowing what the mortality rate of the next pandemic is going to be. ***The approach for this exercise is to pick points that bracket a wide enough range to provide substantive information for meaningful planning exercises.***

Thus, consistent with U.S. government figures for planning purposes, two scenarios were developed:

1. a moderate scenario resulting in approximately 209,000 excess deaths and
2. a severe scenario resulting in approximately 1.9 million excess deaths.

By comparison, the CDC estimates 36,000 deaths occur each year on average due to seasonal flu. These pandemic excess death figures represent a six-fold increase in mortality under the moderate scenario and an increase of over 50 times under the severe scenario.

3.2.3 Distribution of Excess Deaths by Age

The age distribution of the insured population is different from the age distribution of the general population. Thus, all things being equal, a distribution of excess deaths which differs by age will produce a different excess death rate in the insured population than in

[38] Wade, Nicholas, "Researchers Find New Details on Transmission of Avian Flu," *The New York Times*, March 22, 2006.
[39] Ibid.
[40] Hillesheim, Lindsey, "Dead Birds Don't Fly: An Avian Flu Primer for Small-Scale Farmers," Institute for Agriculture and Trade Policy, March 2006.

the general population. This effect is further exaggerated due to the fact that the average face amount varies by age.

The importance of the distribution of excess deaths by age in estimating the impact of pandemic influenza on an insured population should not be underestimated. Over 75 percent of the insured face amount in the model is distributed between ages 30-60. Thus, the virulence of the virus in these age ranges will have a great bearing on the overall impact of the event on the industry.

The distribution of excess deaths for seasonal influenza is typically shaped like a "U;" that is to say that excess deaths are heaped at age 0, quickly decrease to close to zero until they start to increase again at older ages (typically age 65) with a rapid rise at ages 85 and older.

However, the shape of the excess death curve usually changes in a pandemic. The 1957 pandemic attacked individuals primarily ages 65 and older; there were no excess deaths at age 0 versus the five-year period prior to the pandemic.[41] Compare this to the striking pattern in 1918, which showed a spike in excess deaths at all ages under age 65 but exhibited decreases in excess deaths for ages 65 and above. But the most disturbing characteristic in 1918 was the spike in excess deaths in the age groups from 20-40. This presentation was dubbed a "W" curve before it was realized that there were no excess deaths at the older ages—99 percent of the excess mortality occurred under age 65[42] and an estimated 50 percent between ages 20 to 40.[43] For the purposes of this paper, the 1918 distribution by age is termed a "V\" curve to visually cue the lack of deaths in the older ages and distinguish it from a hypothetical "W" curve which assigns deaths to older ages.

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[41] Luk, Jeffrey et al, "Observations on Mortality during the 1918 Influenza Pandemic," Clinical Infectious Diseases 2001, Vol. 33, Table 1.
[42] Simonsen, Lone, et al, "Pandemic vs Epidemic Influenza Mortality: A Pattern of Changing Age Distribution," *Journal of Infections Diseases*, 1998, vol. 178, p. 55.
[43] Luk et. al. op cit.

There are different schools of thought as to why older ages were not affected in 1918. The traditional view is that older individuals were exposed to a variant of the virus in the 1889 pandemic, picking up some degree of immunity.[44] Drawing insight from experience with H5N1, others believe older individuals might have avoided the worst of the disease due to their lowered immune response and lack of cytokine storm.[45] As mentioned previously, the H5N1 virus must find receptors deep in the lungs of its victims, receptors which may seldom be accessed in even the healthy elderly. Of course, given that the demographics, living arrangements and sheer magnitude of the elderly population today is so different from 1918 it is difficult to extrapolate; other implications are clearly possible but beyond the scope of this paper.

It is not possible to predict the shape of the distribution of excess deaths. Based on past experience, a "U" shaped distribution of excess deaths was selected for the moderate pandemic scenario and a "V\" shaped distribution of excess deaths in the severe scenario. The "U" curve is based on information from 1957 and 1968 pandemics.[46] The "V\" curve was developed using information from the 1918 pandemic where additional deaths spike at the 20-40 age group and older ages are spared impact.[47]

For comparison purposes, deaths per thousand have been calculated for the general population and the insured population on page 3 of Exhibits 2-4 and 6-8. The results include statistics for percentage of deaths below age 20, 20-64 and 65-plus. This is useful for comparing the results utilizing these assumptions to actual results from previous pandemics.

[44] Willets, Richard, "The Facts Behind the Hype," *The Actuary* (UK), December, 2005, p. 29.
[45] McNeil, Donald G., "Immediate Treatment Needed for Bird Flu Cases, Study Says," *The New York Times*, 2006, September 11.
[46] Luk et. al. op cit.
[47] Luk et. al. op cit.

As stated previously, the 1918 pandemic had attributed 99 percent of its deaths to ages under 65. Compare this to the relatively mild pandemic in 1968 which caused 34,000 deaths and had a traditional "U" shaped distribution of excess deaths. Here, 50 percent of deaths were below 65 and 50 percent above 65. Finally, in the moderate 1957 pandemic, the proportion of deaths below 65 was closer to 35 percent because there were very few excess deaths at age 0; the majority of the excess deaths were found at ages 65 and above.

3.2.4 Insured vs General Population Mortality Ratio

The mortality rate of the individual insured population is significantly better than the general population due to the impact of underwriting and economic self-selection. While the ratio will vary by age, sex, smoking class, policy duration and underwriting type, the overall mortality for a block of individual underwritten business may be 60 percent of the general population mortality or less.[48] Even after 25 years, a seasoned block of individually underwritten business will exhibit significantly lower mortality than the general population, demonstrating the power of underwriting and economic self selection. Even group life certificate holders have better mortality than the general population due to selection afforded by the actively at work requirement needed to qualify for the benefit. The question is how much of this benefit might apply during an influenza pandemic.

3.2.4.1 Underwriting

Underwriting serves the dual purpose of selection and classification of risks. The purpose of underwriting is to protect the company (selection) and place purchasers with similar expected costs into appropriate risk pools (classification). Individual underwriting classes include standard, substandard and a multiplicity of preferred classifications, as well as smoker/non-smoker and male/female classifications. More germane to this discussion is the selection aspect of the underwriting process

[48] Per discussions with reinsurers.

Underwriting standards for individual products differ by company and are proprietary in nature. Broad brush underwriting processes include guaranteed issue (none, but typically reduced benefits in the first two years), simplified issue (a simple form), paramedical (long form, nurse visit and blood draw) and full medical underwriting (full medical exam). Mortality on guaranteed and simplified issue products are closer to the general population or worse due to built-in anti-selection. These underwriting approaches are more often associated with niche products; the remainder of this discussion will presume issuance based upon medical and paramedical underwriting decisions.

In this process, chronic diseases such as heart disease, diabetes and renal problems are loaded with substandard rates if not eliminated from the risk pool. Companies will typically not insure individuals with any type of compromised immune systems, although a past history of cancer, once a certain rejection, is starting to be accepted at some companies. The underwriting process removes many of the at-risk subgroups, leaving an overall healthier population with lower baseline disease burden and lower mortality risk.

3.2.4.2 Economic Self Selection

Whether the sale is initiated by an agent or prospective client, the life insurance transaction starts with a significant amount of economic self-selection. The client needs discretionary income to buy the product and typically would only be interested in purchasing it if they had assets and/or a lifestyle to protect. According to LIMRA, the probability of life insurance ownership increases as income increases.[49] While there is potential for anti-selection against the company as the size increases, the company is typically protected from this sort of risk through the underwriting process and contract language.

[49] Retzloff, Cheryl D, op. cit., p. 28

LIMRA estimates that approximately 40 percent of Americans own individual life insurance and the same amount have group coverage; in total, 60 percent of Americans are covered by one or more life insurance policies. As of 2004, 17 percent of Americans lived at or below 125 percent of the poverty level.[50] Approximately 45 million people (16 percent of the U.S. population) were not covered by any type of health insurance at any point during the course of 2004.[51] While there is certainly some overlap between the population with life insurance and these sub-populations, it is reasonable to assume that the vast majority of the 60 percent of Americans with life insurance coverage and an even greater percentage of the 40 percent with individual insurance coverage live above 125 percent of the poverty level and have some form of employer based health insurance.

While having health insurance may not make a significant difference in access or quality of care during a severe pandemic if the health care system is overwhelmed, the overall health and existing disease burden of individuals with health insurance will be better coming into the event as they will have had access to needed preventative as well as emergent care. The treatment of chronic diseases among the medically insured population is also more consistent than for the uninsured population.

Thus, in addition to the underwriting process, part of the explanation for the significantly better mortality experience of the insured population is economic self selection. Individual insureds are in an economic class which is healthier than the general population and have better access to health care due to greater participation in the employer based health insurance system.

3.2.4.3 Society of Actuaries Delphi Study

The Project Oversight Group for the SOA's pandemic research project performed a two round Delphi study to provide guidance on how the excess death rate of the U.S.

[50] U.S. Bureau of the Census, Annual Social and Economic Supplements, 2005.
[51] Denavs-Walt, Carmen, et al, "Income, Poverty, and Health Insurance Coverage in the United States: 2005," U.S. Census Bureau, August 2006, p. 20.

insured population might differ from that of the U.S. general population during an influenza pandemic.[52] Assumed general population excess death rates from the selected pandemic scenarios were provided to participants, who were asked to estimate excess death rates for the insured population under these scenarios. Participants were asked to provide assumptions and reasoning behind their estimates. The results of the second round of the Delphi study are presented in Table 2.

Table 2

Ratio of U.S. Insured Population Excess Mortality vs U.S. General Population
Second Round Results of SOA Delphi Study

	Moderate Scenario		Severe Scenario	
	Delphi Results	*Ratio to Population (0.7 / 1000)*	*Delphi Results*	*Ratio to Population (6.5 / 1000)*
25th percentile	0.35	50.0%	3.39	52.1%
50th percentile (median)*	0.40	57.1%	5.00	76.9%
75th percentile	0.50	71.4%	5.50	84.6%
Mean	0.44	62.4%	4.64	71.4%

* *Selected*

The primary factors driving assumed reductions in the insured mortality rate versus the general population rate mentioned by participants corresponded to the prior discussion on underwriting and socioeconomic factors. In addition, study participants mentioned differences in exposure by age (captured in the model design), education level (captured through economic selection to a significant extent) and smoking status (the smoking rate among the individual insured population is less than one-half of the general population rate).

[52] For a full report on the study as well as the completed questionnaires for each round, please see Stryker, Ronora et. al. "Study of the Effect of a Flu Pandemic on Insured Mortality Using the Delphi Method," http://www.soa.org/research/research-projects/life-insurance/default.aspx May 2007.

3.3 Life Insurance Industry Assumptions

The assumptions that were used to develop the excess claim estimates relate to the U.S. insurance industry. Individuals who work in the industry will be familiar with the primary sources: A. M. Best (Best's), the American Council of Life Insurers (ACLI), LIMRA International (LIMRA), the National Association of Insurance Commissioners (NAIC) and the Society of Actuaries (SOA). The potential impact of a pandemic on private sector self-insured plans was not addressed in this research.

3.3.1 Background

As might be expected, there are significant differences between the life insurance industry in 1918 and today. It seems worthwhile to review some of the differences to determine factors that put the industry more or less at risk. In 1918, there were fewer than 100 companies versus the more than 1,150 life insurance companies in existence today.[53] Of course, the regulatory environment was far different, but in general, statutory reserves were more conservative than they are today. However, there was no estimate of risk-based capital or asset adequacy testing in 1918 like there is now.

In terms of product types, there were no universal life or variable products. Most policies at the time were participating, meaning they paid optional dividends, providing additional conservatism. Group insurance had just gotten started at the beginning of the decade and in 1918 made up less than 2.5 percent of the total life insurance in force versus over 40 percent today.[54] This shift is material in the context of a pandemic as group insurance contracts are seldom reinsured and have low annual renewable term policy reserves. However, most of these contracts have a provision for annual repricing, reducing the pricing risk.

