

# **AXA Global Variable Annuity Product Review & Risk Management**

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**May 19, 2006**



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- **Risk Management**
- **Risk Sensitivity**
- **Conclusion**



# Unprecedented opportunities exist for insurance companies

- Retirees are living longer – A 30+ year plan
  - Example → Married couple aged 60: There is a 62% chance that one individual will live to age 90 !
- Retirees can no longer rely on government or employer
  - Future of government provided benefits in question
  - Corporate defined benefit plans becoming rare
- Individual savings will not be enough to fill the gap
- U.S. Example: 77 million worried Baby Boomers are entering retirement

***A global retirement income dilemma...***



**Insurance companies are uniquely positioned to address needs through guarantees**

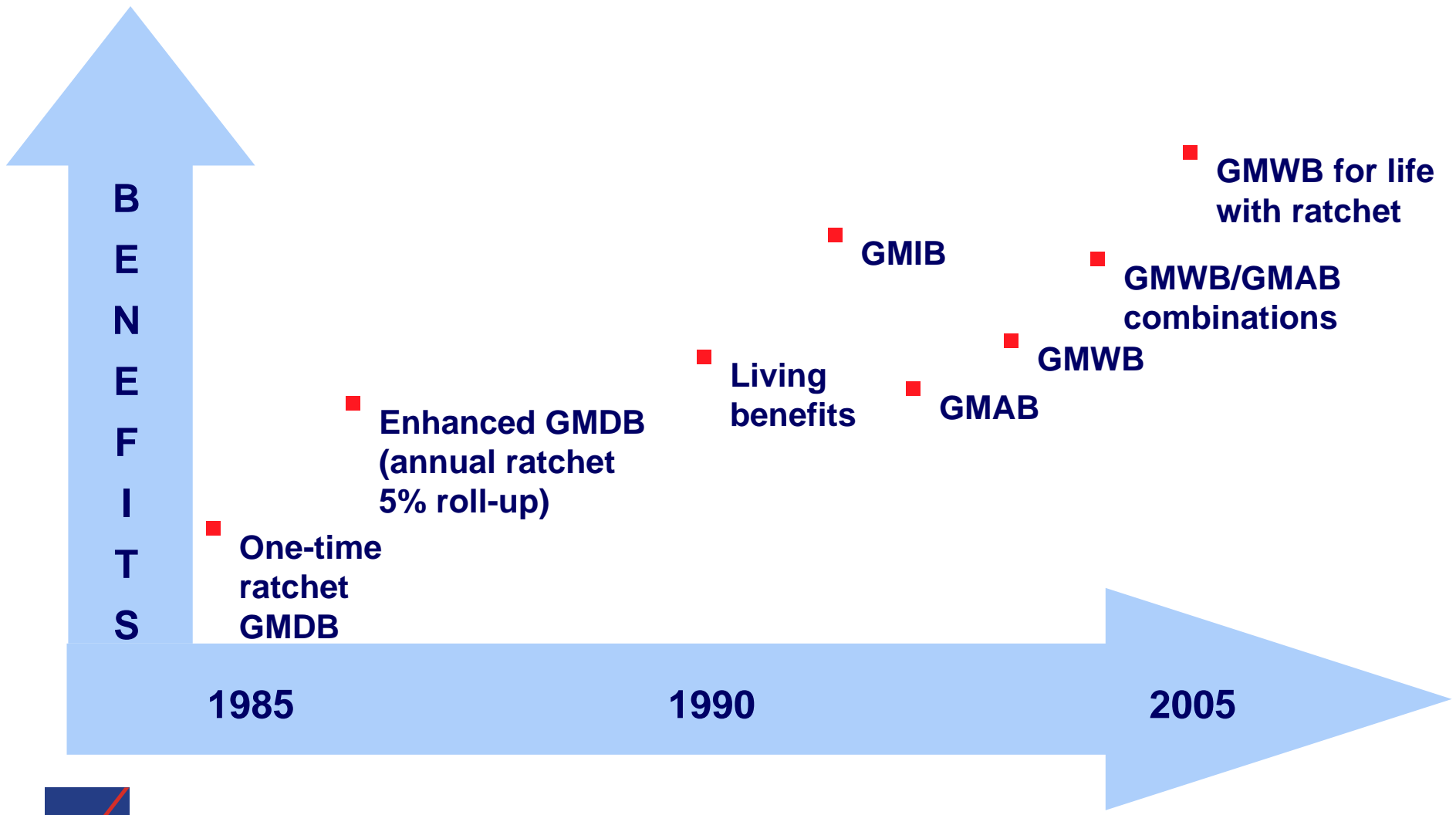
***Guarantees allow long-term exposure to equities and provide:***

- Death protection
- Longevity protection
- Income protection
- Principal protection

