



Institute of Actuaries of Australia

**4th Financial Services Forum**

*Innovation in Financial Markets*

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# Investment Guarantee Product Risk Management

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2. Risks
3. Risk Management
4. Capital Considerations



## Investment Guarantee Building Blocks

Guaranteed Minimum Death Benefit (GMDB)	Guaranteed Minimum Accumulation Benefit (GMAB)
Guaranteed Minimum Income Benefit (GMIB)	Guaranteed Minimum Withdrawal Benefit (GMWB)
Investment funds	



# US: AXA Financial/MONY Accumulator

Main Benefits	Description	Current Charges
Basic GMDB	Return of contribution	Included as standard
Enhanced GMDB	Greater of annual ratchet or roll-up (0%, 3%, 6%, 6.5%)	25 to 85 bps
GMAB	Return of 100% or 125% of principal after 10 years	50 or 75 bps
GMIB	Guaranteed roll-up of 6% or 6.5% and guaranteed lifetime annuity rates	65 or 80 bps
GMWB	Guaranteed lifetime withdrawals subject to an annual maximum, with or without an annual ratchet, single or joint life	65 to 95 bps

- Limited benefit combinations are permitted, particularly GMIB with enhanced GMDB with same roll-up rate
- The base guarantee level for the GMWB increases 7% per annum for each of the first 10 years where no withdrawal is made, continuing to the time of first withdrawal if no withdrawals are made within the first 10 years
- 76 investment funds





# Japan: Tokio Marine and Nichido Financial Life Three-in-One

Main Benefits	Description
GMDB	Return of contribution, with additional 30% of contribution in case of accidental death
Fund exceeds target level	Fund value as immediate lump sum or as deferred annuity certain at current rates (at any time after policy year 3)
Fund exceeds contribution but not target level	Fund value as lump sum or as immediate annuity certain at current rates
Fund less than contribution (GMAB/GMIB)	Greater of fund value or 90% of single premium, as either a lump sum or a 15-year immediate annuity certain, with a minimum annuity payment of 1/15 <sup>th</sup> of the single premium

- Target level from 110% to 200% of contribution selected at outset but may be altered
- No investment choice
- Fixed charge structure, including allowance for the guarantee



## Europe: Aegon 5 for Life

Main Benefits	Description	Current Charges
GMIB	5% of initial contribution for life, ratchet every three years if taking income, otherwise annual ratchet	50 to 150 bps
GMDB	Greater of initial contribution or 100.1% of cash value	
GMAB	Guarantee of 100% of initial contribution after 10 years	

- Fixed benefit structure
- 55 investment funds



## Australia: AXA North

Main Benefits	Description	Current Charges
GMAB	Return of contributions, with annual ratchet	70 to 245 bps
GMDB/GMWB	Account value plus percentage of excess of protected balance over the account value	

- Fixed structure, with choice of guarantee period (10, 15 or 20 years)
- Over 40 investment funds with the protection option, but must select from one of three investment strategies
- Superannuation and pension product
- Product offered by N.M. Super, with guarantee provided by NMFM



## Product observations

- Small number of building blocks but significant variation
- Generally charges are not guaranteed, but may be subject to maximum
- Investment restrictions



