

Massachusetts Mutual Life Insurance Co. And Subsidiaries

Major Rating Factors

Strengths:

- Extremely strong competitive position with strong market positions in individual life insurance, retirement plans, and asset management.
- Very strong operating performance on a statutory and management GAAP basis.
- Extremely strong capitalization.
- Well-diversified investment portfolio exhibits strong performance.
- Very well-developed asset/liability management.
- Benefits of mutual corporate governance structure.

Weaknesses:

- Highly competitive key markets and challenges in maintaining a strong position across life insurance markets.
- Challenges consistent with the industry to attract and retain agents and improve agent productivity.

Rationale

The insurer financial strength ratings on Massachusetts Mutual Life Insurance Co. (Massachusetts Mutual) and its subsidiaries, C.M. Life Insurance Co. (C.M. Life) and MML Bay State Life Insurance Co. (MML Bay State) (collectively, MassMutual), are based on the company's extremely strong competitive position, capital, and liquidity. The ratings also reflect the company's very strong operating performance and asset/liability management

Operating Companies Covered

By This Report

Financial Strength Rating

Local Currency

AAA/Stable/—

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(ALM), as well as the benefits it derives from its mutual ownership structure. Partially offsetting these strengths is the competition MassMutual faces in its key markets.

MassMutual has an extremely strong competitive position and leads peers in several product lines: individual life insurance, individual disability insurance (DI), annuities, long-term care insurance, retirement plans, and asset management through the ownership of OppenheimerFunds and other asset managers. Scale is one element of MassMutual's efficient operations, with total assets under management (AUM) experiencing double-digit growth annually since 2003 and reaching \$505 billion as of year-end 2007.

MassMutual's earnings remain very strong and well diversified on both a statutory and management GAAP accounting basis. Because of earnings diversification, the company continues to generate consistent earnings with strong underlying fundamentals including competitive spreads, active expense management, and favorable morbidity and mortality. In full-year 2007, pretax statutory earnings increased more than 50% over 2006. The main drivers were strong increases in the individual life and disability income segments.

The company's ALM and investment performance are very strong, and its invested assets are well diversified. The company engages in extensive cash-flow testing to ensure correctly matched assets and liabilities. At the same time, as a mutual company, MassMutual has the option to decrease policyholder dividends to adjust for any unexpected negative developments.

As of Dec. 31, 2007, MassMutual's cash and invested assets consisted primarily of corporate public and private bonds (30%); cash, short-term investments, and treasuries (7%); commercial mortgages and REITs (14%); high-quality and securitized securities (26%); policy loans (11%); equity stocks and partnerships (11%); and real estate (1%). The company does have sizable subprime/Alternative-A (Alt-A) exposure, although its excess capital should comfortably absorb potential losses.

MassMutual's liquidity remains very strong. Invested assets are well diversified in highly liquid asset classes, and the portfolio's liquidity far exceeds the company's liquid liabilities. Investment quality is solid because of the lack of concentration in any issuer or investment class and because of the high-quality, fixed-income portfolio.

MassMutual's stress testing of liquidity follows strict guidelines, which Standard & Poor's Ratings Services views as conservative. As of year-end 2007, Massachusetts Mutual, the lead operating company, had a very strong liquidity ratio of about 224%, which supports the rating.

MassMutual's capitalization is extremely strong. Total adjusted capital grew at a compound annual growth rate of 8.2% from 2005 to 2007, when it reached \$10.3 billion. This growth resulted primarily from strong operating performance and capital gains.

Outlook

The outlook is stable. Standard & Poor's expects MassMutual's individual life insurance sales to further decrease modestly through the remainder of 2008, given the competitive dynamics in the universal life (UL) insurance market. We expect individual insurance sales of whole life in the career agency channel to increase further in 2008. Retirement services' AUM are expected to trail 2007 levels, reflecting the current challenges in that market, offset by MassMutual's efforts to acquire new assets and to expand distribution and retain existing assets.

We expect overall individual annuity sales to increase significantly in 2008, reflecting MassMutual's continued momentum in this highly competitive market. Pension and annuity prospective sales growth, however, is directly affected by potential continuation of the volatile equity market.

