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Secondary Guarantee Universal Life: Practical Considerations

MILLIMAN INC.

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Executive summary

Secondary guarantee universal life insurance (SGUL) has been a major product in the U.S. permanent life insurance market. This report discusses the history of SGUL products and the reserving mechanisms underlying product mechanics in each of several reserving eras. Pricing results are presented for sample protection and accumulation life products with a secondary guarantee. Stochastic results are presented for protection and accumulation versions of traditional fixed SGUL products along with accumulation product results for indexed and variable SGUL products.

The potential for applying risk management techniques on SGUL products is also discussed, and sample Greeks are calculated and presented for a variable SGUL product. Principles-based reserving and its impact on SGUL products are reviewed; sample pricing results demonstrate reduced capital strain for two traditional fixed products under principles-based reserves. The report concludes with a discussion on pricing an SGUL product, assuming future surplus relief, including an AXXX securitization example that outlines the potential for improved profitability for an SGUL product coupled with a securitization solution.

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1. Introductory comments

Secondary guarantee universal life (SGUL) products have enjoyed a growing market for the past three years. Especially in the asset-transfer, older-age market, SGUL products have filled a market need with the lowest premiums available. The secondary guarantee mechanism inside these contracts permits a policyholder to maintain coverage solely through premium funding, meaning that credited interest, expense charges, and cost of insurance rates driving the account value do not affect the contract's death benefit guarantees. This report will delve into multiple products containing secondary guarantees, highlighting pricing results, reserving under current and proposed methodologies, risk management, and surplus relief mechanisms.

2. Overview of the SGUL market

BRIEF HISTORY OF STATUTORY VALUATION REQUIREMENTS

When first introduced, secondary guarantees were a mechanism to make sure universal life policies did not lapse in early policy years from lack of surrender value. Companies would calculate a minimum premium that, when paid cumulatively, would keep a contract in force for 5–10 years until the underlying cash surrender value could support the policy on its own.

When first introduced, secondary guarantees were a mechanism to make sure universal life policies did not lapse in early policy years from lack of surrender value.

Over time, the universal life market began to offer ever longer guarantees until, in the mid- to late 1990s, lifetime death benefit guarantees were available. At that time, statutory reserves for universal life policies were subject to the Universal Life Insurance Model Regulation of the National Association of Insurance Commissioners (NAIC). The regulation made no reserving differentiation for the existence of the secondary guarantee in the contract. As a result, the per-policy statutory reserves for these contracts were quite small (due to low account values resulting from the minimum-premium strategies by which they were marketed). Regulators felt that this low level of reserves did not correspond to what is essentially a product chassis of term insurance to age 100.

With the arrival of the Valuation of Life Insurance Policies Model Regulation (Regulation XXX) in 2000, a means for reserving secondary guarantees became available. Many products at this time contained specified-premium secondary guarantees, which tracked cumulative premium payments to test for the satisfaction of the underlying guarantee. Some products, however, were shadow fund products, which meant that a "phantom" fund value was tracked within the product. As long as this shadow fund had a positive value, the secondary guarantee was deemed to be intact.

With the arrival of the Valuation of Life Insurance Policies Model Regulation (Regulation XXX) in 2000, a means for reserving secondary guarantees became available.

REGULATION XXX TREATED SPECIFIED-PREMIUM PRODUCTS SIMILARLY TO GUARANTEED LEVEL TERM PRODUCTS, WHEREBY SEGMENTED RESERVES WERE CREATED FOR THE GUARANTEE PERIOD.

Regulation XXX treated specified-premium products similarly to guaranteed level term products, whereby segmented reserves were created for the guarantee period. Not all in the industry, however, considered shadow fund products subject to XXX. For those that did feel that shadow products fell within the scope of XXX, complex product designs were created in an effort to significantly reduce XXX reserves.

Effective January 1, 2003, Actuarial Guideline 38 (AXXX) sought to clarify reserve requirements for all universal life products with secondary guarantees, including those with shadow funds. Mechanically, the methodology attempted to track the extent to which a secondary guarantee was pre-funded. Theoretically, policies requiring less future premium to satisfy a secondary guarantee would have larger reserves than those requiring more future premium to satisfy the same guarantee. The actual mechanics, however, left open the possibility of creating sophisticated shadow fund designs, again resulting in statutory reserves disproportionate to the insurance guarantee provided. Many companies in the industry aggressively pursued these product designs, creating an imbalance between creative shadow account products, traditional permanent products, specified-premium SGUL, and shadow account SGUL products not utilizing the creative designs.

Seeking to close any perceived loophole in reserving methodologies, the NAIC enacted a revision to Actuarial Guideline 38 (AXXX), effective July 1, 2005. Although these newer mechanics do not eliminate all of the problems with potential misalignment of reserves and product guarantees, most companies no longer use product design to manage reserve levels.

Effective January 1, 2007, an additional adjustment to reserving for universal life with secondary guarantees permits preferred risk versions of valuation mortality and utilization of specified lapse rates in reserve mechanics. This methodology is called an interim solution because it sunsets in 2010, presumably as principles-based reserves become effective.

SGUL PRODUCT DESIGN

The design of SGUL products is similar to those of universal life policies without secondary guarantees. Like other universal life policies, SGUL products have target premiums, current and guaranteed credited rates, current and guaranteed cost-of-insurance rates, current and guaranteed expense charges (per policy, percent of premium, and per thousand of insurance), surrender charges, loan provisions, and death benefit corridor factors.

THE DESIGN OF SGUL PRODUCTS IS SIMILAR TO THOSE OF UNIVERSAL LIFE POLICIES WITHOUT SECONDARY GUARANTEES.

One of the main differences between products with and without lifetime guarantees is the extent to which cash value accumulates in the contracts. Many SGUL products generate only modest cash surrender values that can disappear by attained age 90. This is a result of low premium requirements to satisfy secondary guarantee requirements and higher loads associated with these products. A second major design difference exists for secondary guarantees that have an explicit charge, which is often the case when the secondary guarantee is offered as a rider on a product. A third consideration is the manner in which policy loans interact with the secondary guarantee.

THE EFFECT OF PRODUCT FEATURES ON STATUTORY VALUATION REQUIREMENTS

Within the genre of secondary guarantee products, several varieties of secondary guarantees are in force today. First-generation specified-premium varieties require a minimum premium level priced to guarantee the product's existence with lifetime premium payment. Other specified-premium varieties include an associated interest accumulation rate that allows discounted pre-payment of the lifetime premium. Neither of these types enjoys statutory mechanics that significantly reduce reserve requirements.