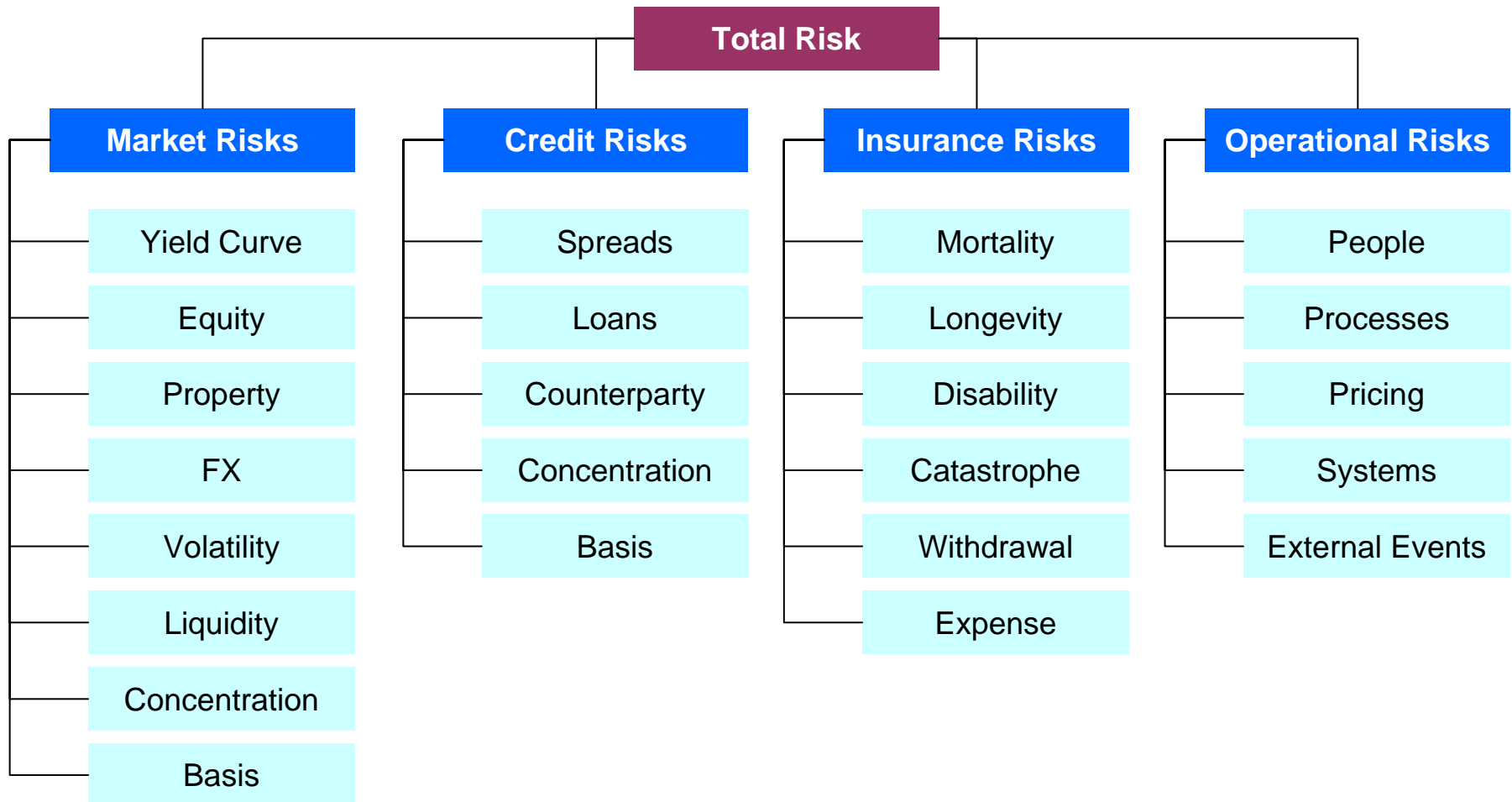


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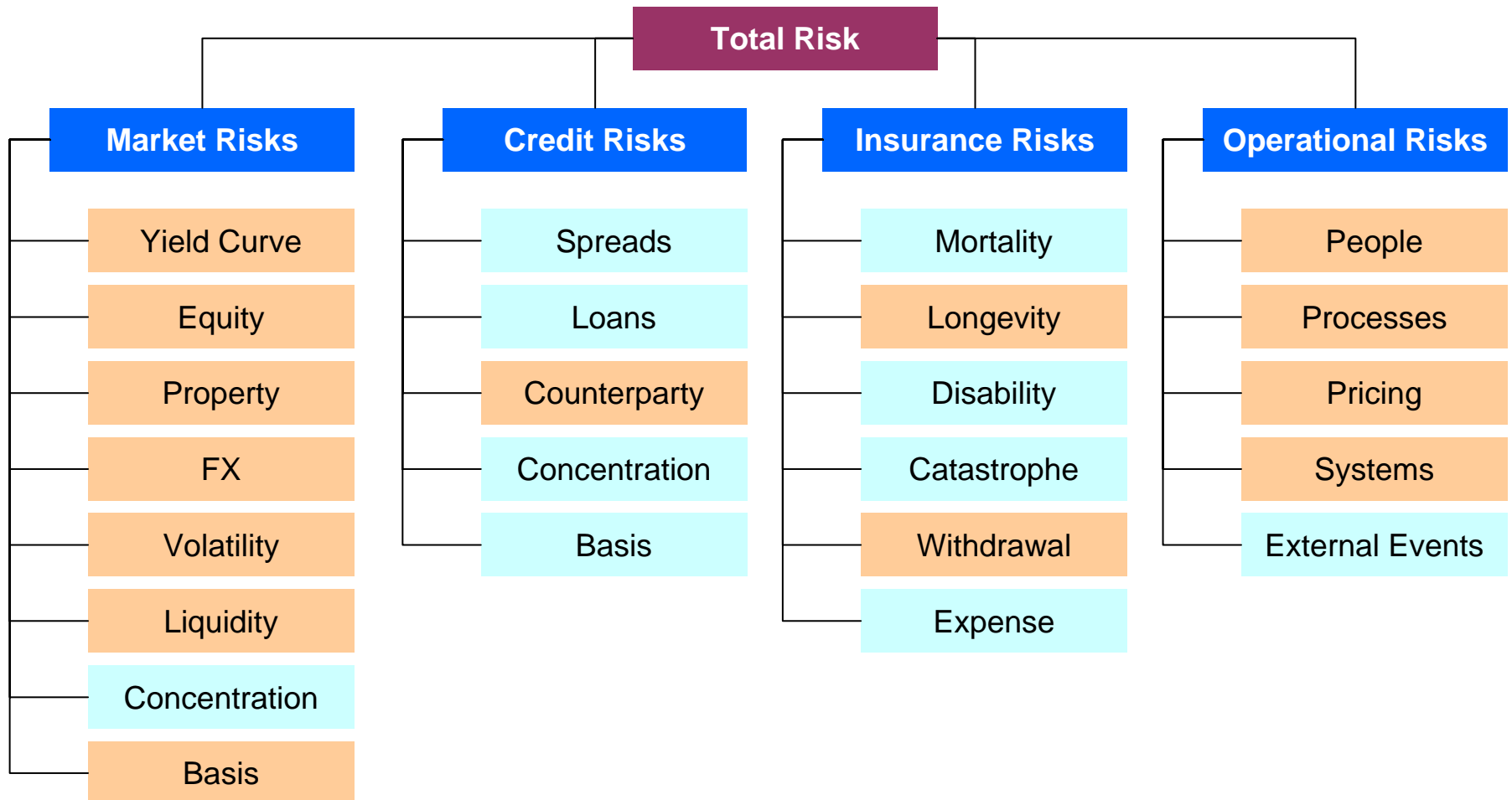


# Risk





# Guarantee Product Risks





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# Financial Risk Management

<b>Stay Naked</b>	Not recommended for companies that wish to participate in this market in the long term
<b>Purchase Static Protection</b>	Investment banks could tailor protection to the particular needs of an investment guarantee provider
<b>Internal Dynamic Hedging</b>	Regular (daily) monitoring of the hedge position against pre-defined limits
<b>Outsource the Hedging</b>	Outsource the hedging process to a specialist
<b>Outsource the Guarantee</b>	Use an investment bank to provide the investment guarantee
<b>Reinsure</b>	May be a viable way of transferring any unwanted risk
<b>Hold Capital</b>	Cover residual risk or risk that cannot be hedged