MassMutual's financial performance will remain very strong. Management GAAP adjusted pretax earnings, excluding realized investment gains and losses, likely will rise modestly in 2008 from 2007 levels. MassMutual's investment portfolio, both in asset allocation and hedging strategy, is not expected to change significantly. We expect the company to maintain extremely strong capitalization as strong statutory operating performance largely offsets potential investment losses. We expect liquidity to remain strong because of MassMutual's investment strategy and liability profile. The company's liquidity ratio likely will remain at about 230% in 2008.

Competitive Position: Emphasizing Agency Force, Working To Regain Market Share And Production Levels

MassMutual maintains an extremely strong competitive position because of its diversified revenue sources and its position as one of the leading issuers in the traditional whole life insurance market. The company continues to reemphasize its commitment to its increasingly efficient career agency distribution force for the sale of life insurance products and especially traditional whole life, and agent productivity has improved consistently since 1998.

In 2008, MassMutual has continued to focus on its captive agency force, and we believe the company has the potential to further improve agent productivity and retention. That said, MassMutual has yet to regain overall sales levels and market share that it had achieved prior to the rededication of its efforts primarily to its career channel. While MassMutual has deemphasized life sales through third parties, the company will continue to use these distributors for the sale of disability insurance and annuities. Given management's aggressive plans for growth in the captive channel, Standard & Poor's expects MassMutual ultimately to continue to increase its share of the individual life insurance market once the noise surrounding third-party distributed universal life insurance subsides.

Table 1

MassMutual Insurance Group/Selected Statistics					
	—Year ended Dec. 31—				
(Mil. \$)	2007	2006	2005	2004	2003
Capital adequacy ratio (%)	AAA	AAA	498.8	383.8	482.8
Statutory earnings adequacy ratio (%)	161.0	145.9	166.0	169.6	212.0
Liquidity ratio (%)	223.5	224.2	239.3	244.6	257.9
Total assets (including separate accounts)	131,557.0	122,179.6	113,586.4	108,886.2	97,422.4
Total premiums and considerations	13,423.5	13,198.0	12,707.5	14,285.6	13,620.3
Pretax income	834.8	562.8	689.7	386.0	597.8
Total adjusted capital (including asset valuation reserve)	10,294.4	9,428.0	8,787.0	8,644.5	7,760.5

Table 2

MassMutual Insurance Group/Business Statistics					
	—Year ended Dec. 31—				
(Mil. \$)	2007	2006	2005	2004	2003
Total revenue	18,996.8	18,246.6	17,585.8	18,943.8	18,186.3
Total premiums and considerations	13,423.5	13,198.0	12,707.5	14,285.6	13,620.3
Premium revenue increase (%)	1.7	3.9	(11.0)	4.9	11.3
Deposits	2,327.5	1,132.5	698.4	1,867.5	1,687.5
Total premiums, considerations, and deposits	15,751.0	14,330.5	13,405.9	16,153.1	15,307.8
Premiums, consideration, and deposit revenue increase (%)	9.9	6.9	(17.0)	5.5	25.1
Net first-year premiums	4,147.0	4,104.0	2,264.3	3,488.7	3,545.8
Net first-year increase (%)	1.0	81.2	(35.1)	(1.6)	22.1
Net single premiums	1,185.5	1,467.6	1,082.6	1,644.2	1,227.1
Net single increase (%)	(19.2)	35.6	(34.2)	34.0	2.2
Separate accounts assets	50,226.9	45,568.9	40,227.1	37,102.3	30,334.4
Increase in separate accounts assets (%)	10.2	13.3	8.4	22.3	31.7
Major lines					
Individual life	3,902.0	3,819.7	3,529.1	3,644.7	3,714.4
Individual annuities	2,134.2	2,156.7	1,993.0	2,860.9	2,107.9
Group life	880.8	729.0	457.5	810.0	1,389.9
Group annuities	6,065.7	6,065.3	6,316.0	6,576.0	6,038.0
Individual accident and health	440.8	427.2	411.9	394.0	370.1
Deposits	2,327.5	1,132.5	698.4	1,867.5	1,687.5

Historical

Although MassMutual had invested in additional distribution methods, the career agency force remained its centerpiece. The four-year agent retention is in line with the industry average. The retention rate has improved because of increased efforts in recruiting and improved marketing support. Although we expect the renewed focus on the career agency channel through enhanced technology, agency development, and client-building programs to improve retention, sustaining an improved

retention ratio will remain a challenge given the competition in the agent channel and the industry tendency for agents to be attracted to the brokerage houses.