***... delivered through variable annuities***



# Variable annuity product evolution has witnessed increased sophistication



# Current trends in VA's point to increasing growth for strong competitors

- Return of U.S. VA industry to growth market status
  - +20% YOY growth in Q1'06 following +10% Q4'05 performance\*
- Scale is increasingly important - Top 10 Market share\*
  - 2001: 57%
  - Q1'06: 71%
- Living benefits guarantees driving sales
  - 81% of contracts sold in 2005 included a living benefits guarantee\*
  - Merrill Lynch Advisors Survey (2006)
    - GMIB seen as best value and easiest sale
  - Morgan Stanley advisors study (2005)
    - Almost 80% view living benefits as essential to sale
- Global rollout of U.S. Variable Annuity style guarantees



\* Source: VARDS

# Variable annuity guarantee overview

- Variable annuities offer sophisticated guarantees to meet customer retirement needs
  - Equity put options to provide financial protection
  - Mortality based income distribution using mortality pooling expertise of insurers
- **Guaranteed Minimum Death Benefit (GMDB)** – guarantees a flat or contractually increasing death benefit (return of premium, Roll-up and ratchet)
- **Guaranteed Minimum Income Benefit (GMIB)** – guarantees a minimum income when annuitization option is elected
- **Guaranteed Minimum Withdrawal Benefit (GMWB)** – guarantees principal and allows set percentage of withdrawal each year, even if account value is zero



# Variable annuity guarantees are not exclusive to U.S. retiree needs

- Global pensions shortfall in virtually all developed markets
- AXA offers U.S. style guarantees globally
  - Germany – (Q1'06)
  - Japan – (Q1'06)
  - Further potential to rollout to continental Europe and U.K.
- AXA shares innovations to leverage scale advantage
  - Risk management / hedging expertise and platform
  - Guaranteed benefits innovations
  - Consolidated European VA product platform



# AXA's global VA product can offer income and protection across markets

<u>Country</u>	<u>Initial Launch Date</u>	<u>Benefits Offered</u>	<u>Distribution</u>	<u>Hedge Platform</u>
U.S.	1995	GMDB, GMIB, GMAB, GMWB	Tied Agents, Banks, Brokers, Planners	New York
Germany	Q1'06	GMIB	Tied Agents	Dublin
Japan	Q1'06	GMDB (\$ Denominated)	Banks	New York

- Potential guaranteed benefits opportunities
  - France
  - Belgium
  - Southern Europe (Spain, Italy, Portugal)
  - UK



# New GMWB for Life launch creates opportunity to further penetrate “Living Benefits” market

- U.S. Accumulator '06 launch expected in July
  - Complements RIFL Dec '05 Retail advisors launch
- Living Benefits market = GMIB + GMWB
  - Both products address need for lifetime income
  - Target non-GMIB producers with new GMWB offering
- Product Features
  - Lifetime withdrawal percentage based upon age at first withdrawal
    - 4% below age 65; 5% for ages 65-74; 6% for ages 75-84, 7% above age 84
  - Benefit base resets annually to account value before and during withdrawal period
  - Benefit base increased by 5% of contribution if greater than reset and no withdrawal made during the year
  - Annual charge of 60 bps



# GMIB remains a powerful Living Benefits competitor amidst a very competitive GMWB market

Major Product	Rank* Q1'06		Market Share		Delta
			Q1'04	Q1'06	
	1	TIAA-CREF	9.70%	9.30%	(0.40)
<b>GMIB</b>	2	Met + Travelers	11.60%	8.96%	(2.64)
	<b>3</b>	<b>AXA Equitable</b>	<b>6.90%</b>	<b>8.55%</b>	<b>1.65</b>
<b>G M W B</b>	4	Hartford	13.40%	8.25%	(5.15)
	5	John Hancock	4.00%	6.38%	2.38
	6	Pacific Life	5.50%	6.35%	0.85
	7	Lincoln National	4.60%	6.33%	1.73
	8	AIG	6.60%	5.83%	(0.77)
	9	ING	5.30%	5.67%	0.37
	10	Prudential (U.S.)	5.00%	5.58%	0.58

*Hartford mkt share loss from peak (5.15%) exactly replaced by other GMWB competitors gains*

- Strong competition on product features in GMWB market
  - Ratchets, withdrawal %, GMWB for life, funds management
- AXA GMWB opportunity depends on distribution execution
  - Identify and win GMWB producers from GMWB competitors
  - Protect GMIB market share



\* Source: VARDS

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- **Product and Market Introduction**