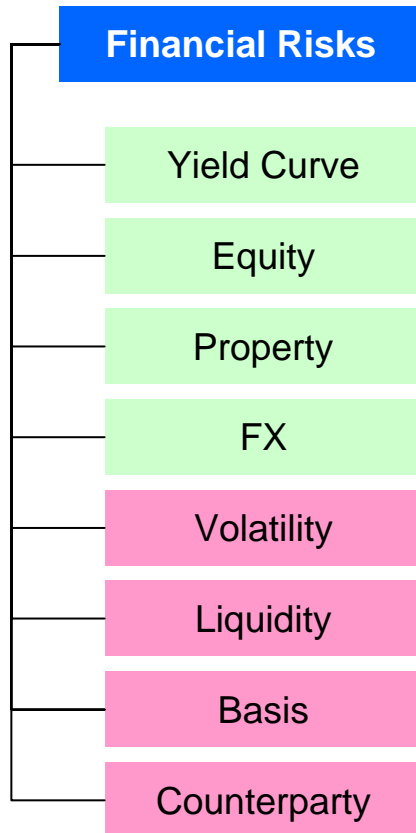
# Financial Risk Management



- Understand the risk divested and retained
  - Stochastic analysis
  - Stress analysis
- Capital
- Value



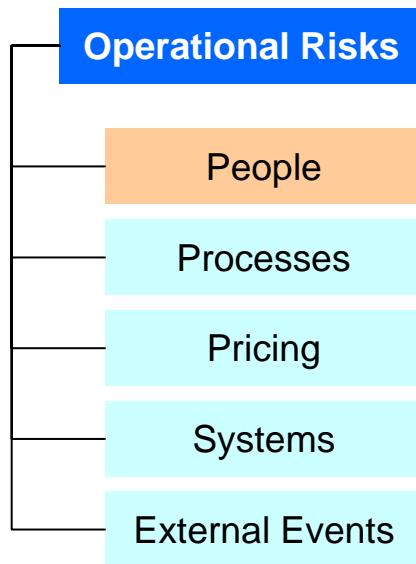
# Financial Risk Analysis



- Actuaries are accustomed to dealing with these elements
- Traditional analysis often does not consider these



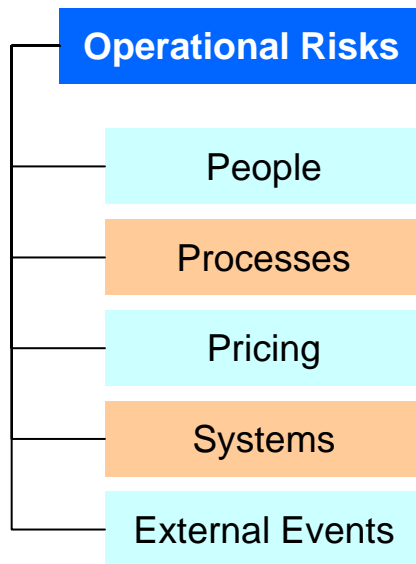
# Operational Risks



- People risks are not unique to guarantee products
  - New area with more limited knowledge
  - Backup support
  - Training, training tools, documentation
- Outsourcing
- Reinsurance



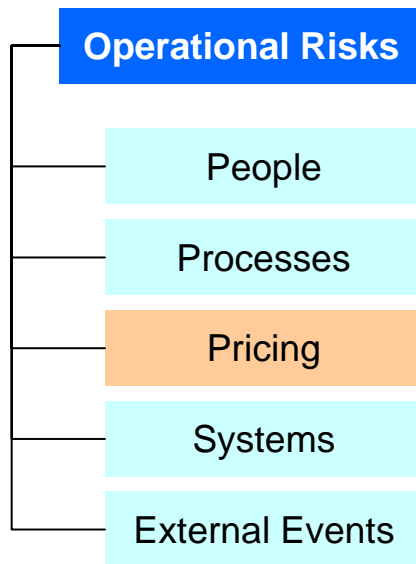
# Operational Risks



- New processes and systems may be required
  - Timely (e.g. rebalance hedge before final unit prices are available)
  - Accurate and robust
  - Checks and balances
  - Assigned responsibility
  - Deal with both known and unusual events



# Operational Risks



- Assumptions
  - No local experience for new product
  - Data from overseas to be used with caution
  - Sensitivity analysis
- Consistent with actual product conditions
- Alternative product features