MassMutual and its affiliates consist of three major segments: domestic insurance, asset management, and international.

Domestic insurance

Of the total \$505 billion of AUM in 2007, domestic insurance constituted 28% of AUM and about 76% of the company's total premiums in 2007.

Domestic insurance includes life, disability/long-term care, executive benefits, retirement services, retirement income, and financial products. Total sales in domestic insurance increased 31%, driven by strong performances in executive benefits, retirement services, and financial products, and offset by declines in life insurance.

Life insurance sales fell by 12% in 2007 and 3% in first-quarter 2008. This drop in sales resulted from MassMutual's intentional pullback from its independent distribution, which Standard & Poor's views favorably with the potential to improve career channels retention and productivity. MassMutual maintains its position as a top-four company in periodic premiums from whole life insurance sales. Life sales also spiked in 2006 with MassMutual's introduction of secondary guaranteed UL and a pent-up demand for this product in its agency force. Life insurance premiums in 2007 increased 1% over 2006 but were up 9% compared with 2005. The company's primary focus continues to be providing life insurance to mid- to upper-middle-income individuals (household income greater than \$75,000), as well as to small to midsize businesses. MassMutual has a strong market position in the high-net-worth market.

The 2007 weighted sales mix is predominantly whole life as well as some UL products. Life sales moved downward in 2004 and 2005 because of the competitive pressures surrounding UL with secondary guarantees. However, sales increased significantly in 2006, with UL sales rebounding strongly as the company responded with a competitive secondary guarantee product. In 2007, overall weighted life sales declined by 10%, partially because of a slowdown in UL sales, reflecting stronger-than-expected sales in 2006.

Subsidiaries C.M. Life and MML Bay State provide some variable and UL products. The financial strength ratings on these entities reflect explicit support from MassMutual.

MassMutual's ability to provide a complete spectrum of both traditional and nontraditional products, as well as fixed and variable products, gives it a diverse portfolio, which is an advantage during unstable market conditions.

MML Investors Services Inc. is the broker-dealer for MassMutual's career agency force. It provides a full complement of securities products, including proprietary and nonproprietary mutual funds and variable life insurance and annuity products.

MassMutual provides individual disability and long-term care insurance through multiple distribution channels. These sales increased 7.5% in 2007, followed by an increase in first-quarter 2008 of 38% to \$11 million from \$8 million in first-quarter 2007.

Recently, the company increased its focus on selling individual annuities. MassMutual continues to introduce new fixed- and variable-annuity products to bring its portfolio up to date and has enhanced existing products with new funds.

In 2007, retirement income sales increased 7.7% to \$2.2 billion. Although MassMutual is not a market leader in this product line, the sales volumes are considerable and provide a degree of diversification to sales and earnings.

Sales for retirement services, which focuses on providing full-service, defined-contribution, and defined-benefit retirement plans ranging from small to midsize businesses, rebounded strongly in 2007 from 2006 because of favorable market conditions and the effect of registered products. Its main competitive advantage is leveraging its defined contribution technology platform through its more than 900,000 plan participants. MassMutual maintains a top-tier life insurance company market share position in the defined contribution market. To further bolster its position, MassMutual purchased First Mercantile Trust Co., with \$4.6 billion of AUM earlier this year.

Asset management

Of the total \$505 billion of AUM as of Dec. 31, 2007, asset management constituted 67%. This segment consists of four asset managers: OppenheimerFunds Inc., Babson Capital Management LLC, Baring Asset Management Ltd., and Cornerstone Real Estate Advisers LLC. MassMutual owns almost 100% of Oppenheimer, which has more than 60 mutual fund offerings and \$262 billion in AUM as of Dec. 31, 2007. Oppenheimer has a strong distribution network and above-average investment performance relative to the industry. The company has significant brand recognition and continues to exploit the cross-selling opportunities with MassMutual. Standard & Poor's believes that the enterprise value of Oppenheimer, Babson, and Baring is greater than the statutory book value recorded of \$2.3 billion because of its above-average earnings power and acknowledged brand. This excess value is considered a favorable resource for MassMutual, and we adjust our capital model accordingly.