Shadow fund designs, however, have developed in eras (based on regulatory changes) when the market perceived advantages to certain design mechanisms. This development became particularly evident once the SGUL-specific sections of AG 38 became effective January 1, 2003. Although there are currently three categories of valuation rules based on issue date, all three sets of rules include the calculation of a funding ratio, analogous to the funding ratio in the Universal Life (UL) Model Regulation. Certain shadow fund designs—and particularly strategies such as ART designs, multiple–interest-rate bucket designs, and shadow funds with a large excess of target premium loads—will minimize the funding ratio so as to minimize the additional AXXX reserve. Rules applying to policies issued on or after July 1, 2005, make this more difficult to do, however.

It should be noted that in applying the formulaic rules of AXXX in the manner described above, there is a risk that regulators may view these methods as violating the spirit of the guideline. In this case reserve levels in products could be challenged.

COMPETITIVE ENVIRONMENT

SGUL PRODUCTS HAVE MIMICKED GUARANTEED LEVEL TERM PRODUCTS IN THE PRICE WARS THAT HAVE DRIVEN LIFETIME GUARANTEE PREMIUMS TO EVER LOWER LEVELS.

SGUL products have mimicked guaranteed level term products in the price wars that have driven lifetime guarantee premiums to ever lower levels. In the first era of AXXX, companies that designed products aggressively were able to reduce reserves and offer very competitive lifetime premiums. Companies that continued to offer the specified premium design were no longer able to compete with the more complex shadow account products.

During the second era of products, starting with the regulatory change on July 1, 2005, premium levels have not increased substantially. Presumably, this means that companies are accepting lower profitability and may have enacted surplus relief solutions (discussed later in this report) to make their offerings feasible. Appendix A shows lists of lifetime guarantee premiums for several issue age/sex/class combinations as of the third quarter, 2006.

Underscoring the market position filled by various insurance products, the table below shows a competitive comparison of annual premium rates for different product types, including term, SGUL, and whole life, offered by a top insurance provider. Thirty-year term cannot offer a level-premium guarantee beyond the initial term period and is not available above age 50; nor can it offer age 100 guarantees and beyond. Return-of-premium (ROP) term can offer a form of cash value but, again, no guaranteed lifetime level premium. Whole life premiums are exceedingly higher for a guarantee product than the SGUL product, but they will provide a cash value. Secondary guarantee universal life products offer longer guarantees than level period term and a lower premium than whole life.

Male, 35, Best Class NonTobacco, $1M Face			
30-year Term	30-year ROP	Lifetime SGUL	Whole Life
$980.00	$1,715.00	$4,800.00	$14,500.00

3. Protection-oriented, traditional fixed SGUL

Because SGUL products traditionally deemphasize cash-value accumulation, the insurance industry has begun differentiating between protection life products (term and SGUL) and accumulation products (par and non-par whole life, universal life without secondary guarantees, indexed life, and variable life). This section discusses a modeled protection-oriented SGUL product. Section 4 discusses an accumulation SGUL product.

PRODUCT DESIGN

BECAUSE SGUL PRODUCTS TRADITIONALLY DEEMPHASIZE CASH-VALUE ACCUMULATION, THE INSURANCE INDUSTRY HAS BEGUN DIFFERENTIATING BETWEEN PROTECTION LIFE PRODUCTS (TERM AND SGUL) AND ACCUMULATION PRODUCTS.

The modeling exercise made no attempt to design a product that reduces reserves under AG 38 effective July 1, 2005. Lifetime secondary guarantee premiums were created to be competitive in the market at the time of the work's completion. The designed shadow fund uses a relatively high load on paid premium in excess of a target premium to make sure that the single-pay and quick-pay premiums derived via the shadow fund are not so aggressive as to be unprofitable. For purposes of this report, only the level life-pay scenario is modeled.

The aggregate pricing results obtained via MG-ALFA® for the sample product are shown below. Detailed cell-by-cell results are shown in Appendix B.

Aggregate	Break-even Year	Profit Margin @Net Investment Earned Rate (NIER)	Profit Margin @8.00%	Internal Rate of Return (IRR)
Baseline	22	4.7%	0.1%	8.0%

At 8.0% statutory internal rate of return (IRR), the profitability is far below the IRR target for most insurers. Results from the sensitivities below provide some insight into items affecting the baseline results.

Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
110% Mortality	27	1.9%	(2.5%)	6.8%
90% Mortality	19	7.7%	2.7%	9.3%
0.5% Mort Improve	21	6.6%	1.5%	8.7%
150% Lapse	20	5.6%	1.1%	8.5%
50% Lapse	26	3.6%	(1.2%)	7.5%
120% Premium	19	11.6%	5.6%	10.3%

One hundred interest-rate scenarios were run to provide color as to how the return profile of the product (using baseline assumptions) varies with interest rates. The Milliman scenario generator produced scenarios using a starting yield curve captured at the time of this research, with mean reversion set back to the starting curve (no upward or downward bias).

Scenario Ranked by IRR	IRR
Minimum	2.8%
5th percentile	3.5%
10th percentile	4.4%
25th percentile	5.5%
50th percentile	6.9%
62nd percentile (baseline protection result)	8.0%
75th percentile	9.3%
90th percentile	11.2%
95th percentile	12.2%
Maximum	15.7%