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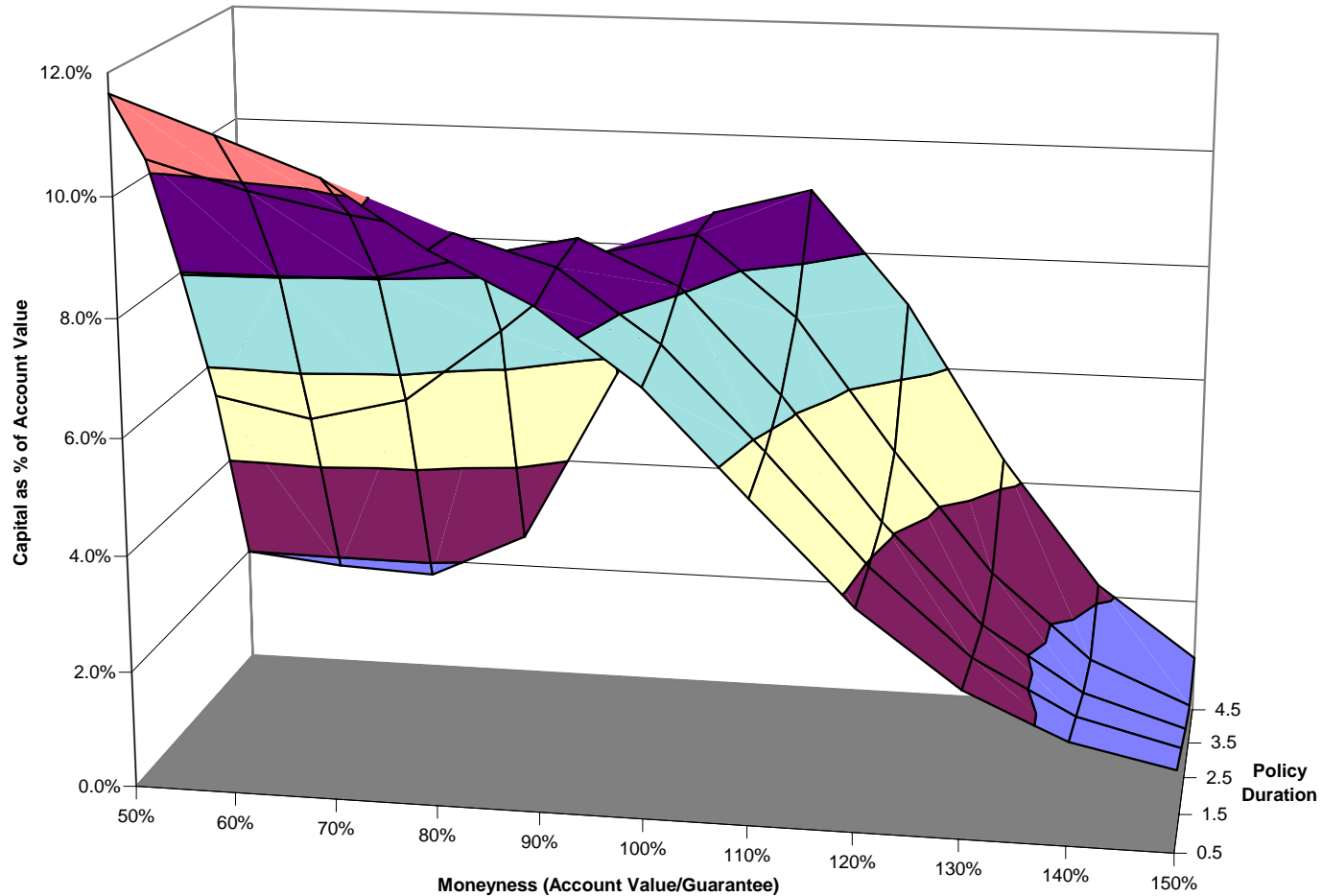
# Example Product Analysis