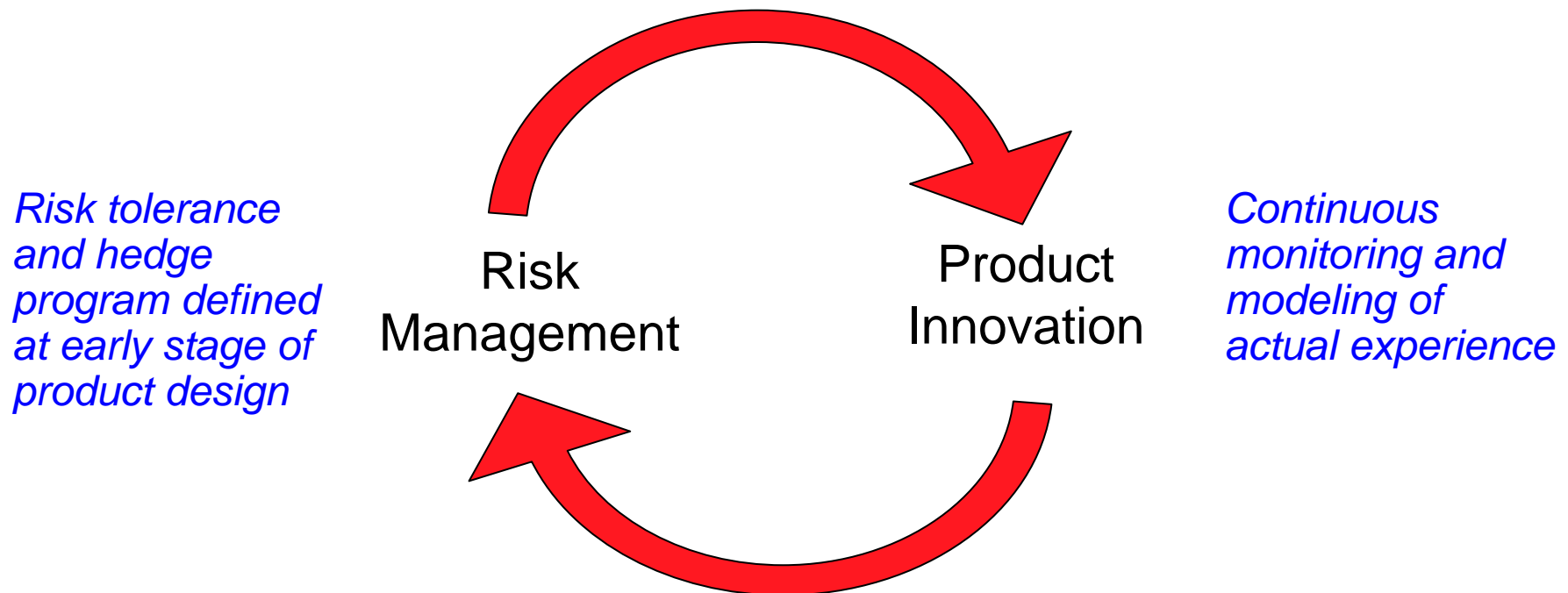
- **Risk Management**

- **Risk Sensitivity**

- **Conclusion**



# Integrated Product and Risk Management is a continuous cross-functional process



- ➔ **A sustainable presence in the market**
- ➔ **Support strong balance sheet and ratings**
- ➔ **Validated by AXA Product Approval Process**



# Product design is the starting point for product risk management

- **GMDB**

- No Roll up / Ratchet after age 85 - Product not offered after age 75

- **GMIB**

- Annuity purchase rate based on very conservative mortality table
- 10 Yr waiting period (longer for policyholder below age 50)
- Annual election only during 30 days following policy anniversary
  - Diversify benefit election risk
- Natural hedge in GMDB/GMIB product design
  - Policyholder can only benefit from DB or IB option – not both
- No election beyond age 85 - Product not offered after age 75

- **GMWB for Life (Retirement Income for Life)**

- Investments restricted to allocation funds
- Deferral bonus limited to 10 years



# Fund management can improve risk profile and returns for clients

## Allocation Funds have lower volatility

Allocation Fund	Target Allocation Equity / FI	Amount Invested	Estimated Realized Volatility*
AXA Aggressive Allocation	90/10	\$0.5bn	9.4%
AXA Moderate Plus Allocation	70/30	\$2.7bn	7.7%
AXA Moderate Allocation	50/50	\$2.7bn	6.1%
AXA Conservative Plus Allocation	40/60	\$0.4bn	4.6%
AXA Conservative Allocation	20/80	\$0.2bn	3.3%

\* Estimated realized volatility since August 2003 – Based on return net of asset mgt fees

- Allocation Funds favored by policyholders (57% of Q1'06 net inflows)
- Fund Management Group responsible for selecting the funds
- Limits adverse selection from policyholder
  - Target allocation funds ensure diversification, reducing fund volatility
  - Rebalancing strategy embedded in fund