[53] American Council of Life Insurance. *Life Insurers Fact Book*, 2006, p. 2.
[54] Ibid, p. 92.

In 1918 the industry was still immature and the average policy size was much lower than today. According to the Spectator Year Book and Institute of Life Insurance, the average ordinary policy size in 1918 was $1,891 and the average industrial policy was $136.[55] At $839, group insurance certificates were quite a bit higher than industrial. But since the vast majority of policies inforce were industrial, the combined average policy size was only $543. Adjusted for inflation, in today's terms these policies range from a maximum of $25,000 for ordinary to only $2,000 for industrial.[56]

Average in force coverage today is approximately $140,000 per individual and one half that for group coverage.[57] With this five-fold increase in policy size since 1918 (even after adjusting for inflation), there has also been a marked increase in the reliance of direct writers on reinsurance, particularly on the individual side. The use of reinsurance in 1918 was not material, whereas 40 percent of individual life insurance inforce today is reinsured,[58] although this percentage varies greatly by product type.

3.3.2 Inforce Distribution

According to the 2000 census, the projected U.S. population in 2004 was 293.7 million.[59] The ownership distribution by age for individual and group insurance was estimated based on a 2004 LIMRA study.[60] The number of individual insureds/certificate holders is arrived at by multiplying the census population by the estimated insurance ownership percentages. The number of insureds thus estimated is approximately 108 million or 37 percent of the U.S. population, which is consistent with LIMRA and other sources.

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[55] American Council of Life Insurance. *Life Insurers Fact Book,* 1953, p. 12.
[56] McCusker, John J., "Comparing the Purchasing Power of Money in the United States," Economic History Services, 2006, www.measuringworth.com/calculators/ppowerus.
[57] Note: Figures include multiple policies on one life.
[58] Bruggeman, David M., "Life Reinsurance Data from Munich American Survey," *Reinsurance News*, August 2005, No. 56, p. 8.
[59] U.S. Bureau of the Census, "National Population Estimates," www.census.gov/popest/national/asrh/NC-EST2005-sa.html.
[60] Retzloff, Cheryl D, op. cit.

To determine the total face amount in force, the number of insureds is multiplied by the assumed average face amount by age. The average face amount by age is also estimated from 2004 LIMRA research; the total amount in force thus calculated ties to LIMRA and other sources. The face amount by age is then multiplied by excess deaths per thousand to determine gross claims.

3.3.3 Reserves by Age

Traditional insurance products charge a level premium over the insured's lifetime to provide a level death benefit. Because mortality increases by age, part of the premium collected from a block of policies in the early years must be saved to pay for benefits in later years. The amount of the reserve is statutorily defined in the U.S. based on the year the product was issued, the type of product, mortality tables and formula based interest rates that discount expected cash flows to the current date.

Reserves by age in the model are different for group products (which hold an annual renewable term reserve) and individual products, which are a blend of whole life, term, universal life and variable life products. Estimating the group life reserve was relatively straightforward as a reserve mortality table was applied to the in force by age and the result validated against the total NAIC group life reserve.

Validating the individual reserve estimate to aggregate industry data is more challenging, as it is a blend of different product types, all of which have different reserve patterns. Reserves per thousand for various blocks of in force business were requested from members of the Project Oversight Group. From this data a curve of reserves by age was developed. The curve was then fitted to the in force and compared to the aggregate NAIC ordinary life reserve. Thus, the estimated reserves by age is not reflective of any one company, nor is it a strict representation of the reserve distribution of the entire industry. Instead, it is a reasonable estimate of a curve which, while likely to be off at any given age, ties in aggregate to the NAIC reserve data. Companies can easily (and more accurately) extend this methodology to their own specific exposures.

3.3.4 Impact of Taxes

Claims are deductible from insurer income. To the extent operating losses due to a pandemic claim surge exceed current income, the impact will be ameliorated by the tax treatment of the resulting net operating losses (NOL). The 2006 ACLI Life Insurance Fact Book shows 2005 net operating income for the life industry of $22.2 billion after taxes and policyholder dividends. Net operating losses from even a severe pandemic could presumably be utilized in three years or less.

A corporate tax rate of 35 percent has been assumed in this analysis; the tax positions of individual companies will be different. The NOL adjustment assumes a going concern (tax deductions are of less value in bankruptcy); NOL are also of value in a sale or merger. Although there may be companies that are not able to make use of their NOLs, the paper assumes that the industry as a whole will be able to do so. The value of the NOL is calculated on an undiscounted basis. Individual companies using this methodology would need to make an appropriate adjustment for the time value of money.

3.4 Reinsurance Industry Assumptions

In contrast to the direct side, reinsurance in the United States, like the world at large, is very concentrated. Nine companies control 90 percent of the U.S. reinsurance market, with 75 percent concentrated in the top five players: Munich American Re, RGA Re, Scottish Re, Swiss Re and Transamerica Re.[61] To a much greater extent than the direct side, the results of the U.S. reinsurance industry are tied to the fortunes of these five companies. The reinsurers considered in the determination of the reinsurance credit percent are shown in Table 3.

[61] Bruggeman, David M., op. cit.

Table 3

Reinsurers Included in Reinsurance Analysis

Employers Reassur Corp	RGA Reins Co
General Re Life Corp	SCOR Life US Re Ins Co
Generali USA Life Reassurance Co	Scottish Re Life Corp
Munich American Reassur Co	Scottish Re Us Inc
Optimum Re Ins Co	Swiss Re Life & Health Amer Inc
Reassure America Life Ins Co *	Transamerica Financial Life Ins Co
Revios Reins Canada Ltd	Transamerica Occidental Life Ins Co *
Revios Reins US Inc	

** Adjusted for direct business written*

As a caveat, note that each direct writer's reinsurance program is tailored for its individual needs and risk tolerances. Thus, while understanding the capacity of the reinsurance industry as a whole is important to understanding the net impact of a pandemic, it **will not** provide accurate insight into the effect on an individual company. It must be noted that each individual reinsurance carrier has very different risk exposures, statutory surplus, retrocession programs and capital available from other sources. Thus, depending both on an insurer's reinsurance program and the reinsurance carriers selected to implement it, similarly situated direct writers may fare differently during a particular pandemic scenario.

3.4.1 Background

There are two main types of reinsurance products: proportional and non-proportional. The vast majority of life products are proportional (YRT, co-insurance or some variant of these), where the reinsurance risk is in proportion to the face amount of the individual policy.

Non-proportional reinsurance is primarily the bailiwick of P&C companies, although there are some non-proportional life products available. Non-proportional life coverages include catastrophe (Cat) coverage and stop loss coverage, typically sold to groups. Cat cover is provided for a single event, typically defined as a fire, earthquake or terrorist attack. Although it would certainly be tried in court, most reinsurers would argue that Cat cover is not meant to cover a pandemic as it is not a defined "event."[62] It is safe to assume that, barring surprise judicial action, Cat cover would not provide coverage for a pandemic.

The other non-proportional life reinsurance product is stop loss. This is more often provided to group life contracts (particularly large employer contracts which self insure) but it may also be negotiated by direct writers that wish to put an aggregate limit on their overall claims for a year. In the past, there has not been much interest in this product, although it was available. Currently there is more interest in the product due to the heightened awareness of pandemic exposure, but availability has decreased and the cost is greater. While this coverage would specifically include losses due to a pandemic, it is an annual renewable product and, were a multi-wave pandemic to occur, prices and availability would likely be modified to take events into account.

While non-proportional reinsurance is of interest to the companies that have purchased it, for the purposes of this exercise, the paper assumes only proportional coverage.

3.4.2 Assumptions

The total amount of reinsurance in force is $5.6 trillion based on 2005 One Source Data. Reinsurance exposure is distributed by age using information provided by members of the Project Oversight Group. Thus, the effect of the distribution of excess deaths by age is captured in the same manner as on the direct basis.

[62] It would be difficult to determine whether or not a death were due to the pandemic or some other cause.

Normally, reinsurance payable would be subtracted from direct claims to arrive at the net. However, this assumes that the reinsurer has adequate reserves and surplus to cover claims. For an extreme shock to the system like a pandemic, it must be established whether there are enough funds to pay the claims and, if not, adjust the payout accordingly. This is the function of the reinsurance credit percent in the model.

The reinsurance credit percent is simply the claims surge capacity divided by claims. If claims are less than surge capacity, the reinsurance credit is 100 percent. If claims are greater than surge capacity, the reinsurance credit is less than 100 percent. The implication is that not all reinsurer claims are paid in full and the direct writer is responsible for making up the difference.

The claims surge capacity consists of:

- Statutory surplus
- Assets backing offshore retroceded amounts (letters of credit, trust agreements, funds deposited)
- Other capital and surplus (reserve redundancies, securitized mortality risks, capital market funding, infusion from parent or U.S. P&C affiliates)

This report develops an estimate for a reinsurance credit for the U. S. reinsurance industry in aggregate under different pandemic scenarios. Reinsurance is a dynamic marketplace, very responsive to capital requirements and its attendant costs. Individual reinsurers have widely differing exposures and positions with regard to reserves and capital and surplus, as well as access to capital from a parent and other sources.

The reinsurance figures used in this report are in constant flux and the results should be considered a guide, not a definitive answer. Reinsurance programs for direct writers differ significantly and individual treaties can be complex. Results developed for the purpose of this report are not indicative of the potential experience of individual reinsurers nor appropriate for use with specific insurance portfolios.

3.5 Results

Based on the methodology and assumptions described previously, Table 4 quantifies the potential impact of a moderate pandemic scenario. Full details of the calculation are shown in Exhibits 2 through 5 in the EXHIBITS section of this paper.

Table 4

Estimated Impact of a Moderate Pandemic Scenario on Direct Writers
0.7 deaths per 1000, "U" excess mortality distribution; billions of dollars

	Gross Claims	Reserve Release	Reinsurance Credit	Tax offset	Net Claims After Taxes
Individual	4.5	0.9	1.8	0.7	1.3
Group	2.3	0.0	0.0	0.8	1.5
Total	6.8	0.9	1.8	1.5	2.8
% of Gross Total		*13.2%*	*26.5%*	*22.1%*	*41.2%*

Based on the methodology and assumptions described previously, Table 5 quantifies the impact of a severe pandemic scenario. Full details of the calculation are shown in Exhibits 6 through 9 in the EXHIBITS section of this paper.

Table 5

Estimated Impact of a Severe Pandemic Scenario on Direct Writers
6.5 deaths per 1000, 1918 "V\ " excess mortality distribution; billions of dollars

	Gross Claims	Reserve Release	Reinsurance Credit	Tax offset	Net Claims After Taxes
Individual	78.6	2.7	23.2	18.4	34.3
Group	47.1	0.1	0.8	16.1	30.0
Total	125.7	2.8	24.0	34.5	64.3
% of Gross Total		*2.2%*	*19.1%*	*27.4%*	*51.2%*

Note the focus of companies on certain markets may lead to greater risk in the event of a pandemic. Older companies with large blocks of in force business that have aged significantly will find themselves more exposed in a scenario with a "U" excess death curve (a moderate pandemic). However, as the older policies at the older ages tend to have higher reserves and lower face amounts, this will have the effect of ameliorating the already softer blow of a moderate pandemic scenario.

Large face amount level premium term policies carry lower reserves than whole life and are often highly leveraged with reinsurance. Companies which focus on writing this business typically target a younger demographic that is more vulnerable to a "V\" distribution of excess deaths. Companies struggling under a severe scenario may be stressed to a greater degree if they are focusing in markets vulnerable to the "V\" mortality distribution.

3.6 Other Considerations Impacting Value

While the results described here and presented in the exhibits are robust, they are not comprehensive. Because a pandemic is so broad in scope, there are a number of cascading issues which might further impact a company's solvency or ability to pay claims in a timely fashion. However, many of these issues reveal themselves only at an individual company level, as the data needed to quantify them at the industry level are not available from public sources. A few of these issues include changes in asset values, liquidity and disintermediation risks, the duration of the claims surge, gains on release of payout annuity reserves, the cost of guarantees on variable products and post-pandemic mortality levels.