- GMAB
  - single premium of \$100,000
  - 5 year term
  - guarantee return of 0%
  - annual ratchet
  - 75% equity/25% fixed interest
  - total asset based charges of 4.1% per annum (2.8% without ratchet)
  - no taxes considered
- Stress analysis
  - 25% fall in asset values
  - yield curve fall of 200 basis points
  - 250 basis point increase in volatility
  - withdrawals at 50% of base level
- Hedge delta, rho and vega



# GMAB Stress Analysis

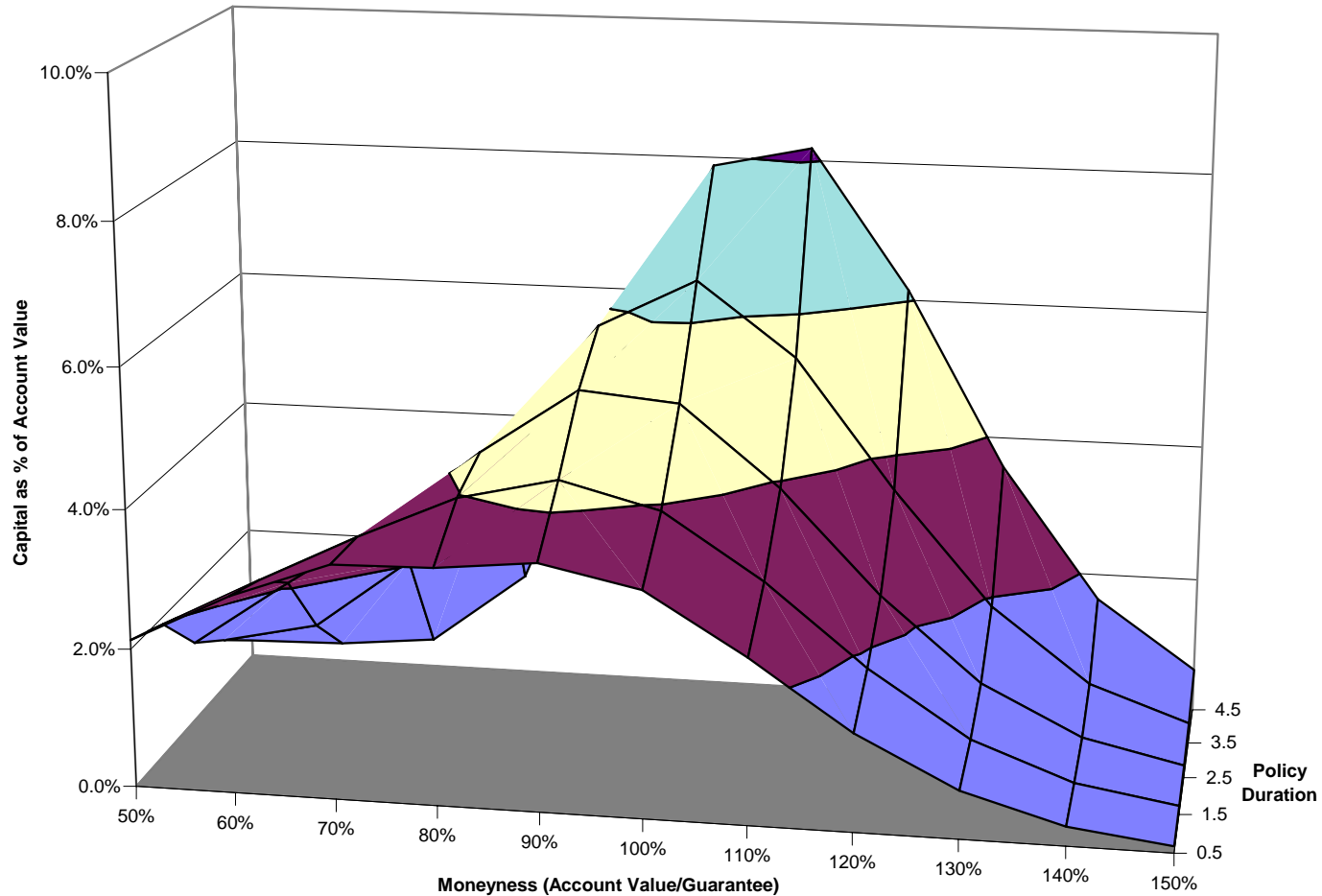
Combined Stress - Delta, Vega, Rho Hedged