# Dynamic Hedging is a core component of the VA risk management program

- Dynamic Hedging process designed to accumulate assets to meet future claims from policyholder options
- Isolate Dynamic Hedging as a “business”
  - Guaranteed benefits added to help sell variable annuities
  - Annual guaranteed benefit charges fund dynamic hedging program
- Mitigate economic exposure and P&L volatility
- Economics drive hedge program design - Dynamic hedging assets consist of accumulated funds available to pay guaranteed benefit claims

$$\begin{array}{r} + \text{ Policyholder charges} \\ + \text{ gain/(loss) on Futures} \\ + \text{ accumulated interest} \\ - \text{ claims paid} \\ \hline = \text{ change in aggregate value of benefits} \end{array}$$



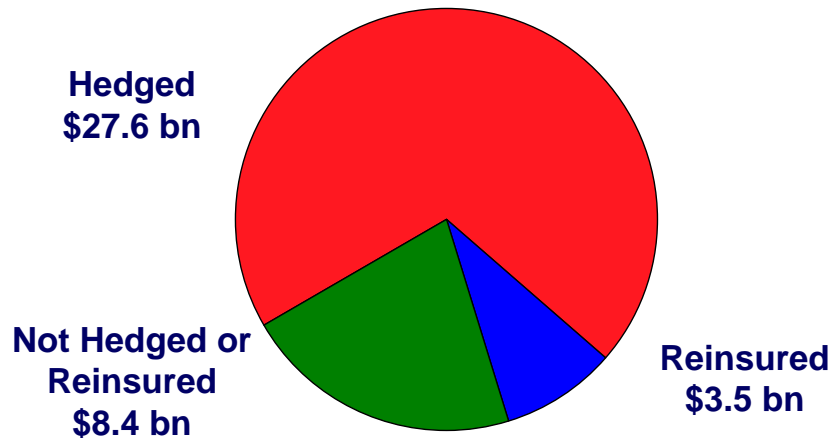
# Additional impacts of hedging program

- IFRS hedge accounting and program economics have converged (unlike U.S. GAAP)
- Statutory
  - RBC / C3 Phase II – effective YE'05
    - Hedge program mitigates reserve requirements
    - Favorable 21 pts impact to RBC due to mix of business
      - Due to aggregation across entire VA block, significant amounts of inforce business featuring only ROP death benefit currently eliminates impact of new RBC rules
  - VACARVM – due to take effect 2006/07
    - Stochastic results will reflect benefit of hedging
- Ratings agency recognition for effective hedge program

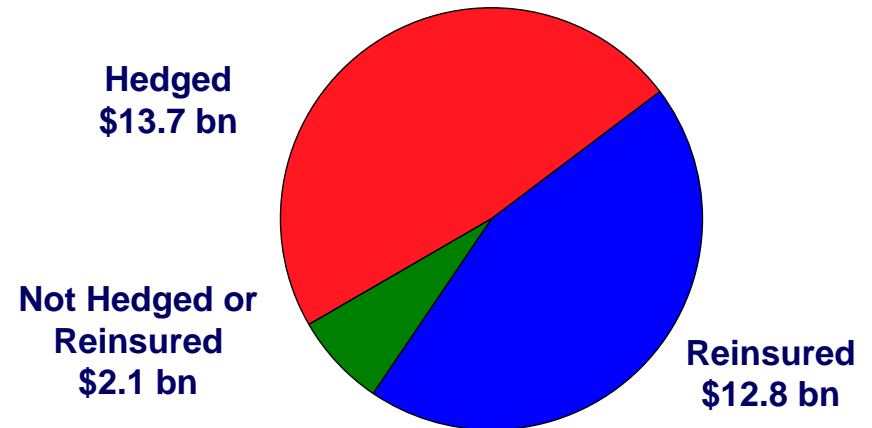


# AXA Equitable Accumulator: Risk management summary

**GMDB Benefit Base \$39.5 bn**  
**79% Hedged / Reinsured**



**GMIB Benefit Base \$28.5 bn**  
**93% Hedged / Reinsured**



***New business risk management does not utilize reinsurance, reducing counterparty exposure***



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# Key risks embedded in VA products

- **DELTA**: Rate of change of option price with respect to underlying fund value
- **VEGA**: Rate of change of option price with respect to volatility
- **RHO**: Rate of change of option price with respect to interest rates
- **Basis Risk**: Deviation between expected vs actual underlying fund returns
- **Policyholder behavior**: Deviation from valuation assumptions
  - Election (GMIB, GMWB)
  - Lapse
  - Fund selection



# Delta risk hedged through dynamic hedging

- Delta (Equity market risk): Risk of equity market decline on separate account fund balances relative to guaranteed accumulation rate
- Risk hedged through short positions in exchange traded futures
  - S&P 500, Russell 2000, Nasdaq
- Highly liquid standardized contracts traded on CME
  - AXA is 0.3% of S&P 500 futures open interest, 3.5% of Russell 2000 futures open interest and 0.8% of NASDAQ 100 futures open interest
  - Open interest is only a fraction of monthly volume
  - Positions cash settle daily