3.6.1 Asset Values

It is widely believed that asset values will suffer during a pandemic. The Congressional Budget Office estimates that a severe pandemic will cause a 5 percent drop in overall economic output similar in depth and duration to that of an average post war recession

in the United States.[63] While this may be true, the impact on the stock and bond markets is less certain; results of the SOA Delphi Study were inconclusive.[64] While lower interest rates driven by the economic slowdown might increase the value of bonds, the decrease in credit worthiness due to the recession might offset this effect as defaults increase.

In 1918 and 1919 the stock market responded with gains, but its composition was significantly different than it is today. Likewise, the availability of information and the real time response of institutional and day traders might have an unpredictable short term effect on asset values; although, mid term one would expect the market to find appropriate levels. It is likely that uncertainty surrounding the event will increase spreads on bonds while equities will have their value reduced until scientists and politicians get their arms around the issues and the population feels the end of the event is near.

3.6.2 Disintermediation

An insurance company will need to be able to pay out a significant amount of claims in a short period of time in an efficient manner. It needs to be able to have liquidity to accomplish this during a period when markets may well be down. Thus, it will be prudent to build up short-term cash positions as evidence of sustained H2H transmissibility builds.

Another item to be aware of is disintermediation in the form of demand for loans or cash surrender values. While possible, it is unclear what the economic drivers might be for these scenarios. However, any added demands for cash flow in addition to claims will put additional stress on potentially reduced asset values.

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[63] Holtz-Eakin, Douglas, "A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues," Congressional Budget Office, December 8, 2005, p. 1.
[64] Stryker, Ronora, et. al. "Study of the Effect of a Flu Pandemic on Economic Values Using the Delphi Method," www.soa.org/research/research-life.aspx, May 2007.

3.6.3 Duration of the Claims Surge

Unlike seasonal influenza, there is no seasonal pattern as to when pandemic influenza occurs and no way of knowing in advance how long the pandemic might last. The characteristics of the 1918 pandemic varied by location but it is generally agreed to have occurred in the United States in three waves over a period of 18 to 24 months, although two thirds of the deaths occurred in a six month period.[65]

The excess deaths in this report were modeled as though they all occurred within one accounting period. However, it is possible (some would argue likely) that the impact of a severe pandemic would be felt over multiple accounting periods. During this period, there could be market responses, both in terms of demand for insurance and in the risk mitigation tactics insurers might implement, that might ameliorate the financial effects of the pandemic as it plays out. However, the effect of such measures are uncertain, and from a solvency standpoint it was deemed appropriate to consider the excess deaths as occurring in one accounting period. This assumption is offset somewhat by accounting for the Net Operating Losses on an undiscounted basis, and the net impact is considered to be immaterial for the purpose of this report.

3.6.4 Gains on Payout Annuities

There is no way to identify reserves held for contingent payout annuities on the annual statement. Some payout annuities are structured settlements which have guaranteed payouts (are not life contingent). Even if information on reserves were available, the attained age distribution for this business is not available, although the majority of the business would likely be in the over 65 age group.

The consensus is the bulk of the annuity assets on the annual statement are not life contingent, but are instead either still in the accumulation stage or are not life contingent. Thus, it appears that the amount of savings due to the release of annuity reserves from excess mortality would be small by comparison to the overall losses.

[65] Barry, op. cit., p. 5.

However, companies that have significant annuity holdings are encouraged to go through the exercise of quantifying the potential impact of a pandemic on their annuity portfolio.

3.6.5 Guaranteed Minimum Death Benefit

A guaranteed minimum death benefit (GMDB) feature is generally available with variable universal life and variable annuity products to help maintain the death benefit coverage despite drops in equity markets. Some products ensure that the death benefit will not lapse even if the cash surrender value or account value is insufficient to cover monthly charges. In short, GMDB ensures the policy death benefit is guaranteed for a life policy or annuity in the accumulation phase no matter how the underlying funds are performing.

This is another area where the annual statement does not provide sufficient information to adequately quantify the potential risks for the industry. Based on deterministic estimates of drops in asset values, a company should be able to quantify a range of potential losses for their company. Although exposure will vary by company based on their product distribution, it is unlikely that this exposure will be a material factor in overall solvency and pandemic preparedness.

3.6.6 Post-pandemic Mortality Levels

There are different schools of thought as to how a pandemic might affect mortality levels subsequent to the event.

The survivorship echo theory suggests that there would be measurable improvement in mortality after a pandemic. The argument is that pandemic influenza targets the weak and infirm, thus a portion of the excess deaths from the pandemic would have died shortly thereafter anyway. One could test this theory through examining the post pandemic death rates in populations, specific demographics (e.g., the elderly) or

disease states. However, care must be taken not to include items from secular trend and attribute them to a survivorship echo.

This theory may be reasonable in mild or moderate scenarios, particularly at the older ages. There are some contra indications to a survivorship echo theory in the 1918 pandemic. As noted by all observers, this pandemic targeted young and healthy individuals who would not otherwise have been at risk during a normal seasonal flu. While certainly unhealthy individuals died, it was not a culling of the weak and infirm.

Another contraindication to this theory in 1918 is that individuals aged 65 and over did not experience excess mortality from the flu. Thus, it seems more likely that rather than an echo, this is an example of an overall improvement in mortality at the older ages that was already in progress at the time the pandemic occurred. This improvement at the older ages continued for several years and is not consistent with the echo theory.

An alternative theory holds that heavier mortality is experienced in the period immediately following the pandemic due to weakening of those who were stricken but survived the illness. The author could find no controlled longitudinal studies analyzing the issue or a generally accepted hypothesis other than the null hypothesis. While it may well be the case that it is the frail that are primarily impacted during the seasonal flu, it seems that as pandemics increase in virulence the healthy population as a percentage of the total impacted grows. At the same time, it may well be that in absolute terms the number of deaths of the frail grows, even while deaths as a percentage of the total excess deaths is falling. Whether and how this impacts the mortality rate subsequent to a pandemic is unclear, and may well be a function of factors specific to a given pandemic.

4. CONCLUSION

This research has attempted to quantify the impact of pandemic influenza on the direct life insurance industry while providing companies, regulators and guaranty associations with tools to help them plan for this eventuality. Critical areas for additional research have been cited, including identifying appropriate ranges for stress testing, further quantifying the difference in excess death rates between individual insured versus population mortality and estimating the potential impact of a pandemic on different asset classes.

But research is only a start. Concern about the current H5N1 influenza subtype should be leveraged to push the development of infrastructure and processes needed to mitigate the impact of a pandemic event. Insurers should take steps to expand their business continuity efforts to include pandemic planning and discuss tactical responses to pre-pandemic, pandemic and recovery event stages.

Businesses do not operate in closed systems; the best continuity plans can be derailed by lack of integration with local planning efforts. Actuaries and their employers should be proactive in reaching out to local officials and take leadership roles in community planning efforts.

Finally, stakeholders need to consider how the industry as a whole will respond under the stress of a pandemic. The industry image and 100 years of brand equity will rest to some degree on the ability of all insurers, regulators and guaranty associations to respond effectively to the many challenges a severe pandemic poses. It is my hope that this exercise has educated interested parties about the financial risks a pandemic poses, stimulated them to consider the consequences of those risks and motivated them to take steps to mitigate those risks.

Exhibits

Moderate Pandemic Scenario Assumptions

Morbidity (1)	30.0%			
Excess Curve (2)	U	*Flat, "U", 1918 "V\ ", or "W" shaped distribution of excess deaths*		
Population XS Deaths per 1000 (3)	0.70	Moderate 0.70	Severe 6.50	
Mortality Ratio of Insured vs Gen Pop (4)	57.1%	Moderate 57.1%	Severe 76.9%	*Relative impact of pandemic on insured vs general population mortality*

Distribution of Excess Deaths by Age

Age Range	US Census Population (5)	Flat Extra Percentage (6)	Flat Extra Excess qx (7)	"U" Curve (Seasonal) Percentage (8)	"U" Curve (Seasonal) Excess qx (9)	1918 "V\ " Curve Percentage (10)	1918 "V\ " Curve Excess qx (11)	Hypothetical "W" Curve Percentage (12)	Hypothetical "W" Curve Excess qx (13)
0 - 4	20,071,268	100%	0.70	250%	1.75	177%	1.24	105%	0.74
5 - 9	19,605,572	100%	0.70	15%	0.11	35%	0.25	19%	0.13
10 - 14	21,145,156	100%	0.70	15%	0.11	35%	0.25	38%	0.27
15 - 19	20,729,802	100%	0.70	15%	0.11	106%	0.74	86%	0.60
20 - 24	20,971,302	100%	0.70	15%	0.11	153%	1.07	124%	0.87
25 - 29	19,560,906	100%	0.70	30%	0.21	224%	1.57	181%	1.27
30 - 34	20,471,032	100%	0.70	30%	0.21	224%	1.57	181%	1.27
35 - 39	21,052,318	100%	0.70	30%	0.21	130%	0.91	105%	0.73
40 - 44	23,056,334	100%	0.70	30%	0.21	106%	0.74	76%	0.53
45 - 49	22,122,629	100%	0.70	60%	0.42	82%	0.58	38%	0.27
50 - 54	19,496,176	100%	0.70	90%	0.63	59%	0.41	38%	0.27
55 - 59	16,489,501	100%	0.70	120%	0.84	47%	0.33	57%	0.40
60 - 64	12,589,423	100%	0.70	160%	1.12	35%	0.25	76%	0.53
65 - 69	9,956,467	100%	0.70	200%	1.40	24%	0.17	95%	0.67
70 - 74	8,507,005	100%	0.70	250%	1.75	24%	0.17	141%	0.99
75 - 79	7,410,757	100%	0.70	320%	2.24	12%	0.08	191%	1.33
80 - 84	5,560,125	100%	0.70	390%	2.73	12%	0.08	286%	2.00
85+	4,859,631	100%	0.70	1000%	7.00	12%	0.08	381%	2.67
Total	293,655,404		**0.70**		**0.70**		**0.70**		**0.70**

Column Notes:

(1) Implementation Plan for the National Strategy for Pandemic Influenza
(2) Selected excess death curve, based on historical data
(3) Based on HHS figures
(4) SOA Pandemic Mortality Delphi Study
(5) 2000 US Census projected to 2004
(6) Flat extra mortality %
(7) (6) x (3)
(8) Hypothetical distribution based on data from 1957 and 1968
(9) (8) x (3)
(10) Hypothetical distribution based on data from 1918
(11) (10) x (3)
(12) Hypothetical distribution extrapolating historic data
(13) (12) x (3)

Severe Pandemic Scenario Assumptions

Morbidity (1)	30.0%			
Excess Curve (2)	V\	*Flat, "U", 1918 "V\ ", or "W" shaped distribution of excess deaths*		
Population XS Deaths per 1000 (3)	6.50	Moderate 0.70	Severe 6.50	
Mortality Ratio of Insured vs Gen Pop (4)	76.9%	Moderate 57.1%	Severe 76.9%	*Relative impact of pandemic on insured vs general population mortality*