# GMAB Stress Analysis

Price Stress - Delta Hedged



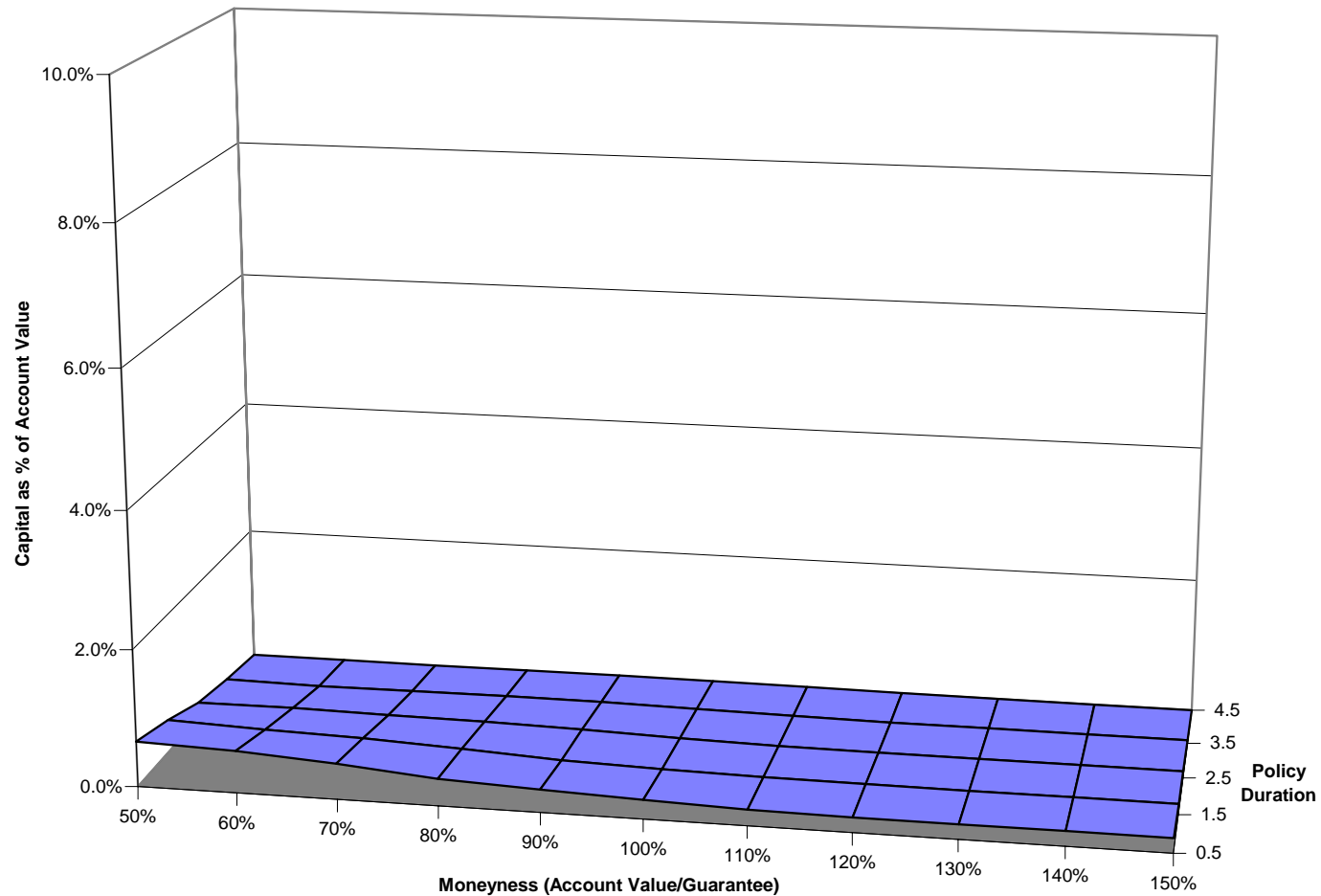


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