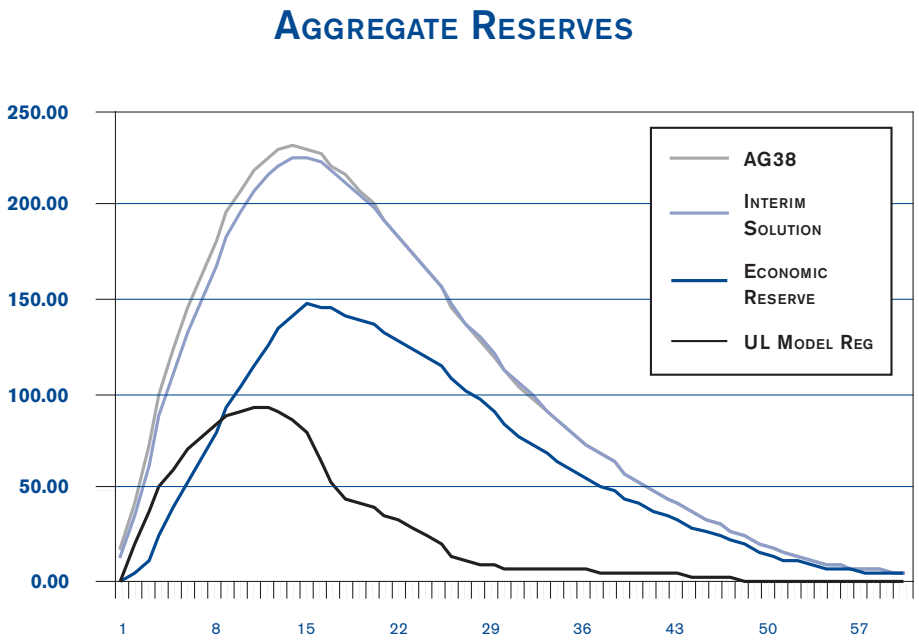
SOURCES OF PROFIT

Sources-of-profit reports generally break down the various factors driving account values and compare statutory income to disbursements as reflected in these mechanics. Inherent in this is the assumption that changes in account

Sources-of-profit reports generally break down the various factors driving account values and compare statutory income to disbursements.

values flow through the statutory income statement. In products where reserves are subject only to UL Model Regulation reserves, changes in account value flow through the change in reserve, albeit not on a dollar-for-dollar basis. The remaining account value change flows through the AV/Reserve balancing item. For SGUL products subject to AG 38, the reserve mechanics are largely disjoint from the account value accumulation. Because of this, the source of profits is not an integral part of the pricing exercise for SGUL products.

Reserves: current AG38 and interim solution (effective 1/1/2007)



As mentioned above, the exercise made no attempt to design a product that reduces reserves under current AG38. The illustration shows aggregate reserve levels per unit issued for UL Model Regulation, current AG38, and the interim solution, as well as one interpretation of economic reserves. (For purposes of this exercise, we have set economic reserves equal to the present value of benefits and expenses less the present value of premiums, using best-estimate assumptions.) As the graphs for the AG38 and interim solution reserves appear very close, some detail will clarify the difference between them. The first-year projected interim solution is 71% of the AG38 reserve, which becomes 90% of the AG38 reserve at the fifth year, 94% at the 10th year, 98% at the 15th year, and 100% by the 21st year.

RISKS TO WRITING COMPANY

As designed, and without any surplus relief in place (to be discussed later), this sample product presents the writing company with substantial reserve strain and limited profitability. Because of the limited account values that are produced in protection-oriented products, the company has few levers in the form of interest-spread or cost-of-insurance adjustments to help manage future profitability. As demonstrated by the results of 100 interest-rate scenarios, there is additional downside risk when current interest rates are insufficient to support account values (and provide spread income) for a sufficient number of future years. Most competitive products require aggressive assumption setting from a lapse and mortality standpoint. Given the lapse-supported nature of the product, it is important for companies to be comfortable with the lapse rates being projected. From a mortality standpoint, the sales emphasis on older issue ages leaves companies on the hook for future older-age mortality slopes for which it is hard to find applicable experience today.

Most competitive products require aggressive assumption setting from a lapse and mortality standpoint.

An additional design issue that companies must test carefully is to make sure the flexibility of the shadow fund does not permit unprofitable quick-pay premiums. Companies that have entered the SGUL market have later found themselves with uncomfortably low premiums in untested situations (such as 4-pays or 8-pays). Often this is due to the high shadow fund interest rates used to get competitive lifetime secondary guarantee premiums. Without due care, these high interest rates can allow too much discount on pre-paid premiums, permitting unduly low quick-pay guaranteed premiums. Significant testing is necessary to avoid any such "holes" in the product.

The secondary market for life insurance policies has created additional risks for companies writing competitive secondary guarantees. The original intentions of the secondary settlement market was to permit the policyholders to realize value from a life insurance policy once the policy was no longer essential to the financial planning needs of the insured. The settlement market offered to the insured a cash value higher than the value offered by the actual surrender value. In addition, in today's market, customers are also purchasing policies with the express intent of making them investor-owned insurance. Under either circumstance, the value of the life insurance policy to the investor relies on keeping the contract in force. Companies must consider the effect of the secondary market on persistency when setting overall lapse assumptions.

4. Accumulation-oriented, traditional fixed SGUL

ONE OF THE GOALS OF THIS REPORT IS TO INVESTIGATE THE DIFFERENT RISKS TO A COMPANY FROM OFFERING A COMPETITIVE SECONDARY GUARANTEE IN AN ACCUMULATION PRODUCT INSTEAD OF A PROTECTION PRODUCT.

One of the goals of this report is to investigate the different risks to a company from offering a competitive secondary guarantee in an accumulation product instead of a protection product. To investigate this, the protection design was changed to lessen the load structure and lower the interest spread to improve the account value accumulation. Additional changes in the assumptions were to project higher lapse rates and higher expected premium payments into the product. It is conceivable that a product that more efficiently accumulates cash value could receive increased premiums from policyholders, compared with the protection product. This report assumes that accumulation products receive a level of premium in line with competitive endowment premiums in the accumulation UL market, but not less than the minimum to carry the shadow fund over the life of the policy. The revised account value mechanics combined with the endowment premiums endow the demonstration product on a current assumption basis.

PRICING RESULTS

The fixed accumulation product was designed to earn a similar deterministic return to the protection product. MG-ALFA pricing projections produce the following results.

Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
Protection Product - Baseline	22	4.7%	0.1%	8.0%
Accumulation Product - Baseline	21	5.2%	0.4%	8.2%

The following table shows results from 100 interest-rate scenarios.

Scenario	Protection IRR	Accumulation IRR
Minimum	2.8%	4.6%
5th percentile	3.5%	4.9%
10th percentile	4.4%	5.7%
25th percentile	5.5%	6.4%
50th percentile	6.9%	7.4%
62nd percentile (baseline protection result)	8.0%	8.0%
64th percentile (baseline accumulation result)	8.2%	8.2%
75th percentile	9.3%	9.1%
90th percentile	11.2%	9.8%
95th percentile	12.2%	11.0%
Maximum	15.7%	14.1%

The stochastic scenarios on the accumulation product appear to show less tail risk than the protection product. One should not draw too many generalizations, as the model projects the accumulation product with higher premium funding and higher lapse rates (that are not dynamically set).