Distribution of Excess Deaths by Age

Age Range	US Census Population (5)	Flat Extra Percentage (6)	Flat Extra Excess qx (7)	"U" Curve (Seasonal) Percentage (8)	"U" Curve (Seasonal) Excess qx (9)	1918 "V\ " Curve Percentage (10)	1918 "V\ " Curve Excess qx (11)	Hypothetical "W" Curve Percentage (12)	Hypothetical "W" Curve Excess qx (13)
0 - 4	20,071,268	100%	6.50	250%	16.25	177%	11.49	105%	6.83
5 - 9	19,605,572	100%	6.50	15%	0.98	35%	2.30	19%	1.24
10 - 14	21,145,156	100%	6.50	15%	0.98	35%	2.30	38%	2.48
15 - 19	20,729,802	100%	6.50	15%	0.98	106%	6.89	86%	5.57
20 - 24	20,971,302	100%	6.50	15%	0.98	153%	9.95	124%	8.05
25 - 29	19,560,906	100%	6.50	30%	1.95	224%	14.55	181%	11.77
30 - 34	20,471,032	100%	6.50	30%	1.95	224%	14.55	181%	11.77
35 - 39	21,052,318	100%	6.50	30%	1.95	130%	8.42	105%	6.81
40 - 44	23,056,334	100%	6.50	30%	1.95	106%	6.89	76%	4.96
45 - 49	22,122,629	100%	6.50	60%	3.90	82%	5.36	38%	2.48
50 - 54	19,496,176	100%	6.50	90%	5.85	59%	3.83	38%	2.48
55 - 59	16,489,501	100%	6.50	120%	7.80	47%	3.06	57%	3.72
60 - 64	12,589,423	100%	6.50	160%	10.40	35%	2.30	76%	4.96
65 - 69	9,956,467	100%	6.50	200%	13.00	24%	1.53	95%	6.19
70 - 74	8,507,005	100%	6.50	250%	16.25	24%	1.53	141%	9.17
75 - 79	7,410,757	100%	6.50	320%	20.80	12%	0.77	191%	12.39
80 - 84	5,560,125	100%	6.50	390%	25.35	12%	0.77	286%	18.58
85+	4,859,631	100%	6.50	1000%	65.00	12%	0.77	381%	24.77
Total	293,655,404		**6.50**		**6.50**		**6.50**		**6.50**

Column Notes:

(1) Implementation Plan for the National Strategy for Pandemic Influenza
(2) Selected excess death curve, based on historical data
(3) Based on HHS figures
(4) SOA Pandemic Mortality Delphi Study
(5) 2000 US Census projected to 2004
(6) Flat extra mortality %
(7) (6) x (3)
(8) Hypothetical distribution based on data from 1957 and 1968
(9) (8) x (3)
(10) Hypothetical distribution based on data from 1918
(11) (10) x (3)
(12) Hypothetical distribution extrapolating historic data
(13) (12) x (3)

Insurance Industry Assumptions

Corporate Tax Rate (1)	35.0%	
Individual Reins (2)	5,396.6	Billion
Group Reins (3)	167.0	Billion

	INDIVIDUAL ASSUMPTIONS				GROUP ASSUMPTIONS			
Age Range	Reserve per 1000 (4)	Percent Owning (5)	Average Face (6)	Reinsurance Distribution (7)	Reserve per 1000 (8)	Percent Owning (9)	Average Face (10)	Reinsurance Distribution (11)
0 - 4	9.00	15.0%	25,000	0.1%	0.75	15.0%	18,000	0.1%
5 - 9	20.00	25.0%	25,000	0.2%	0.40	25.0%	18,000	0.1%
10 - 14	35.00	30.0%	25,000	0.2%	0.40	30.0%	18,000	0.1%
15 - 19	60.00	35.0%	50,000	0.2%	0.75	30.0%	20,000	0.2%
20 - 24	75.00	25.0%	75,000	0.6%	0.80	25.0%	35,000	0.7%
25 - 29	25.00	25.0%	150,000	4.2%	0.80	40.0%	70,000	5.8%
30 - 34	25.00	30.0%	200,000	6.9%	0.90	50.0%	90,000	12.7%
35 - 39	25.00	40.0%	300,000	14.6%	1.15	50.0%	135,000	15.2%
40 - 44	40.00	45.0%	300,000	17.6%	1.70	50.0%	135,000	16.6%
45 - 49	65.00	50.0%	200,000	15.8%	2.50	50.0%	100,000	16.6%
50 - 54	100.00	50.0%	150,000	14.8%	3.70	50.0%	100,000	14.1%
55 - 59	160.00	45.0%	125,000	10.2%	5.75	45.0%	100,000	10.7%
60 - 64	240.00	45.0%	100,000	6.5%	8.50	40.0%	80,000	5.0%
65 - 69	350.00	50.0%	75,000	3.4%	14.00	30.0%	60,000	1.1%
70 - 74	470.00	50.0%	75,000	2.3%	21.00	25.0%	35,000	0.3%
75 - 79	580.00	50.0%	65,000	1.6%	35.00	20.0%	35,000	0.2%
80 - 84	690.00	50.0%	50,000	0.5%	55.00	20.0%	35,000	0.2%
85+	810.00	50.0%	50,000	0.3%	82.50	20.0%	35,000	0.1%

Column Notes:

(1) US Corporate tax rate
(2) Based on 2005 NAIC One Source data
(3) Based on 2006 SOA/Munich American Re Study
(4) Based on data provided by industry leaders
(5) Estimated from 2005 LIMRA study
(6) Estimated from 2005 LIMRA study
(7) Based on data provided by industry leaders
(8) Based on data provided by industry leaders
(9) Estimated from 2005 LIMRA study
(10) Estimated from 2005 LIMRA study
(11) Based on data provided by industry leaders

Total Net Life Insurance Claims - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	Gross Claims (1)	Reserve Release (2)	Reinsurance Credit (3)	Net Claims Before Taxes (4)	Tax Rate (5)	Net Claims After Taxes (6)
0 - 4	129,459,670	663,680	6,249,006	122,546,984	35%	79,655,539
5 - 9	12,645,594	138,348	553,612	11,953,634	35%	7,769,862
10 - 14	16,366,351	313,800	642,068	15,410,483	35%	10,016,814
15 - 19	29,229,022	1,267,049	762,671	27,199,303	35%	17,679,547
20 - 24	34,602,652	1,643,825	1,860,894	31,097,932	35%	20,213,656
25 - 29	153,748,727	1,565,037	28,657,825	123,525,865	35%	80,291,812
30 - 34	257,935,013	2,658,814	47,472,270	207,803,928	35%	135,072,553
35 - 39	473,677,148	5,415,058	97,296,060	370,966,029	35%	241,127,919
40 - 44	560,268,905	10,691,741	117,344,948	432,232,217	35%	280,950,941
45 - 49	796,414,680	21,842,102	211,512,048	563,060,530	35%	365,989,345
50 - 54	877,327,920	25,194,403	295,572,714	556,560,803	35%	361,764,522
55 - 59	801,389,700	30,966,486	272,742,116	497,681,098	35%	323,492,714
60 - 64	620,406,733	35,254,699	230,018,452	355,133,583	35%	230,836,829
65 - 69	442,067,160	54,871,344	149,094,317	238,101,499	35%	154,765,974
70 - 74	393,449,010	92,007,888	127,087,510	174,353,612	35%	113,329,848
75 - 79	374,687,898	118,848,364	107,831,289	148,008,245	35%	96,205,360
80 - 84	277,561,479	124,389,072	41,811,660	111,360,746	35%	72,384,485
85+	622,032,840	353,366,218	64,444,683	204,221,939	35%	132,744,261
Total	6,873,270,501	881,097,928	1,800,954,143	4,191,218,431		2,724,291,980

Column Notes:

(1) Exhibit 2, Page 3, Column 11
(2) Exhibit 3, Page 1, Column 5 + Exhibit 4, Page 1, Column 5
(3) Exhibit 2, Page 2, Column 6
(4) (1) - (2) - (3)
(5) Exhibit 1, Page 3, Entry 1
(6) (4) x [1 - (5)]

Reinsurance Analysis Total - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	6,249,005,835	1.00	6,249,006	100.0%	6,249,006
5 - 9	0.2%	9,226,874,230	0.06	553,612	100.0%	553,612
10 - 14	0.2%	10,701,137,454	0.06	642,068	100.0%	642,068
15 - 19	0.2%	12,711,176,753	0.06	762,671	100.0%	762,671
20 - 24	0.6%	31,014,906,960	0.06	1,860,894	100.0%	1,860,894
25 - 29	4.3%	238,815,207,593	0.12	28,657,825	100.0%	28,657,825
30 - 34	7.1%	395,602,253,028	0.12	47,472,270	100.0%	47,472,270
35 - 39	14.6%	810,800,503,757	0.12	97,296,060	100.0%	97,296,060
40 - 44	17.6%	977,874,563,110	0.12	117,344,948	100.0%	117,344,948
45 - 49	15.8%	881,300,199,856	0.24	211,512,048	100.0%	211,512,048
50 - 54	14.8%	821,035,315,420	0.36	295,572,714	100.0%	295,572,714
55 - 59	10.2%	568,212,741,448	0.48	272,742,116	100.0%	272,742,116
60 - 64	6.5%	359,403,830,604	0.64	230,018,452	100.0%	230,018,452
65 - 69	3.3%	186,367,896,746	0.80	149,094,317	100.0%	149,094,317
70 - 74	2.3%	127,087,510,089	1.00	127,087,510	100.0%	127,087,510
75 - 79	1.5%	84,243,194,193	1.28	107,831,289	100.0%	107,831,289
80 - 84	0.5%	26,802,346,292	1.56	41,811,660	100.0%	41,811,660
85+	0.3%	16,111,170,632	4.00	64,444,683	100.0%	64,444,683
Total	100.0%	5,563,559,834,000		1,800,954,143		1,800,954,143

Column Notes:

(1) (2) / Total of (2)
(2) Exhibit 3, Page 2, Column 2 + Exhibit 4, Page 2, Column 2
(3) Exhibit 2, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 5, Row 9
(6) (4) x (5)

Gross Claims Total - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Total IL & GL Policyholders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Total IL & GL Policyholder XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	30%	6,021,380	21,500	129,459,670,000	1.75	57.1%	1.00	35,125	6,021	129,459,670
5 - 9	19,605,572	50%	9,802,786	21,500	210,759,899,000	0.11	57.1%	0.06	2,059	588	12,645,594
10 - 14	21,145,156	60%	12,687,094	21,500	272,772,521,000	0.11	57.1%	0.06	2,220	761	16,366,351
15 - 19	20,729,802	65%	13,474,372	36,154	487,150,370,000	0.11	57.1%	0.06	2,177	808	29,229,022
20 - 24	20,971,302	50%	10,485,652	55,000	576,710,860,000	0.11	57.1%	0.06	2,202	629	34,602,652
25 - 29	19,560,906	65%	12,714,589	100,769	1,281,239,390,000	0.21	57.1%	0.12	4,108	1,526	153,748,727
30 - 34	20,471,032	80%	16,376,826	131,250	2,149,458,440,000	0.21	57.1%	0.12	4,299	1,965	257,935,013
35 - 39	21,052,318	90%	18,947,086	208,333	3,947,309,565,000	0.21	57.1%	0.12	4,421	2,274	473,677,148
40 - 44	23,056,334	95%	21,903,517	213,158	4,668,907,545,000	0.21	57.1%	0.12	4,842	2,628	560,268,905
45 - 49	22,122,629	100%	22,122,630	150,000	3,318,394,500,000	0.42	57.1%	0.24	9,292	5,309	796,414,680
50 - 54	19,496,176	100%	19,496,176	125,000	2,437,022,000,000	0.63	57.1%	0.36	12,283	7,019	877,327,920
55 - 59	16,489,501	90%	14,840,550	112,500	1,669,561,875,000	0.84	57.1%	0.48	13,851	7,123	801,389,700
60 - 64	12,589,423	85%	10,701,009	90,588	969,385,520,000	1.12	57.1%	0.64	14,100	6,849	620,406,733
65 - 69	9,956,467	80%	7,965,174	69,375	552,583,950,000	1.40	57.1%	0.80	13,939	6,372	442,067,160
70 - 74	8,507,005	75%	6,380,254	61,667	393,449,010,000	1.75	57.1%	1.00	14,887	6,380	393,449,010
75 - 79	7,410,757	70%	5,187,530	56,429	292,724,920,000	2.24	57.1%	1.28	16,600	6,640	374,687,898
80 - 84	5,560,125	70%	3,892,088	45,714	177,924,025,000	2.73	57.1%	1.56	15,179	6,072	277,561,479
85+	4,859,631	70%	3,401,742	45,714	155,508,210,000	7.00	57.1%	4.00	34,017	13,607	622,032,840
Total	293,655,404		216,400,455		23,690,322,270,000				205,600	82,573	**6,873,270,501**
								Excess deaths per 1000	**0.70**	**0.38**	**0.29**
			Average Face Amount	109,474				*Percent less than 20*	**20.2%**	**9.9%**	**2.7%**
			Net Amount Inforce (billions)	18,127				*Percent 20 - 64*	**33.8%**	**42.8%**	**66.6%**
			% Total Policyholders	73.7%				*Percent 65+*	**46.0%**	**47.3%**	**30.7%**