# Equity market volatility risk (Vega)

- High levels of market volatility may create imbalances between estimated benefit liability and hedge position
- Frequency of hedge program operation can mitigate impact
  - Normal markets
    - Option value calculated daily on seriatim basis / Futures positions traded weekly
  - Volatile markets
    - Option value calculated daily, or as often as intra day / Futures positions traded daily, or even intra day
- AXA Allocation funds
  - Reduce fund / benefit volatility and cost of benefit



# Most policyholders unable to exercise options in response to an extreme volatility event

- Market dislocation risk (e.g. October 1987)
  - Option sensitive to equity market declines, but policyholder ability to exercise option is limited by product design
    - GMDB – no adverse selection
    - GMIB – 10 year waiting period ; annual election only during 30 days following policy anniversary
    - GMWB – subject to defined maximum annual withdrawal amount
  - Based on scenario testing, downside risk of sudden volatility is limited
    - 9/11, October 1987
  - Higher hedge cost during volatile periods should be offset by volatility gains realized over life of option



# Scenario analysis reinforces economics of accepting volatility risk

	Current Charge	Estimated Hedge Costs (bps):		
		95th Percentile (20 year realized volatility distribution)	Volatility Used In Embedded Value	95th %ile + 4% (20 year realized volatility distribution)
<b>Accumulator '04</b>				
Ratchet GMDB, stand-alone	25	8	9	12
Max(Ratchet,6% rollup) GMDB, stand-alone	60	58	59	62
<b>Total, ROP GMDB &amp; Max GMIB</b>	65	45	50	58
<b>Total, Ratchet GMDB &amp; Max GMIB</b>	90	56	62	72
<b>Total, Max GMDB &amp; Max GMIB</b>	125	93	98	107
Representative 20 yr Equity Volatility:		18%	19%	22%
Wgt avg of S&P500, Russell, & NASDAQ vols of :		17.5%, 20.5%, 31.0%	18.0%, 22.0%, 28.0%	21.5%, 24.5%, 35.0%

• Assumes mean fund return of 5% net of investment management fees

- Benefit charges set above estimated cost at extreme levels of volatility
  - Realized overall equity volatility since program inception of approx 12.5%
    - of which S&P 10.9%, Russell 17.3%, and Nasdaq 17.3%
- GMIB election rate 5% / 10% / 15%
  - Corresponds to “In-the-money” % of: 0%-20%, 20%-50%, > 50%
  - For example, 5% elect if benefit base is 0% - 20% ITM



# [ Interest rate sensitivity (Rho)

- GMIB annuitization rate
  - Risk that long term rate is below interest rate implicit in guaranteed annuity purchase rate (mostly 2.5%)
  - Dynamically hedged using exchange traded Treasury note futures
- Risk free rate assumption of 5%
  - Risk that hedge assets accumulate at less than 5%
  - Long term rate assumption based on analysis of historical data
  - 10 Year swap rate currently above 5%



# [ Basis risk impacts efficiency of dynamic hedging strategy

- Deviation between expected vs. actual fund performance
  - Underlying separate account funds modeled into indices
  - Regression techniques replicate policyholder fund selection to equity index futures
  - Funds modeling re-evaluated on regular basis to capture performance difference and style drift
  - No basis risk impact assumed in hedge program
    - Fund selection process provides alpha benefits
- Optimization of funds modeling produces good fit
  - Weighted average R was 92% for 2005



# Policyholder Risk – GMIB election risk is naturally hedged by GMDB exposure

- Hedge cost remains stable as GMIB election rate increases

Election Rates	Cost in bps	
	<u>Max</u>	
	GMIB Only	DB/IB
5 / 10 / 15	50	98
5 / 20 / 30	52	98
10 / 20 / 40	52	96
Flat 10	47	95
Flat 20	49	94

*Assumes Embedded Value level volatility*

- AXA Equitable experience represents two years of election activity
  - Election rates through YE'05: 0.7% / 1.9% / 4.9%
- Natural hedge in GMDB/GMIB product design
  - Policyholder can only benefit from DB or IB option – not both