RISKS TO WRITING COMPANY, COMPARED WITH PROTECTION PRODUCT

The accumulation product, as designed, does increase the number of years before the secondary guarantee is in the money (meaning the shadow fund is positive but the surrender value is negative). Key to the pricing process, however, is in predicting and modeling policyholder behavior. For example, will the policyholder pay, on average, the premium levels that produce the baseline profitability? Or will the policyholder recognize the protection feature and choose to pay minimum premiums? A company would also have to be comfortable with using lapse rates higher than are customary in secondary guarantee product pricing. There is no guarantee that a product with the ability to more efficiently accumulate cash values will actually be used as an accumulation vehicle or that the policyholder will behave as if the contract is an investment vehicle (i.e., be more likely to surrender it for value).

Key to the pricing process, however, is in predicting and modeling policyholder behavior.

5. Indexed UL and variable UL with secondary guarantee

PRODUCT COMPARISONS WOULD NOT BE COMPLETE WITHOUT AN ANALYSIS OF INDEXED UL AND VARIABLE UL (VUL) PRODUCTS WITH SECONDARY GUARANTEES.

Product comparisons would not be complete without an analysis of indexed UL and variable UL (VUL) products with secondary guarantees. The design for each of these products is similar to the traditional fixed accumulation product, aside from the crediting mechanisms. The indexed product is a simple annual reset product with a cap, where 80% of the premium is assumed to earn indexed credits and 20% is assumed to earn traditional fixed credits (and from which all non-premium-related product charges are taken).

The exercise assumes that the variable product has 80% investment in an equity-like separate account and 20% in a general/bond/money market account. The VUL product has a mortality and expense charge in lieu of a pricing spread. Additionally, the reserving in these products is assumed to be subject to AG 38 only. The exercise considers no AG 36 reserving for the indexed product and no AG 37 for the secondary guarantee in the VUL product. For purposes of this research, the intent is only to change the crediting mechanics and look at the resulting behavior of the secondary guarantee.

STOCHASTIC PRICING RESULTS

The exercise makes no attempt to show deterministic scenario pricing results for the indexed and VUL products. The following table shows MG-ALFA stochastic results for all four of the products considered thus far.

Scenario	Protection IRR	Traditional Fixed Accumulation IRR	Indexed Accumulation IRR	Variable Universal Life Accumulation IRR
Minimum	2.8%	4.6%	3.6%	4.5%
5th percentile	3.5%	4.9%	4.6%	6.1%
10th percentile	4.4%	5.7%	5.3%	6.9%
25th percentile	5.5%	6.4%	6.5%	8.1%
50th percentile	6.9%	7.4%	7.8%	10.0%
75th percentile	9.3%	9.1%	10.5%	11.2%
90th percentile	11.2%	9.8%	12.1%	14.1%
95th percentile	12.2%	11.0%	14.4%	14.9%
Maximum	15.7%	14.1%	18.5%	16.5%

Index scenarios are the result of using the Milliman scenario generation tool fit to historical data since 1960.

CONTRAST RISKS TO WRITING COMPANY, COMPARED WITH TRADITIONAL FIXED VERSIONS

Indexed and variable products offer increased account value accumulation on an expected basis. The variance in expected account value accumulation, however, is what drives the return profile for the writing company. One should bear in mind that more accumulation potential provides the opportunity for increased premium payments, which could reduce the risk to a company of offering the guarantee.

6. Risk management

REVIEW OF RISKS TO THE WRITING COMPANY SEEN IN DIFFERENT PRODUCT TYPES

The demonstrations on pages 9 and 15 portray two primary risks assumed by direct writers of SGUL-type products. The first is based on policyholder behavior. Competitive secondary guarantees are often priced with aggressive mortality and lapse assumptions. If those assumptions are far enough off the mark, the insurer's realized profitability is much lower than assumed in original pricing.

The second primary risk is driven by the economic environment and the "in-the-moneyness" of the secondary guarantee. Should the actual account value accumulations fall short of pricing projections, secondary guarantees can be in the money earlier than the pricing assumed. This risk appears in the stochastic scenario results, where the least profitable scenarios result from less-than-expected account value accumulation. It is interesting to consider risk-mitigation techniques that might be at a company's disposal to address some of these risks.

IT IS INTERESTING TO CONSIDER RISK-MITIGATION TECHNIQUES THAT MIGHT BE AT A COMPANY'S DISPOSAL TO ADDRESS SOME OF THESE RISKS.

DISCUSSION OF POSSIBLE RISK-MITIGATION TECHNIQUES

Which of the drivers of the primary risks can risk-mitigation techniques address? As with most life insurance products, mortality risk in secondary guarantee products can be reinsured if it is possible to arrange suitable terms. As with other life products, a company can get comfortable with lapse rates only through sensitivity analysis and good due diligence. Theoretically, however, the account value accumulation risk could be hedged with financial market transactions.

To illustrate the hedging concept, a baseline present value of secondary guarantee claims is calculated for one cell over 1,000 scenarios for the variable accumulation product. This value is then converted into a theoretical fee (in basis points) that could be levied against the account value before the secondary guarantee is in the money. The scenarios use discount rates and expected returns equal to a reasonable proxy for a risk-free rate to make them risk neutral. This results in an average present value at issue of the secondary guarantee liability of $15,148, which translates to about 113 bps of account value per year.

After finding these baseline costs, various sensitivities (to changes in interest rates, equity returns, equity volatility, etc.) are determined by shocking various aspects of the stochastic scenario generator. Depending on the sensitivities seen, it might be possible to purchase derivative instruments to mute the effect of these market sensitivities to the writing company. This process, known as dynamic hedging, is used by many writers to manage the ongoing market risk associated with variable annuity guarantees.

THIS PROCESS, KNOWN AS DYNAMIC HEDGING, IS USED BY MANY WRITERS TO MANAGE THE ONGOING MARKET RISK ASSOCIATED WITH VARIABLE ANNUITY GUARANTEES.