International

MassMutual has a diverse international business that has expanded rapidly as a result of strong niche positions in certain Asian products and markets. This segment is viewed primarily as a strategic investment, and at its current scale does not provide substantial benefit to MassMutual's financial strength. Nevertheless, from a management GAAP earnings perspective, the international segment contributes roughly 10% of earnings, which provides some modest diversification. Of the total \$505 billion of AUM in 2007, international constituted only 5%. MassMutual has been expanding steadily in Asia, where some of the company's largest international subsidiaries are based.

MassMutual Mercuries Life Insurance Co. Ltd. is the largest foreign insurer in Taiwan, with \$7.8 billion of AUM as of Dec. 31, 2007. In February 2004, MassMutual acquired Fuh Hwa Securities Investment Trust Co., the fourth-largest mutual fund company in Taiwan. This acquisition, along with MassMutual Mercuries Life, constitutes \$13 billion in AUM in Taiwan as of Dec. 31, 2007. In early 2008, MassMutual announced the sale of Fuh Hwa Securities.

MassMutual Japan has had strong growth as a result of a strong competitive niche in the sale of corporate-owned life insurance (COLI) and single-premiums, fixed-annuity products. However, its performance history is relatively short in Japan, which is highly competitive, especially for non-U.S. companies. MassMutual Life Insurance Co. of Japan (MassMutual Japan) has expanded its distribution significantly to include more financial institutions, banks, brokers, and financial planners.

MassMutual is established in Hong Kong through MassMutual Asia Ltd. (MassMutual Asia), the sixth-largest insurer in Hong Kong, which had AUM of \$1.3 billion as of Dec. 31, 2007. In February

2004, MassMutual Asia and Oppenheimer formed an alliance to offer mutual funds in this market. Standard & Poor's expects MassMutual Asia to continue to expand services aggressively in Hong Kong because of both the demographics of Hong Kong and the access it provides to mainland China. MassMutual also owns a subsidiary in Luxembourg that sells unit-linked and private-client products. The company also has a small minority investment of \$60.7 million in an insurance company in Chile.

Management And Corporate Strategy: Strong Management Execution And Well-Developed ALM Breed Success

MassMutual has successfully executed its strategy of diversifying sources of earnings and distribution sources while maintaining economies of scale by pursuing specific markets. Thus far, Standard & Poor's believes management has achieved enhanced results without assuming a significant amount of additional risk. This success has been attributed to strong execution by management and well-developed ALM.

The ratings reflect the successful leveraging of the company's mutual ownership. Because of this structure, it can build its extremely strong capital base through the development of strong statutory earnings and can selectively enhance its well-diversified business profile through modest strategic acquisitions and by developing businesses in the longer term.

Operational management

Management continues to transform MassMutual into a more diversified organization, in terms of product offerings and earnings sources, while producing strong growth in sales and earnings and maintaining extremely strong capitalization. The implementation of this strategy is evident in the number of new and enhanced product offerings developed, the enhanced focus on the career agency force related to agent retention and productivity, and the company's international expansion efforts.

Financial management

Like its large mutual peers, MassMutual has scale and focuses on efficiency. It differentiates itself from public competitors by returning all profits to policyholders or building capital for its security rather than to provide returns to shareholders. We view this as a competitive differentiator at the current ratings level. The company has overcome a traditional disadvantage associated with mutual insurers by accessing the capital markets through the issuance of surplus notes and commercial paper, which has enhanced capitalization and financial flexibility, although these measures still are not comparable to strong public companies'. MassMutual's financial management focuses on growth in premium, AUM, and operating earnings, both on a statutory and management GAAP basis. In addition, the company is committed to maintaining extremely strong capitalization and a well-diversified investment portfolio.