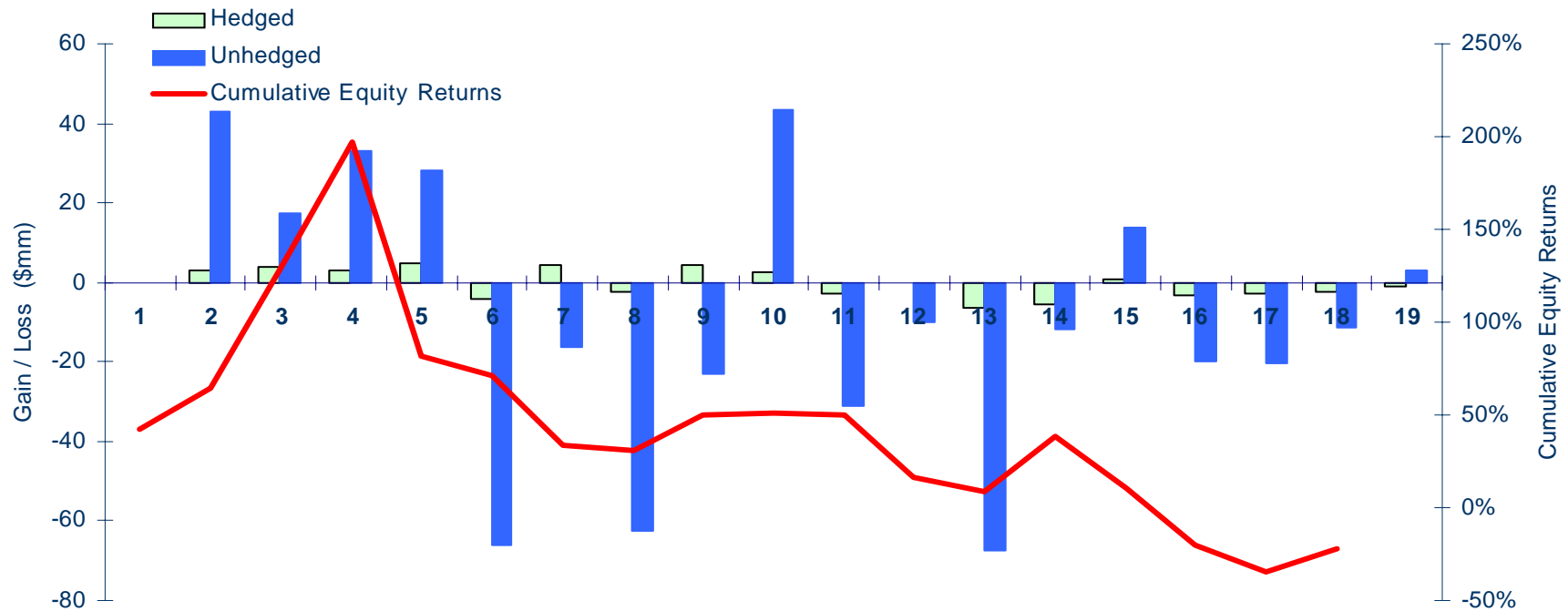
# [ Japan scenario: Exposes risks of both declining equities and interest rates

- Equities perform well in early years, setting guarantees at high levels (effect of annual ratchet). Then severe bear market, followed by several years of flat / negative equity returns
- Interest rates decrease from about 5% to below 2% after the GMIB waiting period, when policyholders can elect to annuitize
- Simulation uses Q4-05 inforce and 95th percentile volatility levels



# Japan scenario: Results

- Max of ratchet & 6% rollup GMDB & GMIB - \$1 billion inforce
- Gain/Loss does not include base product profitability
- Simulation shows hedging program results in a pre-tax loss of \$4m versus a pre-tax loss of \$158m without hedging



# October '87 scenario: Extreme short-term volatility

- October 1987 Stress Test
  - Black Monday: S&P 500 fell 20.5%, largest single day drop since 1929
  - AXA Equitable's Q4-04 actual inforce, \$20bn, 180,000 policies, GMDB and GMIB benefit
  - Examined several hedge rebalancing frequencies (daily, weekly, no rebalancing – initial position only)
- Stress Test conclusions
  - Short Equity Index Futures hedge provide gains, offsetting liability increase
  - Benefit charges over time sufficient to cover losses resulting from extreme events
    - AXA Equitable's volatility assumptions set a high levels
  - Futures rebalancing maintains level of hedge program efficiency
  - If no rebalancing, initial short Equity Index Futures position still provides significant risk mitigation



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# Conclusion

- A Global retirement need met with Variable Annuities
  - Death, longevity, income and principal protection
- AXA's strong risk management program provides a competitive product offering advantage
  - Leverage scale – Sharing risk management platforms
  - Supports Customers / Distributors demand for sophisticated products
- Global Product rollout to continue in 2006-2007...
  - France, Belgium, Southern Europe, UK



THANK YOU!