Column Notes:

(1) Exhibit 1, Page 1, Column 5
(2) (3) / (1); percentage represents total policies and certificates rather than individuals with insurance (estimated to be 60% of the US population).
(3) Exhibit 3, Page 3, Column 3 + Exhibit 4, Page 3, Column 3
(4) (5) / (3)
(5) Exhibit 3, Page 3, Column 5 + Exhibit 4, Page 3, Column 5
(6) Exhibit 1, Page 1, Column 9
(7) Exhibit 1, Page 1, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Net Individual Claims - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	Gross Claims (1)	Reinsurance Credit (2)	Net Claims (3)	Reserve per 1000 (4)	Reserve Release (5)	Net Claims Before Taxes (6)	Tax Rate (7)	Net Claims After Taxes (8)
0 - 4	75,267,250	6,022,119	69,245,131	9.00	623,206	68,621,925	35%	44,604,251
5 - 9	7,352,090	540,315	6,811,774	20.00	136,235	6,675,539	35%	4,339,100
10 - 14	9,515,321	627,727	8,887,594	35.00	311,066	8,576,528	35%	5,574,743
15 - 19	21,766,293	741,841	21,024,452	60.00	1,261,467	19,762,985	35%	12,845,940
20 - 24	23,592,717	1,791,752	21,800,965	75.00	1,635,072	20,165,893	35%	13,107,830
25 - 29	88,024,086	27,488,359	60,535,727	25.00	1,513,393	59,022,334	35%	38,364,517
30 - 34	147,391,440	44,926,808	102,464,632	25.00	2,561,616	99,903,016	35%	64,936,960
35 - 39	303,153,372	94,255,249	208,898,123	25.00	5,222,453	203,675,670	35%	132,389,185
40 - 44	373,512,600	114,014,675	259,497,925	40.00	10,379,917	249,118,008	35%	161,926,705
45 - 49	530,943,120	204,865,600	326,077,520	65.00	21,195,039	304,882,481	35%	198,173,613
50 - 54	526,396,752	287,124,591	239,272,161	100.00	23,927,216	215,344,945	35%	139,974,214
55 - 59	445,216,500	264,167,799	181,048,701	160.00	28,967,792	152,080,909	35%	98,852,591
60 - 64	362,575,360	224,621,156	137,954,204	240.00	33,109,009	104,845,195	35%	68,149,377
65 - 69	298,694,040	147,593,672	151,100,368	350.00	52,885,129	98,215,239	35%	63,839,906
70 - 74	319,012,725	126,553,268	192,459,457	470.00	90,455,945	102,003,512	35%	66,302,283
75 - 79	308,287,533	107,354,721	200,932,812	580.00	116,541,031	84,391,781	35%	54,854,658
80 - 84	216,844,914	41,375,887	175,469,027	690.00	121,073,629	54,395,398	35%	35,357,009
85+	485,963,200	63,468,086	422,495,114	810.00	342,221,042	80,274,072	35%	52,178,147
Total	4,543,509,312	1,757,533,625	2,785,975,686		854,020,257	1,931,955,429		1,255,771,029
	% of Gross Claims	*38.7%*	*61.3%*		*18.8%*	*42.5%*		*27.6%*

Column Notes:

(1) Exhibit 3, Page 3, Column 11
(2) Exhibit 3, Page 2, Column 6
(3) (1) - (2)
(4) Exhibit 1, Page 3, Entry 4
(5) (3) x (4) / 1000
(6) (1) - (2) - (5)
(7) Exhibit 1, Page 3, Entry 1
(8) (6) x [1 - (7)]

Individual Reinsurance Analysis - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	6,022,119,155	1.00	6,022,119	100.0%	6,022,119
5 - 9	0.2%	9,005,251,802	0.06	540,315	100.0%	540,315
10 - 14	0.2%	10,462,111,487	0.06	627,727	100.0%	627,727
15 - 19	0.2%	12,364,020,038	0.06	741,841	100.0%	741,841
20 - 24	0.6%	29,862,528,501	0.06	1,791,752	100.0%	1,791,752
25 - 29	4.2%	229,069,657,619	0.12	27,488,359	100.0%	27,488,359
30 - 34	6.9%	374,390,069,997	0.12	44,926,808	100.0%	44,926,808
35 - 39	14.6%	785,460,411,255	0.12	94,255,249	100.0%	94,255,249
40 - 44	17.6%	950,122,292,014	0.12	114,014,675	100.0%	114,014,675
45 - 49	15.8%	853,606,667,777	0.24	204,865,600	100.0%	204,865,600
50 - 54	14.8%	797,568,307,973	0.36	287,124,591	100.0%	287,124,591
55 - 59	10.2%	550,349,581,078	0.48	264,167,799	100.0%	264,167,799
60 - 64	6.5%	350,970,556,157	0.64	224,621,156	100.0%	224,621,156
65 - 69	3.4%	184,492,089,549	0.80	147,593,672	100.0%	147,593,672
70 - 74	2.3%	126,553,267,665	1.00	126,553,268	100.0%	126,553,268
75 - 79	1.6%	83,870,876,012	1.28	107,354,721	100.0%	107,354,721
80 - 84	0.5%	26,523,004,299	1.56	41,375,887	100.0%	41,375,887
85+	0.3%	15,867,021,623	4.00	63,468,086	100.0%	63,468,086
Total	100.0%	5,396,559,834,000		1,757,533,625		1,757,533,625

Column Notes:

(1) Exhibit 1, Page 3, Column 7
(2) (1) x Exhibit 1, Page 3, Entry 2 x 1,000,000,000
(3) Exhibit 3, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 5, Row 9
(6) (4) x (5)

Gross Individual Claims - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Individual Policy Holders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Insured Population XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	15%	3,010,690	25,000	75,267,250,000	1.75	57.1%	1.00	35,125	3,011	75,267,250
5 - 9	19,605,572	25%	4,901,393	25,000	122,534,825,000	0.11	57.1%	0.06	2,059	294	7,352,090
10 - 14	21,145,156	30%	6,343,547	25,000	158,588,675,000	0.11	57.1%	0.06	2,220	381	9,515,321
15 - 19	20,729,802	35%	7,255,431	50,000	362,771,550,000	0.11	57.1%	0.06	2,177	435	21,766,293
20 - 24	20,971,302	25%	5,242,826	75,000	393,211,950,000	0.11	57.1%	0.06	2,202	315	23,592,717
25 - 29	19,560,906	25%	4,890,227	150,000	733,534,050,000	0.21	57.1%	0.12	4,108	587	88,024,086
30 - 34	20,471,032	30%	6,141,310	200,000	1,228,262,000,000	0.21	57.1%	0.12	4,299	737	147,391,440
35 - 39	21,052,318	40%	8,420,927	300,000	2,526,278,100,000	0.21	57.1%	0.12	4,421	1,011	303,153,372
40 - 44	23,056,334	45%	10,375,350	300,000	3,112,605,000,000	0.21	57.1%	0.12	4,842	1,245	373,512,600
45 - 49	22,122,629	50%	11,061,315	200,000	2,212,263,000,000	0.42	57.1%	0.24	9,292	2,655	530,943,120
50 - 54	19,496,176	50%	9,748,088	150,000	1,462,213,200,000	0.63	57.1%	0.36	12,283	3,509	526,396,752
55 - 59	16,489,501	45%	7,420,275	125,000	927,534,375,000	0.84	57.1%	0.48	13,851	3,562	445,216,500
60 - 64	12,589,423	45%	5,665,240	100,000	566,524,000,000	1.12	57.1%	0.64	14,100	3,626	362,575,360
65 - 69	9,956,467	50%	4,978,234	75,000	373,367,550,000	1.40	57.1%	0.80	13,939	3,983	298,694,040
70 - 74	8,507,005	50%	4,253,503	75,000	319,012,725,000	1.75	57.1%	1.00	14,887	4,254	319,012,725
75 - 79	7,410,757	50%	3,705,379	65,000	240,849,635,000	2.24	57.1%	1.28	16,600	4,743	308,287,533
80 - 84	5,560,125	50%	2,780,063	50,000	139,003,150,000	2.73	57.1%	1.56	15,179	4,337	216,844,914
85+	4,859,631	50%	2,429,816	50,000	121,490,800,000	7.00	57.1%	4.00	34,017	9,719	485,963,200
Total	293,655,404		108,623,614		15,075,311,835,000				205,600	48,401	**4,543,509,312**

			Excess deaths per 1000	**0.70**	**0.45**	**0.30**
Average Face Amount	138,785		*Percent less than 20*	**20.2%**	**8.5%**	**2.5%**
Net Amount Inforce (billions)	9,679		*Percent 20 - 64*	**33.8%**	**35.6%**	**61.6%**
% Individual Policyholders	37.0%		*Percent 65+*	**46.0%**	**55.9%**	**35.8%**

Column Notes:

(1) Exhibit 1, Page 1, Column 5
(2) Exhibit 1, Page 3, Column 5
(3) (1) x (2); ties to LIMRA aggregate
(4) Exhibit 1, Page 3, Column 6
(5) (3) x (4); ties to NAIC net plus One Source reinsured
(6) Exhibit 1, Page 1, Column 9
(7) Exhibit 1, Page 1, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Net Group Claims - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

ate Age Range	Gross Claims (1)	Reinsurance Credit (2)	Net Claims (3)	Reserve per 1000 (4)	Reserve Release (5)	Net Claims Before Taxes (6)	Tax Rate (7)	Net Claims After Taxes (8)
0 - 4	54,192,420	226,887	53,965,533	0.75	40,474	53,925,059	35%	35,051,288
5 - 9	5,293,504	13,297	5,280,207	0.40	2,112	5,278,095	35%	3,430,762
10 - 14	6,851,031	14,342	6,836,689	0.40	2,735	6,833,955	35%	4,442,070
15 - 19	7,462,729	20,829	7,441,900	0.75	5,581	7,436,318	35%	4,833,607
20 - 24	11,009,935	69,143	10,940,792	0.80	8,753	10,932,039	35%	7,105,826
25 - 29	65,724,641	1,169,466	64,555,175	0.80	51,644	64,503,531	35%	41,927,295
30 - 34	110,543,573	2,545,462	107,998,111	0.90	97,198	107,900,913	35%	70,135,593
35 - 39	170,523,776	3,040,811	167,482,965	1.15	192,605	167,290,359	35%	108,738,734
40 - 44	186,756,305	3,330,273	183,426,033	1.70	311,824	183,114,209	35%	119,024,236
45 - 49	265,471,560	6,646,448	258,825,112	2.50	647,063	258,178,050	35%	167,815,732
50 - 54	350,931,168	8,448,123	342,483,045	3.70	1,267,187	341,215,858	35%	221,790,308
55 - 59	356,173,200	8,574,317	347,598,883	5.75	1,998,694	345,600,189	35%	224,640,123
60 - 64	257,831,373	5,397,296	252,434,077	8.50	2,145,690	250,288,387	35%	162,687,452
65 - 69	143,373,120	1,500,646	141,872,474	14.00	1,986,215	139,886,260	35%	90,926,069
70 - 74	74,436,285	534,242	73,902,043	21.00	1,551,943	72,350,100	35%	47,027,565
75 - 79	66,400,365	476,567	65,923,798	35.00	2,307,333	63,616,465	35%	41,350,702
80 - 84	60,716,565	435,774	60,280,791	55.00	3,315,444	56,965,348	35%	37,027,476
85+	136,069,640	976,596	135,093,044	82.50	11,145,176	123,947,868	35%	80,566,114
Total	2,329,761,189	43,420,517	2,286,340,672		27,077,670	2,259,263,002		1,468,520,951
	% of Gross Claims	*1.9%*	*98.1%*		*1.2%*	*97.0%*		*63.0%*