DISCUSSION OF THE RESULTS OF RISK-MANAGEMENT CALCULATIONS

The tables below show the sensitivities calculated for the variable accumulation product at issue and at a hypothetical point after issue. Delta measures the change in value of the liability per change in the account value. Gamma measures the change in value of delta per change in the account value. (In other words, delta is the measure of a first derivative, gamma measures the second derivative). Rho measures the change in liability per change in the risk-free rate. Vega measures the change in liability per change in the volatility of account value growth.

Sensitivities at Issue			
Greek	**Value**	**Shock used**	**Interpretation**
Delta	n/a	n/a	No account value at issue with which to calculate a reasonable delta.
Gamma	n/a	n/a	No account value at issue with which to calculate a reasonable gamma.
Rho	(815.39)	5 bp increase to expected returns and discount rate	Every 5 bp increase in the expected returns and discount rate used in the projection causes an $815 decrease in the expected value of the liability.
Vega	48.23	5 bp increase in volatility	Every 5 bp increase in the expected volatility of returns used in the projection causes a $48 increase in the expected value of the liability.

Sensitivities seven years after issue, assuming $100,000 Account Value			
Greek	**Value**	**Shock used**	**Interpretation**
Delta	(365.10)	+/- 1% AV	A $1,000 increase to the account value decreases the projected liability by $365.
Gamma	(84.75)	+/- 1% AV	A $1,000 increase to the account value decreases delta by 85.
Rho	(870.97)	5 bp increase to expected returns and discount rate	Every 5 bp increase in the expected returns and discount rate used in the projection causes an $871 decrease in the expected value of the liability.
Vega	70.20	5 bp increase in volatility	Every 5 bp increase in the expected volatility of returns used in the projection causes a $70 increase in the expected value of the liability.

Note that the calculation of these sensitivities uses movements in the account value as the measuring stick. Before taking action on these results, a company would thus have to be comfortable that the account value sensitivity so measured could be effectively tied to movements in the financial markets.

That said, once a company calculates these sensitivities, it must decide if the risks reflected in the value of the greeks merit action in the form of hedging activity. As an example, if a company were to decide that the calculated value of delta is significant while the value of gamma is insignificant, it might decide that a delta hedge would be effective and would not require frequent rebalancing. Since hedging locks in a return equal to the risk-free rate, however, a company would have to be happy with trading the account value sensitivity for the lower expected return (locked in at the risk-free rate).

7. Principles-based reserves

THE INSURANCE INDUSTRY IS CURRENTLY PREPARING A PRINCIPLES-BASED RESERVE METHODOLOGY FOR CALCULATING STATUTORY RESERVES.

The insurance industry is currently preparing a principles-based reserve methodology for calculating statutory reserves. At the time of this report, the methodology for principles-based reserves is not yet final. The principles-based reserves shown in this report should be viewed as illustrative based on current proposals.

Principles-based reserves are intended to capture all of the identifiable, quantifiable, and material risks, benefits, and guarantees associated with the contracts, including material tail risk and the funding of the risks.

The proposed methodology for principles-based reserves is the greater of the deterministic reserve and the stochastic reserve. The deterministic reserve is a gross premium valuation approach that uses prudent best-estimate assumptions and a single-interest scenario. It is the present value of benefits and expenses less the present value of premium revenue, where present values are taken at the net investment earnings rate. Deterministic reserves are calculated on a seriatim basis. The prudent best-estimate assumptions are best-estimate assumptions with appropriate margins added for statutory accounting purposes. Best-estimate assumptions are based on company experience, or a blend of company experience and industry experience if company experience lacks full credibility. The deterministic reserve does not explicitly capture material tail risk.

One determines stochastic reserves in aggregate by asset segment over many interest-rate scenarios on a platform of prudent best-estimate assumptions. To calculate these reserves, one determines projected cash flows for each projection year over each scenario. One also determines net accumulated asset amounts for each projection year over each scenario, which are equal to the starting assets at the beginning of the projection. At future durations, the accumulated asset amounts reflect the accumulation of cash flows into and out of the projection. Accumulated deficiencies are equal to the negative net accumulated asset amounts at each projection year. Scenario reserves are equal to the greatest present value of accumulated deficiencies (GPVAD), where present values are determined at the net asset earnings rate for the scenario. The stochastic reserve is then equal to the 65CTE level.

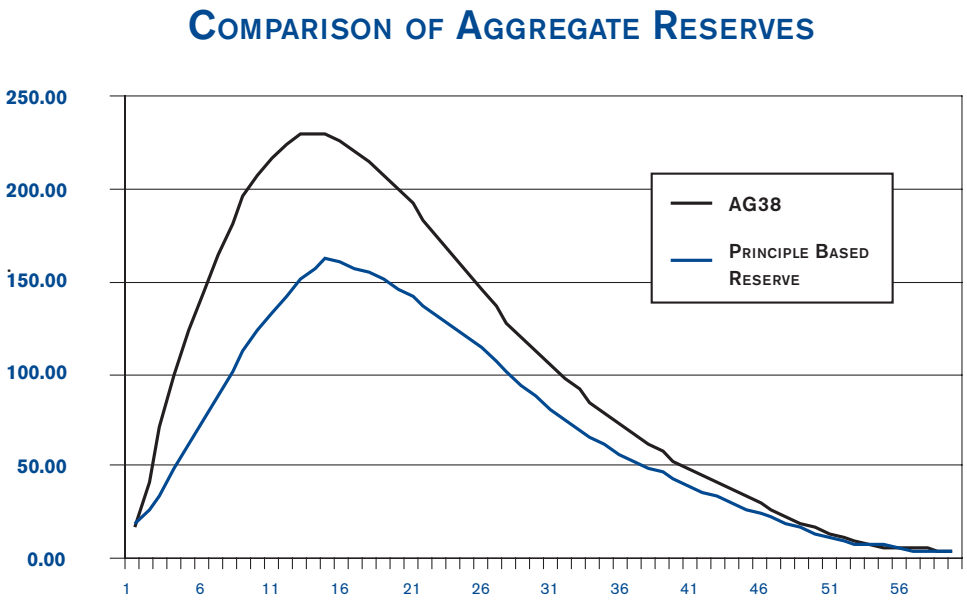
Although in practice the stochastic reserves are calculated in aggregate across asset segments, the reserves for this report are only from the universal life product.

Presentation of reserve results for traditional fixed protection product

Calculating principles-based reserves in MG-ALFA for the traditional fixed protection product generates the following aggregate pricing results.

Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
Protection Product w/ AG 38	22	4.7%	0.1%	8.0%
Protection Product w/ PBR	6	4.8%	3.7%	15.9%

The graph below shows a per-unit-issued projected principles-based reserve stream next to the previously shown AG38 reserve streams.



The exercise calculated the principles-based reserves using 100 interest-rate scenarios at time of issue. In theory, one should calculate the principles-based reserve with a stochastic on stochastic analysis. For example, with 100 interest-rate scenarios, after the second duration one will have 100 new interest-rate starting points to run 100 more interest-rate scenarios. However, this method will very quickly create too many nested scenarios to run the model in a reasonable timeframe.

To reduce the number of nested scenarios, one can create the nested scenarios every five years, but that still results in a large number of scenarios. This approach also creates extreme interest scenarios unless one uses a mean reversion approach.

BECAUSE OF THE TIME CRUNCH THAT IS USUALLY INVOLVED IN PRICING, ANOTHER METHOD TO MEASURE INTEREST-RATE RISK IS TO INCLUDE INTEREST-RATE SENSITIVITIES.

Because of the time crunch that is usually involved in pricing, another method to measure interest-rate risk is to include interest-rate sensitivities. Traditionally, a reduction in the yield curve would not affect the statutory reserve, but with principles-based reserves, the reserve for SGUL products will increase with a decrease in interest rates. This has a double negative effect on the pricing of the product.

The chart below shows the IRR for the protection product:

1. With the principles-based reserves (PBR) in the current interest-rate environment
2. In an interest-rate environment that is lower by 100 basis points, but the same principles-based reserves
3. In an interest-rate environment that is lower by 100 basis points, and the recalculated principles-based reserves

AGGREGATE	IRR
PROTECTION PRODUCT W/PBR IN CURRENT RATE ENVIRONMENT	15.9%
PROTECTION PRODUCT W/PBR IN LOWER RATE ENVIRONMENT, NO RECALCULATION OF STOCHASTIC PBR FACTORS	10.4%
PROTECTION PRODUCT W/PBR IN LOWER RATE ENVIRONMENT, WITH RECALCULATED STOCHASTIC PBR FACTORS	7.6%

The chart demonstrates the importance of including interest-rate sensitivities for protection products and the effect that principles-based reserves will have on the profitability of these products in falling interest-rate environments.

Discussion of reserve differences for three accumulation product varieties, compared with protection product

The proposed principles-based reserve methodology affects the accumulation products considered in this report differently from the protection product because of differences in projected account values and different assumptions about pricing and principles-based valuation.

The following table shows a set of MG-ALFA pricing results after applying the proposed principles-based reserves approach to the traditional fixed accumulation product.

Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
Accumulation Product under AG 38	21	5.2%	0.4%	8.2%
Accumulation Product under PBR	4	5.3%	4.9%	34.3%

Note that the IRR for the PBR results is not indicative of the type of returns one can expect under PBR. Results will vary based on individual product design and the underlying assumptions. With the accumulation product design used here, it is evident the first-year strain has lessened substantially.

8. Surplus relief arrangements

TYPES OF SURPLUS RELIEF ARRANGEMENTS

PART OF THE ABILITY TO OFFER HIGHLY COMPETITIVE PREMIUMS FOR THESE SGUL PRODUCTS IS THE ABILITY TO MANAGE THE FINANCIAL REQUIREMENTS.

Part of the ability to offer highly competitive premiums for these SGUL products is the ability to manage the financial requirements. A company must raise reserves and capital allocated to any business line to meet regulatory and rating agency requirements. There are a variety of innovative ways to deal with the large amounts of capital needed to support the AXXX reserves.

Companies with very strong capital positions could decide to fund the reserve requirements internally. Without access to large amounts of free surplus, however, smaller companies have a harder time competing in the SGUL market. Midsize and larger companies may not want to tie up capital to SGUL products or compromise ratings by potentially lowering free surplus levels when capital demands become higher for this particular product line. As the charts above demonstrate, the shape of the reserve requirement under AG 38 increases steeply for many years.

Companies can get some help through reinsurance. Although reinsurers do not currently have an appetite for the lapse-protection risk in an SGUL product, they do for mortality. Yearly renewable term (YRT) reinsurance does not offer a tremendous amount of surplus relief, but many companies use some form of reinsurance to protect mortality fluctuation and thus enjoy some reserve credit. The ability to reinsure mortality risks will also help in any of the other vehicles that will be discussed in this section. Rating agencies look favorably on direct writers that choose high-quality reinsurers, as this choice decreases the exposure to counterparty risk. Reinsurers are becoming uncomfortable with older-age mortality, exceptions to underwriting guidelines that include table-shaving programs, and secondary life settlement markets associated with SGUL products. Coupled with the decline in the number of reinsurers in the market, direct companies are finding other alternatives to reinsurance to meet their needs, such as increasing their retention levels and managing the capital issues themselves.

One way to manage the capital constraint that comes with higher retention is through captive reinsurers, either offshore or domestic. Offshore reinsurance companies are usually located in countries that have more favorable regulatory treatment for the company. Bermuda, for example, does not require the full statutory reserves but, instead, allows net reserves based on methods similar to Generally Accepted Accounting Principles (GAAP). When deciding where to set up a captive, companies must consider their ability to realize all the potential tax benefits of utilizing an onshore versus an offshore captive.

ONE WAY TO MANAGE THE CAPITAL CONSTRAINT THAT COMES WITH HIGHER RETENTION IS THROUGH CAPTIVE REINSURERS, EITHER OFFSHORE OR DOMESTIC.

One method for setting up a captive arrangement would be to have a company 100% coinsure a SGUL product or SGUL rider to an offshore captive reinsurer. (The decision to reinsure the entire product versus just the rider may be a matter of satisfying the stance of involved state regulators.) Once offshore, the reinsurer would hold the GAAP reserve and use a letter of credit to cover the difference between the GAAP reserve and the statutory reserve so that the direct company would be allowed full statutory reserve credit. A letter of credit (LOC), often issued by a bank, is a promise to pay funds up to a specified capacity should the insurance company need more than the available funding of the GAAP reserve to cover benefit payments. Unless additional funds are actually needed, the captive reinsurer would not have tangible assets associated with the LOC. (A comparable approach would be to set up the full statutory reserve with a corresponding DAC asset equal to the redundant reserve.)