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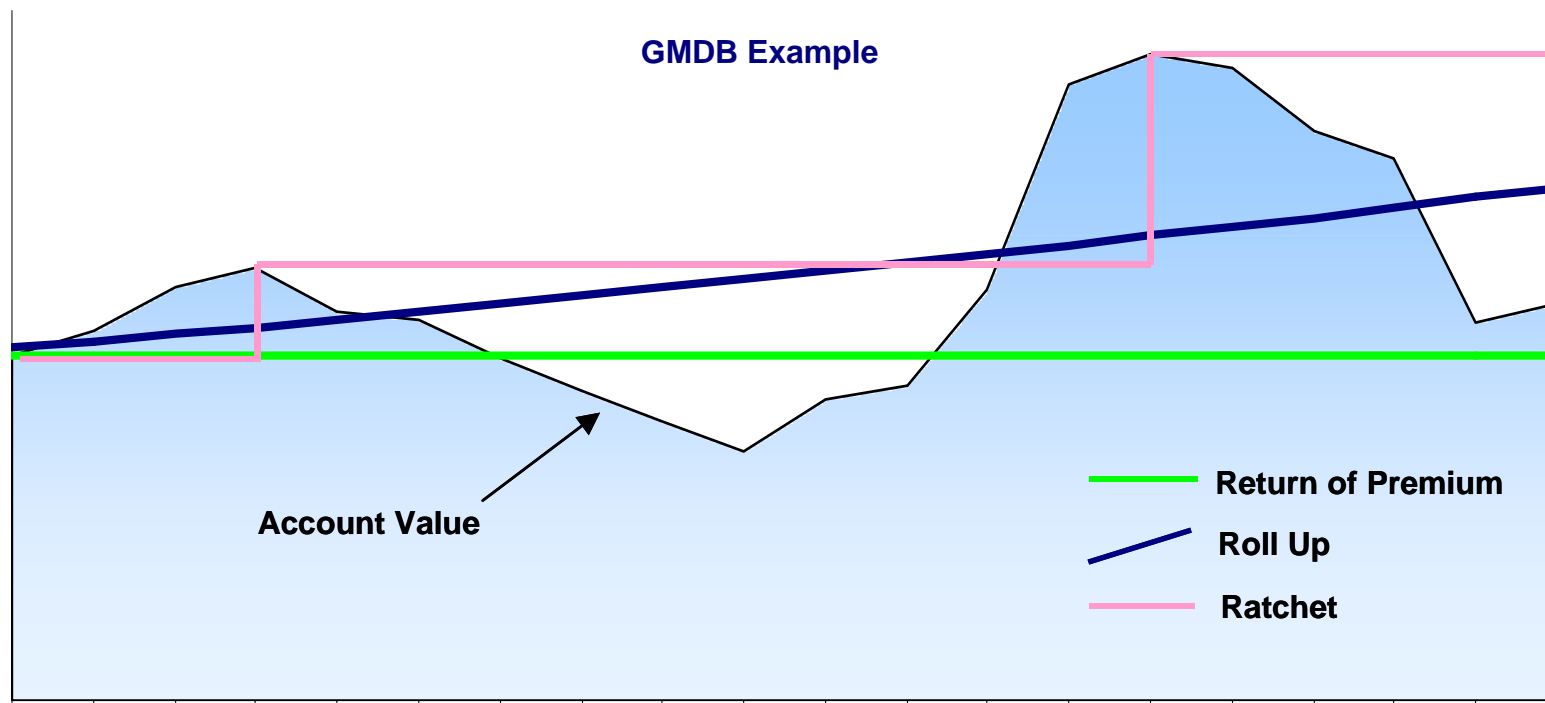
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# GMDB – Death Benefit Options

- **Return of Premium:** higher of total premium or account value, adjusted for withdrawals
- **Roll-up:** premiums paid accumulated at guaranteed rate, adjusted for withdrawals
- **Ratchet:** highest account value at contract anniversary dates, adjusted for withdrawals
- **“Greater of” Ratchet or Roll-up:** greater of annual ratchet or roll-up amount



# GMIB guarantees minimum annual income when annuitization option elected

- Guaranteed Minimum Income Benefit calculated based upon Benefit Base
- Benefit Base is not an annuity account value - only used to calculate guaranteed annual income if policyholder elects to annuitize after waiting period
- Benefit Base is the greater of 6% roll-up and annual ratchet, adjusted for withdrawals, up to certain attained age
- Benefit “in-the-money” when guaranteed benefit exceeds what Account Value could purchase at the then current interest environment

**Purchased at Age 55**

Age Male	Benefit Base	Guaranteed Min Annual Income Benefit
55	\$100.0	\$0.0
65	\$179.1	<b>\$9.7</b>
70	\$239.7	\$14.2
75	\$320.7	\$20.5

(\$'000)

Guaranteed Annual Annuity at given age for \$100,000

**Annual Income at election**  
(at various interest rate levels and Account Value)

Age 65 Acct Value	Current Rate				
	-150bps	-75bps		+75bps	+150bps
\$134.5	<b>\$9.7</b>	\$10.4	\$11.1	\$11.9	\$12.7
\$125.1	9.0	<b>9.7</b>	10.4	11.1	11.8
<b>\$116.8</b>	8.4	9.0	<b>9.7</b>	10.3	11.0
\$109.4	7.9	8.5	9.1	<b>9.7</b>	10.3
\$102.3	7.4	7.9	8.5	9.0	<b>9.7</b>