Enterprise Risk Management: Adequate, With Solid Management Of Its Investment Risks

MassMutual has an adequate enterprise risk management (ERM) program that supports the financial strength rating, with several aspects viewed as strong. The company's largest risks are investment related, and Standard & Poor's finds that MassMutual's controls of those risks are well managed. We believe that these strong risk controls mean it is unlikely the company will experience losses outside its tolerances. The company has experienced low earnings volatility, which is further evidence of the good

risk control. However, MassMutual has several processes of varying sophistication to identify and evaluate risk/reward trade-offs and to manage risk-adjusted returns. In some cases, the company relies on a risk-based capital (RBC) formula analysis of risks rather than a risk model that is calibrated to specific risks. We believe ERM is moderately important to the rating on MassMutual because of the diverse businesses within the group and the diverse physical locations, offset by the conservative risk appetite, participating business, and high earnings and capital that provide capacity to absorb any losses. Standard & Poor's believes that MassMutual's ERM program is stable. We do not expect to see significant changes in the next three years.

The company's risk-management culture has been under development for the past several years. The insurer first appointed a chief risk officer in 2003 and has since expanded the number of committees that oversee risk and risk-management activities. This idea that risk management needs to identify opportunities as well as risks is ingrained into the charter of the risk-management function.

Risk-management practices at MassMutual are most robust in the investment area. The firm shows a very high degree of dedication to diversification, with very low single-name limits and a wide variety of investment vehicles in use. MassMutual shows a very high orientation toward action, with a focus on acting when it sees a significant change (both upside and downside) in the return for the amount of risk for any investment situation. MassMutual has a strong track record of credit risk management. In the area of ALM, the company targets a very low exposure to interest rate risk and acts decisively to maintain that target.

In the area of strategic risk management, MassMutual has articulated a goal to manage its business risks in a portfolio manner similarly to its management of an investment portfolio, recognizing the risk and reward of activities, as well as their contribution to aggregate risk and reward. However, the company currently supports such work primarily with an RBC-type generic view of risk, augmented by stress testing. Standard & Poor's finds it favorable that MassMutual uses risk-adjusted return targets for its products, but it's less favorable that these targets are primarily subjectively determined. In addition, MassMutual's broad commitment to diversification does not seem to be tied to any specific quantitative and systematic view of the impact of diversification on its risk profile, which would be an important component of portfolio risk/reward optimization.

Accounting

Standard & Poor's believes that MassMutual's accounting is consistent and adequate. MassMutual's financial statements are prepared on the basis of U.S. statutory accounting principles.

KPMG audited the 2007, 2006, and 2005 statutory statements and has provided an unqualified opinion on the financial statements and footnotes. No change in auditing firms has occurred in the past three years. The insurance operations, subsidiaries, and affiliates prepare statutory filings in compliance with the various insurance regulatory authorities. The companies have made all filings within the prescribed time frame.

For the purpose of evaluating MassMutual's capitalization, we made an adjustment for the capital required for its affiliated holding in Oppenheimer Funds and other asset managers to partially recognize their significant market value over book value.

From a statutory accounting standpoint, the increase/decrease in the value of the derivatives used to hedge its interest rate risk directly affects statutory surplus. The corresponding economic offset is embedded in the assets and liabilities. From an accounting standpoint, interest rate-related assets and

liabilities targeted for hedging are not marked to market on an ongoing basis. Although assets and liabilities are not adjusted, the change in the mark-to-market derivative valuation basis runs through surplus. Standard & Poor's considers this risk-management technique as very favorable given the uncertainty and volatility related to interest rate risk.

We believe that the group maintains good discipline in financial reporting. Although not regulatory required, the company received a clean internal controls opinion, in conjunction with Sarbanes-Oxley 404 compliance, from its independent public accountants for its 2006 statutory financial statements.

Operating Performance: Various Factors Combine To Generate Consistent Earnings

MassMutual's earnings remain very strong and well diversified on both statutory and adjusted management GAAP accounting bases. Because of earnings diversification, MassMutual continues to generate consistent earnings, with strong underlying fundamentals in competitive spreads, active expense management, and favorable morbidity and mortality.