Column Notes:

(1) Exhibit 4, Page 3, Column 11
(2) Exhibit 4, Page 2, Column 6
(3) (1) - (2)
(4) Exhibit 1, Page 3, Column 8
(5) (3) x (4) / 1000
(6) (1) - (2) - (5)
(7) Exhibit 1, Page 3, Entry 1
(8) (6) x [1 - (7)]

Group Reinsurance Analysis - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	226,886,680	1.00	226,887	100.0%	226,887
5 - 9	0.1%	221,622,427	0.06	13,297	100.0%	13,297
10 - 14	0.1%	239,025,967	0.06	14,342	100.0%	14,342
15 - 19	0.2%	347,156,715	0.06	20,829	100.0%	20,829
20 - 24	0.7%	1,152,378,460	0.06	69,143	100.0%	69,143
25 - 29	5.8%	9,745,549,974	0.12	1,169,466	100.0%	1,169,466
30 - 34	12.7%	21,212,183,032	0.12	2,545,462	100.0%	2,545,462
35 - 39	15.2%	25,340,092,503	0.12	3,040,811	100.0%	3,040,811
40 - 44	16.6%	27,752,271,096	0.12	3,330,273	100.0%	3,330,273
45 - 49	16.6%	27,693,532,079	0.24	6,646,448	100.0%	6,646,448
50 - 54	14.1%	23,467,007,447	0.36	8,448,123	100.0%	8,448,123
55 - 59	10.7%	17,863,160,370	0.48	8,574,317	100.0%	8,574,317
60 - 64	5.0%	8,433,274,447	0.64	5,397,296	100.0%	5,397,296
65 - 69	1.1%	1,875,807,197	0.80	1,500,646	100.0%	1,500,646
70 - 74	0.3%	534,242,424	1.00	534,242	100.0%	534,242
75 - 79	0.2%	372,318,181	1.28	476,567	100.0%	476,567
80 - 84	0.2%	279,341,993	1.56	435,774	100.0%	435,774
85+	0.1%	244,149,009	4.00	976,596	100.0%	976,596
Total	100.0%	167,000,000,000		43,420,517		43,420,517

Column Notes:

(1) Exhibit 1, Page 3, Column 11
(2) (1) x Exhibit 1, Page 3, Entry 3 x 1,000,000,000
(3) Exhibit 4, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 5, Row 9
(6) (4) x (5)

Gross Group Claims - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Group Certificate Holders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Insured Population XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	15%	3,010,690	18,000	54,192,420,000	1.75	57.1%	1.00	35,125	3,011	54,192,420
5 - 9	19,605,572	25%	4,901,393	18,000	88,225,074,000	0.11	57.1%	0.06	2,059	294	5,293,504
10 - 14	21,145,156	30%	6,343,547	18,000	114,183,846,000	0.11	57.1%	0.06	2,220	381	6,851,031
15 - 19	20,729,802	30%	6,218,941	20,000	124,378,820,000	0.11	57.1%	0.06	2,177	373	7,462,729
20 - 24	20,971,302	25%	5,242,826	35,000	183,498,910,000	0.11	57.1%	0.06	2,202	315	11,009,935
25 - 29	19,560,906	40%	7,824,362	70,000	547,705,340,000	0.21	57.1%	0.12	4,108	939	65,724,641
30 - 34	20,471,032	50%	10,235,516	90,000	921,196,440,000	0.21	57.1%	0.12	4,299	1,228	110,543,573
35 - 39	21,052,318	50%	10,526,159	135,000	1,421,031,465,000	0.21	57.1%	0.12	4,421	1,263	170,523,776
40 - 44	23,056,334	50%	11,528,167	135,000	1,556,302,545,000	0.21	57.1%	0.12	4,842	1,383	186,756,305
45 - 49	22,122,629	50%	11,061,315	100,000	1,106,131,500,000	0.42	57.1%	0.24	9,292	2,655	265,471,560
50 - 54	19,496,176	50%	9,748,088	100,000	974,808,800,000	0.63	57.1%	0.36	12,283	3,509	350,931,168
55 - 59	16,489,501	45%	7,420,275	100,000	742,027,500,000	0.84	57.1%	0.48	13,851	3,562	356,173,200
60 - 64	12,589,423	40%	5,035,769	80,000	402,861,520,000	1.12	57.1%	0.64	14,100	3,223	257,831,373
65 - 69	9,956,467	30%	2,986,940	60,000	179,216,400,000	1.40	57.1%	0.80	13,939	2,390	143,373,120
70 - 74	8,507,005	25%	2,126,751	35,000	74,436,285,000	1.75	57.1%	1.00	14,887	2,127	74,436,285
75 - 79	7,410,757	20%	1,482,151	35,000	51,875,285,000	2.24	57.1%	1.28	16,600	1,897	66,400,365
80 - 84	5,560,125	20%	1,112,025	35,000	38,920,875,000	2.73	57.1%	1.56	15,179	1,735	60,716,565
85+	4,859,631	20%	971,926	35,000	34,017,410,000	7.00	57.1%	4.00	34,017	3,888	136,069,640
	293,655,404		107,776,841		8,615,010,435,000				205,600	34,171	**2,329,761,189**
								Excess deaths per 1000	**0.70**	**0.32**	**0.27**
				Average Face Amount	79,934			*Percent less than 20*	**20.2%**	**11.9%**	**3.2%**
				Net Amount Inforce (billions)	8,448			*Percent 20 - 64*	**33.8%**	**52.9%**	**76.2%**
				% Group Certificateholders	36.7%			*Percent 65+*	**46.0%**	**35.2%**	**20.6%**

Column Notes:

(1) Exhibit 1, Page 1, Column 5
(2) Exhibit 1, Page 3, Column 9
(3) (1) x (2); ties to LIMRA aggregate
(4) Exhibit 1, Page 3, Column 10
(5) (3) x (4); ties to NAIC net plus MARC reinsured
(6) Exhibit 1, Page 1, Column 9
(7) Exhibit 1, Page 1, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Reinsurance Credit Percent - Moderate Scenario

General population 0.7 excess deaths per 1000, "U " mortality curve

	(B i l l i o n s)	*Retained*	*Offshore*	*Total*	
(1)	**Exposure**	**2,485.1**	**3,078.5**	**5,563.6**	*From 2005 NAIC One Source Data*
(2)	% of total	44.7%	55.3%		
(3)	**Allocation of Excess Claims**	**0.8**	**1.0**	**1.8**	*Based on Pandemic Scenario*
(4)	Capital & Surplus	6.3	-		*From 2005 NAIC One Source Data*
(5)	Assets Backing Offshore Retroceeded	-	15.1		*Schedule S Database*
(6)	Other Sources	3.2	-		*Captial raise, debt, securitized mortality risk*
(7)	**Claims Surge Capacity**	**9.5**	**15.1**		(4) + (5) + (6)
(8)	**Uncovered Exposure**	**-**	**-**	**-**	(3) - (7)
(9)	**Reinsurance Credit**			**100.0%**	1 - (8) / (3)

Total Net Life Insurance Claims - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	Gross Claims (1)	Reserve Release (2)	Reinsurance Credit (3)	Net Claims Before Taxes (4)	Tax Rate (5)	Net Claims After Taxes (6)
0 - 4	1,143,128,886	5,903,032	50,266,979	1,086,958,875	35%	706,523,269
5 - 9	373,045,021	4,109,644	14,877,810	354,057,567	35%	230,137,418
10 - 14	482,807,362	9,314,822	17,254,976	456,237,564	35%	296,554,417
15 - 19	2,581,896,961	112,272,729	61,372,354	2,408,251,878	35%	1,565,363,721
20 - 24	4,411,838,079	211,113,471	216,143,944	3,984,580,664	35%	2,589,977,431
25 - 29	14,337,068,774	151,651,786	2,434,463,230	11,750,953,759	35%	7,638,119,943
30 - 34	24,052,439,944	257,276,487	4,032,737,899	19,762,425,557	35%	12,845,576,612
35 - 39	25,578,565,981	303,756,663	4,786,302,792	20,488,506,526	35%	13,317,529,242
40 - 44	24,745,209,989	490,170,789	4,721,393,227	19,533,645,972	35%	12,696,869,882
45 - 49	13,671,785,340	395,329,963	3,307,746,652	9,968,708,725	35%	6,479,660,671
50 - 54	7,164,844,680	226,649,743	2,198,975,153	4,739,219,784	35%	3,080,492,860
55 - 59	3,940,166,025	170,771,883	1,221,614,348	2,547,779,795	35%	1,656,056,867
60 - 64	1,715,812,370	110,784,043	579,518,256	1,025,510,071	35%	666,581,546
65 - 69	652,049,061	87,720,520	200,338,430	363,990,111	35%	236,593,572
70 - 74	464,269,832	114,818,143	136,614,259	212,837,430	35%	138,344,329
75 - 79	172,707,703	57,337,141	45,279,121	70,091,440	35%	45,559,436
80 - 84	104,975,175	48,006,534	14,405,754	42,562,887	35%	27,665,876
85+	91,749,844	52,797,564	8,659,449	30,292,831	35%	19,690,340
Total	125,684,361,027	2,809,784,958	24,047,964,633	98,826,611,436		64,237,297,433

Column Notes:

(1) Exhibit 6, Page 3, Column 11
(2) Exhibit 7, Page 1, Column 5 + Exhibit 8, Page 1, Column 5
(3) Exhibit 6, Page 2, Column 6
(4) (1) - (2) - (3)
(5) Exhibit 1, Page 3, Entry 1
(6) (4) x [1 - (5)]

Reinsurance Analysis Total - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	6,249,005,835	8.83	55,178,722	91.1%	50,266,979
5 - 9	0.2%	9,226,874,230	1.77	16,331,567	91.1%	14,877,810
10 - 14	0.2%	10,701,137,454	1.77	18,941,013	91.1%	17,254,976
15 - 19	0.2%	12,711,176,753	5.30	67,369,237	91.1%	61,372,354
20 - 24	0.6%	31,014,906,960	7.65	237,264,038	91.1%	216,143,944
25 - 29	4.3%	238,815,207,593	11.19	2,672,342,173	91.1%	2,434,463,230
30 - 34	7.1%	395,602,253,028	11.19	4,426,789,211	91.1%	4,032,737,899
35 - 39	14.6%	810,800,503,757	6.48	5,253,987,264	91.1%	4,786,302,792
40 - 44	17.6%	977,874,563,110	5.30	5,182,735,184	91.1%	4,721,393,227
45 - 49	15.8%	881,300,199,856	4.12	3,630,956,823	91.1%	3,307,746,652
50 - 54	14.8%	821,035,315,420	2.94	2,413,843,827	91.1%	2,198,975,153
55 - 59	10.2%	568,212,741,448	2.36	1,340,982,070	91.1%	1,221,614,348
60 - 64	6.5%	359,403,830,604	1.77	636,144,780	91.1%	579,518,256
65 - 69	3.3%	186,367,896,746	1.18	219,914,118	91.1%	200,338,430
70 - 74	2.3%	127,087,510,089	1.18	149,963,262	91.1%	136,614,259
75 - 79	1.5%	84,243,194,193	0.59	49,703,485	91.1%	45,279,121
80 - 84	0.5%	26,802,346,292	0.59	15,813,384	91.1%	14,405,754
85+	0.3%	16,111,170,632	0.59	9,505,591	91.1%	8,659,449
Total	100.0%	5,563,559,834,000		26,397,765,751		24,047,964,633