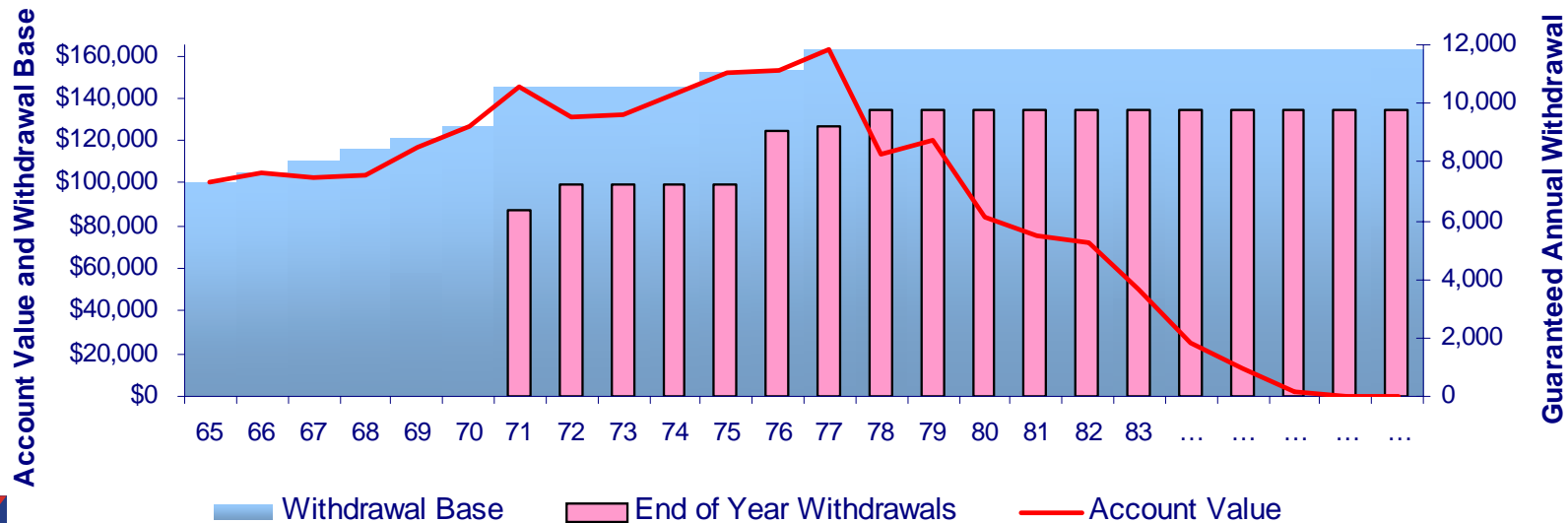
GMIB "in-the-money" - Policyholder should elect

GMIB "out-the-money" - Policyholder should NOT elect



# GMWB for life provides income for life through periodic withdrawals over a number of years

- **Guaranteed withdrawal percentage based upon age at first withdrawal**
  - 4% below age 65; 5% for ages 65-74; 6% for ages 75-84, 7% above age 85
  - Annual charge of 60 bps
- **Benefit base increased by 5% of contribution if greater than reset and no withdrawal made during the year**
- **Benefit base resets annually to account value before and during withdrawal period**
- **If resets occurs, rate resets to percentage withdrawal band**
- **Withdrawal amount guaranteed for life of policyholder**



# Japan Scenario: Detailed results

- Max of ratchet & 6% rollup G MDB & GMIB - \$1 billion inforce
- Gain/Loss does not include base product profitability
- Simulation shows hedging program results in a pre-tax loss of \$4m versus a pre-tax loss of \$158m without hedging

	Equity Returns	Treasury Rates	Year	Futures Gains	Actual Claims	Actual Premiums	Gain / (Loss)	
							Hedged	Unhedged
\$mil			0	\$0	\$0	\$0	\$0	\$0
	42.6%	5.40%	1	-40	0	10	3	43
	15.3%	5.16%	2	-14	0	13	4	18
	39.9%	4.61%	3	-30	0	15	3	33
	29.0%	5.74%	4	-23	0	19	5	28
	-38.7%	6.53%	5	62	-5	22	-4	-66
	-5.9%	5.42%	6	21	-8	21	4	-16
	-21.8%	4.78%	7	60	-11	19	-2	-62
	-2.4%	3.31%	8	28	-11	18	4	-23
	14.5%	4.57%	9	-40	-10	16	3	43
	0.6%	3.07%	10	28	-12	15	-3	-31
	-0.3%	2.77%	11	10	-46	13	0	-10
	-22.2%	1.94%	12	61	-54	10	-6	-68
	-7.3%	2.22%	13	6	-52	8	-5	-12
	27.5%	1.66%	14	-13	-37	6	1	14
	-19.6%	1.63%	15	17	-31	5	-3	-20
	-27.8%	1.37%	16	18	-31	4	-3	-20
	-19.0%	0.91%	17	9	-28	3	-3	-11
	19.42%	1.37%	18	-4	-23	3	-1	3

**Total**                      **-\$4**                      **-\$158**