Table 3

MassMutual Insurance Group/Summary Operating Statistics					
	—Year ended Dec. 31—				
<i>(Mil. \$)</i>	2007	2006	2005	2004	2003
Pretax income	834.8	562.8	689.7	386.0	597.8
Net income	236.5	858.7	799.6	368.6	479.5
Statutory earnings adequacy ratio (%)	161.0	145.9	166.0	169.6	212.0
Return on revenue (%)	4.39	3.08	3.92	2.04	3.29
Return on assets (%)	0.66	0.48	0.62	0.37	0.66
Pretax statutory rate of return on capital (%)	6.20	5.05	12.70	6.85	12.36

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Table 4

MassMutual Insurance Group/Operating Statistics (cont. 'd)					
	—Year ended Dec. 31—				
<i>(Mil. \$)</i>	2007	2006	2005	2004	2003
General expenses	1,140.8	1,176.8	1,012.3	1,262.0	990.9
General expense ratio (%)	7.2	8.3	7.7	7.9	6.6
Expense ratio (%)	10.4	11.8	11.4	11.2	10.1
Unit expenses (in whole dollars)	394.3	406.4	333.2	437.2	332.7
General expenses as a percentage of total assets	0.9	1.0	0.9	1.2	1.0
Commission ratio (%)	6.3	6.6	7.0	7.2	8.2
Lapse ratio (ordinary only) (%)	4.5	4.7	5.1	5.1	5.4
Mortality ratio (%)	266.0	252.7	248.4	271.3	261.5
Investment spread (%)	2.8	2.7	2.8	2.7	2.9
Accident and health					
Loss ratio (%)	71.3	76.8	88.1	80.4	69.7
Expense ratio (%)	46.1	46.9	48.8	47.8	48.5
Combined ratio (%)	117.5	123.7	137.0	128.2	118.2

As of year-end 2007, the statutory net gain before dividends and taxes was \$2.17 billion, an increase of 24% from \$1.75 billion in 2006.

As of year-end 2007, pretax statutory earnings increased more than 50% over 2006. The increase resulted primarily from the strong increases in its individual life and disability income segments. In addition to strong insurance cash flows in both segments, the individual life segment benefited from very strong investment results and from a reduction in reserves for UL insurance.

MassMutual's lapse ratio has continued to decrease, reaching a low of 4.5% as of year-end 2007 from 6.1% in 1996. This is one of the lowest in the industry, reflecting a combination of its loyal career distribution system and competitive products.

Investments And Liquidity: Strong Credit Investment Management, With Incremental Risks Taken On Excess Capital Position

Standard & Poor's views MassMutual's investment management as very strong because of the company's ability to handle the downturn in the credit markets, maintaining high-quality investments in its portfolio, ALM, and an effective hedging strategy.

Anticipating the credit downturn and leveraged buyout risk, MassMutual made a strategic decision to incrementally take on more Alt-A investments. The decision itself added, rather than reduced, risk. But, the discipline that the company employed in exercising this decision somewhat mitigates the amount of expected losses, as MassMutual limited its exposure to within capital tolerance levels.

Table 5

<i>MassMutual Insurance Group/Investment Statistics</i>					
	<i>—Year ended Dec. 31—</i>				
<i>(Mil. \$)</i>	<i>2007</i>	<i>2006</i>	<i>2005</i>	<i>2004</i>	<i>2003</i>
Net investment income	4,998.2	4,563.7	4,377.1	4,069.8	3,968.1
Total invested assets	79,101.2	74,531.9	71,413.9	69,817.6	65,142.4
Net realized capital gains	(455.0)	254.1	212.8	137.9	(193.6)
Asset risk to invested assets (%)	14.1	12.3	5.1	5.3	4.9
High-risk assets to total invested assets (%)	15.0	14.8	13.6	11.9	11.1
Net investment yield (%)	6.51	6.25	6.20	6.03	6.37
Five-year realized capital gains to invested assets (%)	0.28	0.24	0.17	0.14	0.10
<i>Portfolio composition</i>					
Cash, cash equivalents, and short-term investments (%)	3.3	1.4	1.5	1.5	8.0
Bonds (%)	39.0	40.1	40.6	44.6	41.0
Mortgage-backed securities (%)	16.2	18.9	17.1	15.7	12.5
Mortgages (%)	16.0	14.9	13.3	13.8	12.6
Policy loans (%)	10.8	10.8	10.5	10.2	10.4
Stocks (%)	4.8	5.6	5.2	4.8	4.4
Real estate (%)	1.5	1.7	1.8	2.1	2.9
Other (%)	8.4	6.7	10.0	7.3	8.3