Column Notes:

(1) (2) / Total of (2)
(2) Exhibit 7, Page 2, Column 2 + Exhibit 8, Page 2, Column 2
(3) Exhibit 6, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 9, Row 9
(6) (4) x (5)

Gross Claims Total - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Total IL & GL Policyholders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Total IL & GL Policyholder XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	30%	6,021,380	21,500	129,459,670,000	11.49	76.9%	8.83	230,539	53,169	1,143,128,886
5 - 9	19,605,572	50%	9,802,786	21,500	210,759,899,000	2.30	76.9%	1.77	45,034	17,351	373,045,021
10 - 14	21,145,156	60%	12,687,094	21,500	272,772,521,000	2.30	76.9%	1.77	48,570	22,456	482,807,362
15 - 19	20,729,802	65%	13,474,372	36,154	487,150,370,000	6.89	76.9%	5.30	142,849	71,414	2,581,896,961
20 - 24	20,971,302	50%	10,485,652	55,000	576,710,860,000	9.95	76.9%	7.65	208,748	80,215	4,411,838,079
25 - 29	19,560,906	65%	12,714,589	100,769	1,281,239,390,000	14.55	76.9%	11.19	284,572	142,276	14,337,068,774
30 - 34	20,471,032	80%	16,376,826	131,250	2,149,458,440,000	14.55	76.9%	11.19	297,813	183,257	24,052,439,944
35 - 39	21,052,318	90%	18,947,086	208,333	3,947,309,565,000	8.42	76.9%	6.48	177,324	122,777	25,578,565,981
40 - 44	23,056,334	95%	21,903,517	213,158	4,668,907,545,000	6.89	76.9%	5.30	158,881	116,089	24,745,209,989
45 - 49	22,122,629	100%	22,122,630	150,000	3,318,394,500,000	5.36	76.9%	4.12	118,577	91,145	13,671,785,340
50 - 54	19,496,176	100%	19,496,176	125,000	2,437,022,000,000	3.83	76.9%	2.94	74,651	57,319	7,164,844,680
55 - 59	16,489,501	90%	14,840,550	112,500	1,669,561,875,000	3.06	76.9%	2.36	50,507	35,024	3,940,166,025
60 - 64	12,589,423	85%	10,701,009	90,588	969,385,520,000	2.30	76.9%	1.77	28,918	18,941	1,715,812,370
65 - 69	9,956,467	80%	7,965,174	69,375	552,583,950,000	1.53	76.9%	1.18	15,243	9,399	652,049,061
70 - 74	8,507,005	75%	6,380,254	61,667	393,449,010,000	1.53	76.9%	1.18	13,024	7,529	464,269,832
75 - 79	7,410,757	70%	5,187,530	56,429	292,724,920,000	0.77	76.9%	0.59	5,677	3,061	172,707,703
80 - 84	5,560,125	70%	3,892,088	45,714	177,924,025,000	0.77	76.9%	0.59	4,259	2,296	104,975,175
85+	4,859,631	70%	3,401,742	45,714	155,508,210,000	0.77	76.9%	0.59	3,722	2,007	91,749,844
Total	293,655,404		216,400,455		23,690,322,270,000				1,908,909	1,035,724	**125,684,361,027**
								Excess deaths per 1000	**6.50**	**4.79**	**5.31**
			Average Face Amount	109,474				*Percent less than 20*	**24.5%**	**15.9%**	**3.6%**
			Net Amount Inforce (billions)	18,127				*Percent 20 - 64*	**73.3%**	**81.8%**	**95.2%**
			% Total Policyholders	73.7%				*Percent 65+*	**2.2%**	**2.3%**	**1.2%**

Column Notes:

(1) Exhibit 1, Page 2, Column 5
(2) (3) / (1); percentage represents total policies and certificates rather than individuals with insurance (estimated to be 60% of the US population).
(3) Exhibit 7, Page 3, Column 3 + Exhibit 8, Page 3, Column 3
(4) (5) / (3)
(5) Exhibit 7, Page 3, Column 5 + Exhibit 8, Page 3, Column 5
(6) Exhibit 1, Page 2, Column 11
(7) Exhibit 1, Page 2, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Net Individual Claims - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	Gross Claims (1)	Reinsurance Credit (2)	Net Claims (3)	Reserve per 1000 (4)	Reserve Release (5)	Net Claims Before Taxes (6)	Tax Rate (7)	Net Claims After Taxes (8)
0 - 4	664,609,818	48,441,904	616,167,914	9.00	5,545,511	610,622,403	35%	396,904,562
5 - 9	216,886,640	14,520,457	202,366,183	20.00	4,047,324	198,318,860	35%	128,907,259
10 - 14	280,701,955	16,869,560	263,832,394	35.00	9,234,134	254,598,261	35%	165,488,869
15 - 19	1,922,689,215	59,696,205	1,862,993,010	60.00	111,779,581	1,751,213,429	35%	1,138,288,729
20 - 24	3,008,071,418	208,112,979	2,799,958,438	75.00	209,996,883	2,589,961,555	35%	1,683,475,011
25 - 29	8,208,246,020	2,335,117,868	5,873,128,151	25.00	146,828,204	5,726,299,947	35%	3,722,094,966
30 - 34	13,744,251,780	3,816,502,593	9,927,749,187	25.00	248,193,730	9,679,555,458	35%	6,291,711,048
35 - 39	16,370,282,088	4,636,715,619	11,733,566,469	25.00	293,339,162	11,440,227,308	35%	7,436,147,750
40 - 44	16,496,806,500	4,587,399,165	11,909,407,335	40.00	476,376,293	11,433,031,042	35%	7,431,470,177
45 - 49	9,114,523,560	3,203,805,693	5,910,717,867	65.00	384,196,661	5,526,521,206	35%	3,592,238,784
50 - 54	4,298,906,808	2,136,123,574	2,162,783,234	100.00	216,278,323	1,946,504,911	35%	1,265,228,192
55 - 59	2,188,981,125	1,183,209,906	1,005,771,219	160.00	160,923,395	844,847,824	35%	549,151,085
60 - 64	1,002,747,480	565,920,080	436,827,400	240.00	104,838,576	331,988,824	35%	215,792,735
65 - 69	440,573,709	198,322,008	242,251,701	350.00	84,788,095	157,463,606	35%	102,351,344
70 - 74	376,435,016	136,039,969	240,395,046	470.00	112,985,672	127,409,375	35%	82,816,094
75 - 79	142,101,285	45,079,007	97,022,277	580.00	56,272,921	40,749,356	35%	26,487,082
80 - 84	82,011,859	14,255,612	67,756,246	690.00	46,751,810	21,004,436	35%	13,652,884
85+	71,679,572	8,528,224	63,151,348	810.00	51,152,592	11,998,756	35%	7,799,192
Total	78,630,505,845	23,214,660,423	55,415,845,422		2,723,528,866	52,692,316,556		34,250,005,761
	% of Gross Claims	*29.5%*	*70.5%*		*3.5%*	*67.0%*		*43.6%*

Column Notes:

(1) Exhibit 7, Page 3, Column 11
(2) Exhibit 7, Page 2, Column 6
(3) (1) - (2)
(4) Exhibit 1, Page 3, Entry 4
(5) (3) x (4) / 1000
(6) (1) - (2) - (5)
(7) Exhibit 1, Page 3, Entry 1
(8) (6) x [1 - (7)]

Individual Reinsurance Analysis - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	6,022,119,155	8.83	53,175,312	91.1%	48,441,904
5 - 9	0.2%	9,005,251,802	1.77	15,939,296	91.1%	14,520,457
10 - 14	0.2%	10,462,111,487	1.77	18,517,937	91.1%	16,869,560
15 - 19	0.2%	12,364,020,038	5.30	65,529,306	91.1%	59,696,205
20 - 24	0.6%	29,862,528,501	7.65	228,448,343	91.1%	208,112,979
25 - 29	4.2%	229,069,657,619	11.19	2,563,289,469	91.1%	2,335,117,868
30 - 34	6.9%	374,390,069,997	11.19	4,189,424,883	91.1%	3,816,502,593
35 - 39	14.6%	785,460,411,255	6.48	5,089,783,465	91.1%	4,636,715,619
40 - 44	17.6%	950,122,292,014	5.30	5,035,648,148	91.1%	4,587,399,165
45 - 49	15.8%	853,606,667,777	4.12	3,516,859,471	91.1%	3,203,805,693
50 - 54	14.8%	797,568,307,973	2.94	2,344,850,825	91.1%	2,136,123,574
55 - 59	10.2%	550,349,581,078	2.36	1,298,825,011	91.1%	1,183,209,906
60 - 64	6.5%	350,970,556,157	1.77	621,217,884	91.1%	565,920,080
65 - 69	3.4%	184,492,089,549	1.18	217,700,666	91.1%	198,322,008
70 - 74	2.3%	126,553,267,665	1.18	149,332,856	91.1%	136,039,969
75 - 79	1.6%	83,870,876,012	0.59	49,483,817	91.1%	45,079,007
80 - 84	0.5%	26,523,004,299	0.59	15,648,573	91.1%	14,255,612
85+	0.3%	15,867,021,623	0.59	9,361,543	91.1%	8,528,224
Total	100.0%	5,396,559,834,000		25,483,036,805		23,214,660,423

Column Notes:

(1) Exhibit 1, Page 3, Column 7
(2) (1) x Exhibit 1, Page 3, Entry 2 x 1,000,000,000
(3) Exhibit 7, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 9, Row 9
(6) (4) x (5)

Gross Individual Claims - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Individual Policy Holders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Insured Population XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	15%	3,010,690	25,000	75,267,250,000	11.49	76.9%	8.83	230,539	26,584	664,609,818
5 - 9	19,605,572	25%	4,901,393	25,000	122,534,825,000	2.30	76.9%	1.77	45,034	8,675	216,886,640
10 - 14	21,145,156	30%	6,343,547	25,000	158,588,675,000	2.30	76.9%	1.77	48,570	11,228	280,701,955
15 - 19	20,729,802	35%	7,255,431	50,000	362,771,550,000	6.89	76.9%	5.30	142,849	38,454	1,922,689,215
20 - 24	20,971,302	25%	5,242,826	75,000	393,211,950,000	9.95	76.9%	7.65	208,748	40,108	3,008,071,418
25 - 29	19,560,906	25%	4,890,227	150,000	733,534,050,000	14.55	76.9%	11.19	284,572	54,722	8,208,246,020
30 - 34	20,471,032	30%	6,141,310	200,000	1,228,262,000,000	14.55	76.9%	11.19	297,813	68,721	13,744,251,780
35 - 39	21,052,318	40%	8,420,927	300,000	2,526,278,100,000	8.42	76.9%	6.48	177,324	54,568	16,370,282,088
40 - 44	23,056,334	45%	10,375,350	300,000	3,112,605,000,000	6.89	76.9%	5.30	158,881	54,989	16,496,806,500
45 - 49	22,122,629	50%	11,061,315	200,000	2,212,263,000,000	5.36	76.9%	4.12	118,577	45,573	9,114,523,560
50 - 54	19,496,176	50%	9,748,088	150,000	1,462,213,200,000	3.83	76.9%	2.94	74,651	28,659	4,298,906,808
55 - 59	16,489,501	45%	7,420,275	125,000	927,534,375,000	3.06	76.9%	2.36	50,507	17,512	2,188,981,125
60 - 64	12,589,423	45%	5,665,240	100,000	566,524,000,000	2.30	76.9%	1.77	28,918	10,027	1,002,747,480
65 - 69	9,956,467	50%	4,978,234	75,000	373,367,550,000	1.53	76.9%	1.18	15,243	5,874	440,573,709
70 - 74	8,507,005	50%	4,253,503	75,000	319,012,725,000	1.53	76.9%	1.18	13,024	5,019	376,435,016
75 - 79	7,410,757	50%	3,705,379	65,000	240,849,635,000	0.77	76.9%	0.59	5,677	2,186	142,101,285
80 - 84	5,560,125	50%	2,780,063	50,000	139,003,150,000	0.77	76.9%	0.59	4,259	1,640	82,011,859
85+	4,859,631	50%	2,429,816	50,000	121,490,800,000	0.77	76.9%	0.59	3,722	1,434	71,679,572
Total	293,655,404		108,623,614		15,075,311,835,000				1,908,909	475,974	**78,630,505,845**
								Excess deaths per 1000	**6.50**	**4.38**	**5.22**
			Average Face Amount		138,785			*Percent less than 20*	**24.5%**	**17.8%**	**3.9%**
			Net Amount Inforce (billions)		9,679			*Percent 20 - 64*	**73.3%**	**78.8%**	**94.7%**
			% Individual Policyholders		37.0%			*Percent 65+*	**2.2%**	**3.4%**	**1.4%**