LOCs have historically been on a one-year-term basis, with renewals subject to a guaranteed rate. In March 2006, Standard & Poor's (S&P) issued a statement indicating concern over companies' using shorter-term LOCs to back much-longer-term liabilities. S&P views this mismatch as a two-part risk. The first is availability risk: will LOCs be available as inforce reserves increase and new business is issued. The second is pricing risk: as markets change and LOCs are renegotiated, the prices on LOCs may increase. S&P views LOC funding as debt based on the duration of the LOC and the type of business it is backing. This rating agency's view has created demand for longer-term LOCs, a demand the market is currently changing to meet. Longer LOC guarantees come at a higher cost, further thinning margins on SGUL (and other low-profitability) products.

WE HAVE ALSO STARTED TO SEE BANKS USING THEIR OWN BALANCE SHEETS TO PROVIDE RESERVE RELIEF TO INSURANCE COMPANIES.

We have also started to see banks using their own balance sheets to provide reserve relief to insurance companies. Similar to an LOC, a bank makes a set amount, or capacity, available to a company to assist in reserve relief. Rather than a promise to pay that is associated with an LOC, the bank partners with the insurance company to provide funding, using assets on the bank's balance sheet. These arrangements are useful either as a bridge to a long-term solution or as a standalone longer-term solution.

Securitization to fund the redundant reserves is another option. There have been successfully executed securitizations under the terms of Regulation XXX. At the end of October 2006, the first AXXX securitization closed. A securitization structure may also include a bridge solution, whereby the company cedes the risk from the product to a captive reinsurer (usually domestic for optional tax benefits, but sometimes offshore) and then executes a securitization when funds reach capacity, or a level that is both appealing to the capital markets and economical for the insurance company.

All of these approaches look to replace the equity funding of the redundant reserve with debt-like funding raised from the capital market but with off-balance-sheet treatment or operating leverage treatment for the debt.

Compared with Regulation XXX securitizations, AXXX redundant reserve securitizations have taken much longer to come to market, primarily because of the added complexities in the SGUL product. AXXX has created a substantial complexity and variation in designs, which means that each potential deal will have to overcome its own hurdles before successful completion. One of the biggest challenges is just in defining the level of redundancy.

Part of the reason the redundant reserve is so hard to define is the complexity of secondary guarantee products themselves. Investors will want to understand the product and its risks fully before funding the structured solution (whether such solution is a long-term LOC, bank financing, or full securitization). AXXX structured solutions will emphasize pricing assumptions and contractual features, particularly the following:

PART OF THE REASON THE REDUNDANT RESERVE IS SO HARD TO DEFINE IS THE COMPLEXITY OF SECONDARY GUARANTEE PRODUCTS THEMSELVES.

- Mortality: experience, slope, improvement, older ages, table-shaving practices within the company, preferred class mortality and the company's actual-to-expected experience, and conversions from term insurance;

- Lapse rates: dynamic assumption based on how far in-the-money the secondary guarantee is (zero lapse if guarantee is paid up, low 1–2% if some premium is still required), and amount of business susceptible to life settlement market;

- Premium patterns: various premium patterns will need to be tested, and transactions cannot depend on inefficient policyholder behavior;

- Interest rates: investment philosophies, assumptions about earned rates, and credited-rate philosophies;

- Non-guaranteed elements: investors are concerned with how changes in non-guaranteed elements will affect the risks being transferred; and

- Changes in death benefits or specified amounts: increases, decreases, and changes in death-benefit options.

There is a tendency to lock in assumptions at issue, but the structure needs to be flexible enough to handle policyholder behavior and its effect on the liabilities within the transaction.

IN ADDITION TO DEFINING THE REDUNDANT RESERVE, COMPANIES NEED TO ADDRESS MANY OTHER PRODUCT AND DEAL-STRUCTURE ASPECTS WHEN CONSIDERING STRUCTURED SOLUTIONS.

In addition to defining the redundant reserve, companies need to address many other product and deal-structure aspects when considering structured solutions. The level of excess capital within the captive is one example. The captive will need to have excess capital infused into it as a cushion to protect investors from adverse deviations in experience. This capital is above the reserves and risk-based capital required by regulation, and it should be a matter for negotiation in the deal.

Taxes and dividend rules are also important aspects to consider. There are potentially some tremendous tax benefits in structured solutions, so ensuring the tax efficiency of the structure and tax status of the company is essential. As for dividend rules, there is an inherent conflict between the insurance company's desire to release excess capital to investors as soon as possible and the financing provider's desire to keep capital in the captive to protect their investment.

Investors and rating agencies alike must conduct extensive, robust modeling when considering structured solutions. AXXX modeling is more complex and will require more testing than the Regulation XXX models.

Finally, there are regulatory demands and risks to take into account. Structured solutions have to meet regulatory approval in both their state of domicile and the state in which the captive is domiciled. A few states are "captive-friendly" (Arizona, the District of Columbia, Delaware, Hawaii, South Carolina, and Vermont). In other states, however, gaining approval requires educating the regulators on the process and the structures. Regulatory concerns associated with these transactions include risk transfer, counterparty risks, parental guarantees, and business written in New York.

AXXX has introduced a new wrinkle in the time horizon for deals. Unlike for XXX securitizations, in which the time horizon is fixed at a maximum of 30 years, AXXX deals present the capital markets with an investment horizon in excess of 40–50 years. This creates a challenge for putting a deal in place, because the capital markets have not traditionally embraced securities with horizons beyond 30 years.

PRESENTATION OF MODELED RESULTS

As indicated above, various types of surplus relief are available. With a less favorable outlook on the ability to internally generate the capital requirements, and the mounting concerns of LOCs, the present research uses the appeal of structured solutions to provide longer-term surplus relief. For the test plan, we assume that the insurance company cedes 100% of the no-lapse guarantee risk inherent in a rider to its captive domestic reinsurer. The ceding company will pay the captive a premium, and the captive will reimburse the ceding company for benefits associated with the secondary guarantee's being in the money (otherwise uncollectible charges). The business is warehoused within the captive until it achieves capacity for an AXXX securitization, assumed to occur three years later. The captive's definition of redundant reserve will be the difference between full AXXX reserve and the sum of the UL model regulation and the gross premium reserve, equaling the present value of expected benefits paid and expenses incurred by the captive less the present value of expected premium the captive will collect from the ceding company.