Table 6

MassMutual Insurance Group/Liquidity And Reserves Statistics					
	—Year ended Dec. 31—				
<i>(Mil. \$)</i>	2007	2006	2005	2004	2003
Allocation of reserves					
Individual life	50.3	49.6	48.0	47.3	49.1
Group life	14.4	14.1	14.0	13.3	12.6
Individual annuities	9.5	10.3	10.0	9.6	8.0
Group annuities (including guaranteed investment contracts)	18.4	18.5	20.1	21.9	22.2
Accident and health	3.5	3.6	3.5	3.5	3.6
Other	3.8	4.0	4.3	4.5	4.4
Liquidity ratio (%)	223.5	224.2	239.3	244.6	257.9
Surrenderable annuities to total reserves (%)	11.2	N.A.	N.A.	N.A.	N.A.
Liquid assets to total assets (%)	45.6	45.9	N.A.	N.A.	N.A.

N.A.—Not available.

As of year-end 2007, MassMutual had approximately 13% subprime-related exposure relative to total adjusted capital, which is well below the industry average of 27%. The company has excess capital to support this exposure, despite the exposure being above the levels of its large mutual peers.

Investment quality is solid because of the lack of concentration in any issuer or investment class and because of the high-quality, fixed-income portfolio. As of Dec. 31, 2007, MassMutual's cash and invested assets consisted primarily of corporate public and private bonds (30%); cash, short-term investments, and treasuries (7%); commercial mortgages and REITs (14%); high-quality and securitized securities (26%); policy loans (11%); equity stocks and partnerships (11%); and real estate (1%).

MassMutual practices strong ALM. It places particular emphasis on managing liabilities with higher interest rate sensitivity. The company manages each liability segment separately. Periodic scenario testing confirms that assets and liabilities are closely matched. Overall, Standard & Poor's believes the management of this risk is appropriate, given the nature of the liabilities.

The company maintains an active hedging strategy to hedge its exposure to interest rates on both assets and liabilities. Asset risks arise from mortgage-backed securities (MBS) prepayment options and call provisions on bonds. Liability risks arise from floor interest rate guarantees and book value surrenders on the liabilities.

The company offsets these risks by purchasing financial interest rate option contracts, such as call and put options and caps and floors. This strategy adjusts the duration of the asset portfolio to match liability target duration. Convexity is hedged.

Historical

To help maximize yields, MassMutual invests in private placements, which constituted about 30% of the bond portfolio at year-end 2007. The portfolio is internally monitored, conservatively managed, and has performed well, a trend that we expect to continue. Within the MBS portfolio, MassMutual has only a nominal amount of the riskier security types, and overall it has only modest interest rate risk.

The commercial mortgage portfolio, with an average loan size of about \$19 million, is well diversified in both building type and geographic location. The company uses its in-house investment capability to manage these assets.

MassMutual's liquidity remains very strong. Invested assets are well diversified in highly liquid asset classes, and the portfolio far exceeds the company's liquid liabilities. Investment quality is solid because of the lack of concentration in any issuer or investment class and because of the relatively high quality of the fixed-income portfolio.

MassMutual's stress testing of liquidity follows strict guidelines, which are considered conservative. As of year-end 2007, Massachusetts Mutual had a strong liquidity ratio of about 224%, based on Standard & Poor's liquidity model. MassMutual's investment portfolio contains a substantial amount of highly liquid assets, given its allocation in favor of investment-grade, publicly traded bonds, as well as its limited use of more illiquid mortgages and real estate.

Capitalization: Strong Operating Performance Partially Offsets Losses On RMBS

MassMutual's capitalization is extremely strong, with capital redundant at the 'AAA' level under Standard & Poor's new capital model. Expected losses on Alt-A and subprime residential mortgage-backed securities (RMBS) investments are likely to decline amid the cushion of capital redundancy to fall in line with ratings expectations rather than well in excess of the ratings level. Based on Standard & Poor's model, total adjusted capital increased to \$10.3 billion at year-end 2007 from \$9.4 billion at year-end 2006. This growth is primarily attributed to strong operating performance.