Column Notes:

(1) Exhibit 1, Page 2, Column 5
(2) Exhibit 1, Page 3, Column 5
(3) (1) x (2); ties to LIMRA aggregate
(4) Exhibit 1, Page 3, Column 6
(5) (3) x (4); ties to NAIC net plus One Source reinsured
(6) Exhibit 1, Page 2, Column 11
(7) Exhibit 1, Page 2, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Net Group Claims - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

ate Age Range	Gross Claims (1)	Reinsurance Credit (2)	Net Claims (3)	Reserve per 1000 (4)	Reserve Release (5)	Net Claims Before Taxes (6)	Tax Rate (7)	Net Claims After Taxes (8)
0 - 4	478,519,069	1,825,076	476,693,993	0.75	357,520	476,336,473	35%	309,618,707
5 - 9	156,158,381	357,354	155,801,027	0.40	62,320	155,738,707	35%	101,230,160
10 - 14	202,105,407	385,416	201,719,992	0.40	80,688	201,639,304	35%	131,065,547
15 - 19	659,207,746	1,676,149	657,531,597	0.75	493,149	657,038,448	35%	427,074,991
20 - 24	1,403,766,662	8,030,965	1,395,735,697	0.80	1,116,589	1,394,619,108	35%	906,502,420
25 - 29	6,128,822,755	99,345,361	6,029,477,393	0.80	4,823,582	6,024,653,811	35%	3,916,024,977
30 - 34	10,308,188,164	216,235,306	10,091,952,857	0.90	9,082,758	10,082,870,100	35%	6,553,865,565
35 - 39	9,208,283,893	149,587,173	9,058,696,720	1.15	10,417,501	9,048,279,219	35%	5,881,381,492
40 - 44	8,248,403,489	133,994,062	8,114,409,427	1.70	13,794,496	8,100,614,931	35%	5,265,399,705
45 - 49	4,557,261,780	103,940,959	4,453,320,821	2.50	11,133,302	4,442,187,519	35%	2,887,421,887
50 - 54	2,865,937,872	62,851,579	2,803,086,293	3.70	10,371,419	2,792,714,873	35%	1,815,264,668
55 - 59	1,751,184,900	38,404,442	1,712,780,458	5.75	9,848,488	1,702,931,971	35%	1,106,905,781
60 - 64	713,064,890	13,598,176	699,466,715	8.50	5,945,467	693,521,247	35%	450,788,811
65 - 69	211,475,352	2,016,422	209,458,930	14.00	2,932,425	206,526,505	35%	134,242,228
70 - 74	87,834,816	574,290	87,260,526	21.00	1,832,471	85,428,055	35%	55,528,236
75 - 79	30,606,418	200,114	30,406,304	35.00	1,064,221	29,342,084	35%	19,072,354
80 - 84	22,963,316	150,141	22,813,175	55.00	1,254,725	21,558,451	35%	14,012,993
85+	20,070,272	131,225	19,939,046	82.50	1,644,971	18,294,075	35%	11,891,149
Total	47,053,855,181	833,304,210	46,220,550,971		86,256,092	46,134,294,880		29,987,291,672
	% of Gross Claims	*1.8%*	*98.2%*		*0.2%*	*98.0%*		*63.7%*

Column Notes:

(1) Exhibit 8, Page 3, Column 11
(2) Exhibit 8, Page 2, Column 6
(3) (1) - (2)
(4) Exhibit 1, Page 3, Column 8
(5) (3) x (4) / 1000
(6) (1) - (2) - (5)
(7) Exhibit 1, Page 3, Entry 1
(8) (6) x [1 - (7)]

Group Reinsurance Analysis - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	Reinsurance Distribution (1)	Reinsurance Ceded by Age (2)	Excess deaths per K (3)	Reinsurance Claims (4)	Reinsurance Credit Pecent (5)	Reinsurance Credit (6)
0 - 4	0.1%	226,886,680	8.83	2,003,409	91.1%	1,825,076
5 - 9	0.1%	221,622,427	1.77	392,272	91.1%	357,354
10 - 14	0.1%	239,025,967	1.77	423,076	91.1%	385,416
15 - 19	0.2%	347,156,715	5.30	1,839,931	91.1%	1,676,149
20 - 24	0.7%	1,152,378,460	7.65	8,815,695	91.1%	8,030,965
25 - 29	5.8%	9,745,549,974	11.19	109,052,704	91.1%	99,345,361
30 - 34	12.7%	21,212,183,032	11.19	237,364,328	91.1%	216,235,306
35 - 39	15.2%	25,340,092,503	6.48	164,203,799	91.1%	149,587,173
40 - 44	16.6%	27,752,271,096	5.30	147,087,037	91.1%	133,994,062
45 - 49	16.6%	27,693,532,079	4.12	114,097,352	91.1%	103,940,959
50 - 54	14.1%	23,467,007,447	2.94	68,993,002	91.1%	62,851,579
55 - 59	10.7%	17,863,160,370	2.36	42,157,058	91.1%	38,404,442
60 - 64	5.0%	8,433,274,447	1.77	14,926,896	91.1%	13,598,176
65 - 69	1.1%	1,875,807,197	1.18	2,213,452	91.1%	2,016,422
70 - 74	0.3%	534,242,424	1.18	630,406	91.1%	574,290
75 - 79	0.2%	372,318,181	0.59	219,668	91.1%	200,114
80 - 84	0.2%	279,341,993	0.59	164,812	91.1%	150,141
85+	0.1%	244,149,009	0.59	144,048	91.1%	131,225
Total	100.0%	167,000,000,000		914,728,946		833,304,210

Column Notes:

(1) Exhibit 1, Page 3, Column 11
(2) (1) x Exhibit 1, Page 3, Entry 3 x 1,000,000,000
(3) Exhibit 8, Page 3, Column 8
(4) (2) x (3) / 1000
(5) Exhibit 9, Row 9
(6) (4) x (5)

Gross Group Claims - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

Age Range	US Census Population (1)	Percent Owning (2)	Group Certificate Holders (3)	Average Face (4)	Face Amount In Force (5)	Population XS Deaths per 1000 (6)	Mort Ratio Insured vs Gen Pop (7)	Insured Pop XS Deaths per 1000 (8)	General Population XS Deaths (9)	Insured Population XS Deaths (10)	Gross Claims (11)
0 - 4	20,071,268	15%	3,010,690	18,000	54,192,420,000	11.49	76.9%	8.83	230,539	26,584	478,519,069
5 - 9	19,605,572	25%	4,901,393	18,000	88,225,074,000	2.30	76.9%	1.77	45,034	8,675	156,158,381
10 - 14	21,145,156	30%	6,343,547	18,000	114,183,846,000	2.30	76.9%	1.77	48,570	11,228	202,105,407
15 - 19	20,729,802	30%	6,218,941	20,000	124,378,820,000	6.89	76.9%	5.30	142,849	32,960	659,207,746
20 - 24	20,971,302	25%	5,242,826	35,000	183,498,910,000	9.95	76.9%	7.65	208,748	40,108	1,403,766,662
25 - 29	19,560,906	40%	7,824,362	70,000	547,705,340,000	14.55	76.9%	11.19	284,572	87,555	6,128,822,755
30 - 34	20,471,032	50%	10,235,516	90,000	921,196,440,000	14.55	76.9%	11.19	297,813	114,535	10,308,188,164
35 - 39	21,052,318	50%	10,526,159	135,000	1,421,031,465,000	8.42	76.9%	6.48	177,324	68,210	9,208,283,893
40 - 44	23,056,334	50%	11,528,167	135,000	1,556,302,545,000	6.89	76.9%	5.30	158,881	61,099	8,248,403,489
45 - 49	22,122,629	50%	11,061,315	100,000	1,106,131,500,000	5.36	76.9%	4.12	118,577	45,573	4,557,261,780
50 - 54	19,496,176	50%	9,748,088	100,000	974,808,800,000	3.83	76.9%	2.94	74,651	28,659	2,865,937,872
55 - 59	16,489,501	45%	7,420,275	100,000	742,027,500,000	3.06	76.9%	2.36	50,507	17,512	1,751,184,900
60 - 64	12,589,423	40%	5,035,769	80,000	402,861,520,000	2.30	76.9%	1.77	28,918	8,913	713,064,890
65 - 69	9,956,467	30%	2,986,940	60,000	179,216,400,000	1.53	76.9%	1.18	15,243	3,525	211,475,352
70 - 74	8,507,005	25%	2,126,751	35,000	74,436,285,000	1.53	76.9%	1.18	13,024	2,510	87,834,816
75 - 79	7,410,757	20%	1,482,151	35,000	51,875,285,000	0.77	76.9%	0.59	5,677	874	30,606,418
80 - 84	5,560,125	20%	1,112,025	35,000	38,920,875,000	0.77	76.9%	0.59	4,259	656	22,963,316
85+	4,859,631	20%	971,926	35,000	34,017,410,000	0.77	76.9%	0.59	3,722	573	20,070,272
	293,655,404		107,776,841		8,615,010,435,000				1,908,909	559,750	**47,053,855,181**
								Excess deaths per 1000	**6.50**	**5.19**	**5.46**
			Average Face Amount	79,934				*Percent less than 20*	**24.5%**	**14.2%**	**3.2%**
			Net Amount Inforce (billions)	8,448				*Percent 20 - 64*	**73.3%**	**84.4%**	**96.0%**
			% Group Certificateholders	36.7%				*Percent 65+*	**2.2%**	**1.5%**	**0.8%**

Column Notes:

(1) Exhibit 1, Page 2, Column 5
(2) Exhibit 1, Page 3, Column 9
(3) (1) x (2); ties to LIMRA aggregate
(4) Exhibit 1, Page 3, Column 10
(5) (3) x (4); ties to NAIC net plus MARC reinsured
(6) Exhibit 1, Page 2, Column 11
(7) Exhibit 1, Page 2, Entry 4
(8) (6) x (7)
(9) (1) x (6) / 1000
(10) (3) x (8) / 1000
(11) (4) x (10)

Reinsurance Credit Percent - Severe Scenario

General population 6.5 excess deaths per 1000, "V\ " mortality curve

	(B i l l i o n s)	*Retained*	*Offshore*	*Total*	
(1)	**Exposure**	**2,485.1**	**3,078.5**	**5,563.6**	*From 2005 NAIC One Source Data*
(2)	% of total	44.7%	55.3%		
(3)	**Allocation of Excess Claims**	**11.8**	**14.6**	**26.4**	*Based on Pandemic Scenario*
(4)	Capital & Surplus	6.3	-		*From 2005 NAIC One Source Data*
(5)	Assets Backing Offshore Retroceeded	-	15.1		*Schedule S Database*
(6)	Other Sources	3.2	-		*Captial raise, debt, securitized mortality risk*
(7)	**Claims Surge Capacity**	**9.5**	**15.1**		(4) + (5) + (6)
(8)	**Uncovered Exposure**	**2.4**	**-**	**2.4**	(3) - (7)
(9)	**Reinsurance Credit**			**91.1%**	1 - (8) / (3)

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