This study used stochastic scenario testing in MG-ALFA to determine the average payments, benefits, and excess capital that the deal structure produced. The model assumes a 70-basis-point charge on the redundancy securitized to account for expenses and excess interest between the cost of debt and the earned rate on the assets borrowed. The 70-basis-point charge is similar to what term XXX securitizations are being charged. The model would include an additional charge as a percent of collected account value charges, but logistically it is assumed to net out against the tax benefit realized by the parent company. Netting out the tax benefit in this way is a modeling simplification for illustrative purposes only. In reality, every deal would need significant due diligence to accurately assess the tax benefit realized by the parent from a deal such as this. The model assumes that the parent supplies $100 million of additional capital to the captive at the deal's inception. To derive the actual amount, a company would run numerous scenarios and sensitivities to arrive at a capital amount sufficient to cover any shortfall at the captive level in a vast majority of situations.

THIS STUDY USED STOCHASTIC SCENARIO TESTING IN **MG-ALFA** TO DETERMINE THE AVERAGE PAYMENTS, BENEFITS, AND EXCESS CAPITAL THAT THE DEAL STRUCTURE PRODUCED.

The following table shows modeled MG-ALFA results for one year's business, resulting in $500 million of redundant reserve at its highest point.

Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
Protection Product	22	4.7%	0.1%	8.0%
Protection Product with Modeled Securitization	15	11.6%	7.0%	11.7%

Please note that these are deterministic results, but they utilize stochastically calculated additional capital and percent of collections charge to be paid to the captive.

Differences in expected results of similar arrangements for accumulation products

Assuming realization of similar tax benefits, the bigger hurdle to overcome for accumulation products is defining redundancy and the amount of time it would take to build capacity to securitize. Postponing securitization locks up capital for longer periods, reducing returns on the product.

ASSUMING REALIZATION OF SIMILAR TAX BENEFITS, THE BIGGER HURDLE TO OVERCOME FOR ACCUMULATION PRODUCTS IS DEFINING REDUNDANCY AND THE AMOUNT OF TIME IT WOULD TAKE TO BUILD CAPACITY TO SECURITIZE.

For a securitization transaction involving an accumulation product, variations in the above structure are necessary. First, the definition of the redundancy would be different. Cash values would be higher, causing the UL model regulation reserve to be higher, thus lessening the amount of redundancy and causing a delay in the build-up of capacity. Premium patterns and assumption sensitivities would be tested differently for realistic behaviors associated with an accumulation product. Indexed and variable products add the element of stock-index performance on both policyholder behavior and on the potential liabilities for the company.

9. Concluding remarks

Secondary guarantees will continue to be a dominant product feature in the permanent life insurance market. Designing and pricing a secondary guarantee product requires considering multiple pricing risks (on deterministic, stochastic, and risk-neutral bases), current and future regulatory stances, and surplus management. Another important consideration is the type of product chassis in which to embed the guarantee (protection, accumulation, and crediting mechanism).

SECONDARY GUARANTEES WILL CONTINUE TO BE A DOMINANT PRODUCT FEATURE IN THE PERMANENT LIFE INSURANCE MARKET.

As the U.S. insurance industry positions itself to be a player in the retirement planning arena, it will be interesting to see how protection and accumulation life products with and without secondary guarantees fare in the product mix. Given the popularity of guarantees of all types in the insurance market in the past five years, it seems likely that companies will continue to design and sell lifetime secondary guarantees in all types of universal life insurance going forward.

Appendix A

Competitive lifetime secondary guarantee premium for male, best class

Age 35: Company 1	$ 4,450
Age 35: Company 2	$ 4,455
Age 35: Company 3	$ 4,480
Age 35: Company 4	$ 4,668
Age 35: Company 5	$ 4,732
Age 35: Company 6	$ 4,760
Age 35: Company 7	$ 4,980
Age 35: Company 8	$ 4,983
Age 35: Company 9	$ 5,003
Age 35: Company 10	$ 5,010
Age 35: Company 11	$ 5,168
Age 35: Company 12	$ 5,220
Age 35: Company 13	$ 5,280
Age 35: Company 14	$ 5,400
Age 35: Company 15	$ 5,400
Age 35: Modeled Premium	$ 5,395
Age 55: Company 1	$ 10,920
Age 55: Company 2	$ 11,000
Age 55: Company 3	$ 11,081
Age 55: Company 4	$ 11,181
Age 55: Company 5	$ 11,250
Age 55: Company 6	$ 11,320
Age 55: Company 7	$ 11,499
Age 55: Company 8	$ 11,572
Age 55: Company 9	$ 11,628
Age 55: Company 10	$ 11,659
Age 55: Company 11	$ 11,663
Age 55: Company 12	$ 11,666
Age 55: Company 13	$ 11,685
Age 55: Company 14	$ 11,687
Age 55: Company 15	$ 11,690
Age 55: Modeled Premium	$ 11,498

Competitive lifetime secondary guarantee premium for male, best class (continued)

Age 75: Company 1	$ 32,700
Age 75: Company 2	$ 33,371
Age 75: Company 3	$ 33,390
Age 75: Company 4	$ 33,469
Age 75: Company 5	$ 33,658
Age 75: Company 6	$ 34,260
Age 75: Company 7	$ 34,708
Age 75: Company 8	$ 34,940
Age 75: Company 9	$ 37,450
Age 75: Company 10	$ 37,642
Age 75: Company 11	$ 37,823
Age 75: Company 12	$ 37,910
Age 75: Company 13	$ 37,922
Age 75: Company 14	$ 38,420
Age 75: Company 15	$ 38,486
Age 75: Modeled Premium	$ 33,486

Appendix B

Protection product pricing results by model cell				
Aggregate	Break-even Year	Profit Margin @ NIER	Profit Margin @8.00%	IRR
35MNBLP	36	11.5312	(5.5315)	7.2810
35MNSLP	30	12.3975	0.7193	8.1451
35MSSLP	11	15.3471	10.9579	15.9445
55MNBLP	53	0.0634	(12.4908)	6.0092
55MNSLP	29	5.0058	(2.7031)	7.2535
55MSSLP	11	13.4890	10.1964	17.5585
75MNBLP	38	(0.5720)	(5.5887)	5.7844
75MNSLP	15	6.4176	3.5701	10.8307
75MSSLP	9	8.0375	6.4802	18.5577

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