The company currently has \$350 million of outstanding surplus notes that mature in 2023 and 2024 and \$250 million of outstanding surplus notes maturing in 2033. At this time, Standard & Poor's considers the entire \$600 million as equity when evaluating the company's capital structure. The notes constitute less than 6% of the company's total capitalization, Standard & Poor's allows for a surplus note amount of up to 15% of total adjusted capital to be counted as equity. The quality of capital is very strong, given the strong statutory earnings profile; the value of the company's affiliate holding, Oppenheimer; and the active hedging strategy that mostly immunizes the company from interest rate risk volatility.

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Table 7

MassMutual Insurance Group/Capitalization Statistics (cont.'d)					
—Year ended Dec. 31—					
<i>(Mil. \$)</i>	<i>2007</i>	<i>2006</i>	<i>2005</i>	<i>2004</i>	<i>2003</i>
Total assets	131,557.0	122,179.6	113,586.4	108,886.2	97,422.4
General account assets	81,330.1	76,610.7	73,359.3	71,783.9	67,087.9
Total liabilities excluding separate accounts (excluding asset valuation reserve)	71,905.9	67,927.6	65,824.4	64,305.6	59,326.2
Total adjusted capital (including asset valuation reserve)	10,294.4	9,428.0	8,787.0	8,644.5	8,378.0
Unrealized capital gains	517.5	94.8	266.2	163.7	121.4
Capital adequacy ratio (%)	AAA	AAA	498.8	383.8	482.8

Table 7

MassMutual Insurance Group/Capitalization Statistics (cont.'d)					
—Year ended Dec. 31—					
<i>(Mil. \$)</i>	<i>2007</i>	<i>2006</i>	<i>2005</i>	<i>2004</i>	<i>2003</i>
Company action level-to-NAIC risk-based capital ratio (%)	419.8	458.4	459.4	472.1	470.7
Assets risk-to-total adjusted capital ratio (%)	126.5	114.0	41.2	46.0	41.0
High-risk assets-to-total adjusted capital ratio (%)	115.6	116.7	110.7	81.5	86.7
Surplus from operating earnings after dividends (%)	N.A.	N.A.	N.A.	116.3	107.6
Net premiums to gross premiums (%)	94.8	95.1	95.4	96.0	95.7
Net reserves to gross reserves (%)*	96.0	96.4	96.8	97.1	97.5

*Includes annuity and fund deposits. N.A.—Not available.

Financial Flexibility: Commercial Paper Program Boosts Flexibility Despite Mutual Status

MassMutual benefits from strong financial flexibility despite its status as a mutual insurer. In addition to the \$600 million of surplus notes, the company initiated a commercial paper program in mid-2000 for the specific purpose of enhancing financial flexibility. Although the program is authorized for \$1 billion, management intends to keep about \$200 million-\$300 million outstanding to maintain a name presence in the financial markets and to provide a small spread opportunity with the proceeds.

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Ratings Detail (As Of 14-Oct-2008)* (cont.'d)	
Operating Companies Covered By This Report	
Massachusetts Mutual Life Insurance Co.	
Financial Strength Rating	
Local Currency	AAA/Stable/—
Counterparty Credit Rating	
Local Currency	AAA/Stable/A-1+
Commercial Paper	
Local Currency	A-1+
Senior Secured (1 Issue)	AA-
Subordinated (3 Issues)	AA
C.M. Life Insurance Co.	
Financial Strength Rating	
Local Currency	AAA/Stable/—
Issuer Credit Rating	
Local Currency	AAA/Stable/—
MML Bay State Life Insurance Co.	
Financial Strength Rating	

Ratings Detail (As Of 14-Oct-2008)* (cont. 'd)

Local Currency	AAA/Stable/—
Issuer Credit Rating	
Local Currency	AAA/Stable/—
Domicile	Massachusetts

*Unless otherwise noted, all ratings in this report are global scale ratings. Standard & Poor's credit ratings on the global scale are comparable across countries. Standard & Poor's credit ratings on a national scale are relative to obligors or obligations within that specific country.

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