# GMAB Stress Analysis

Yield Stress - Rho Hedged

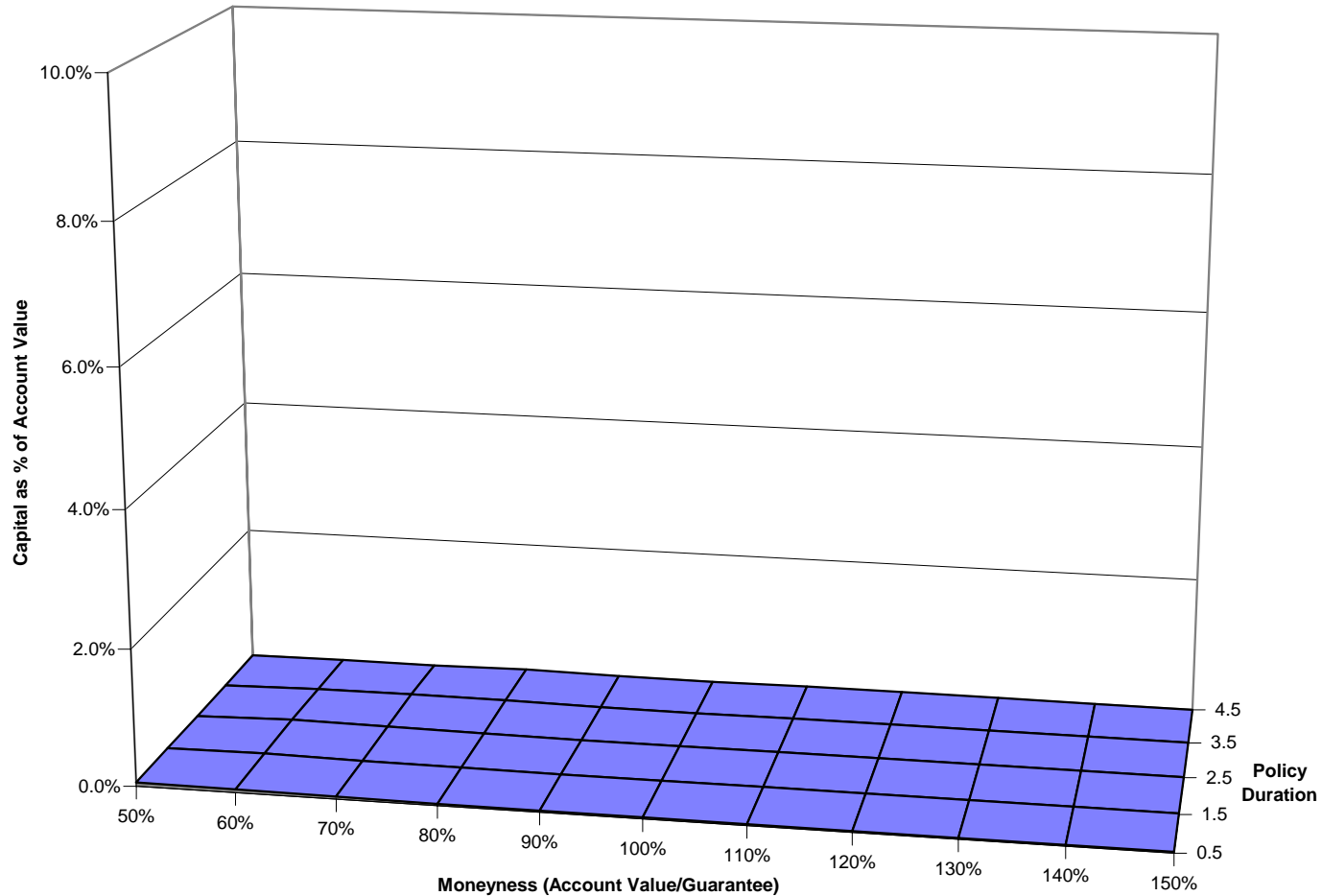






# GMAB Stress Analysis

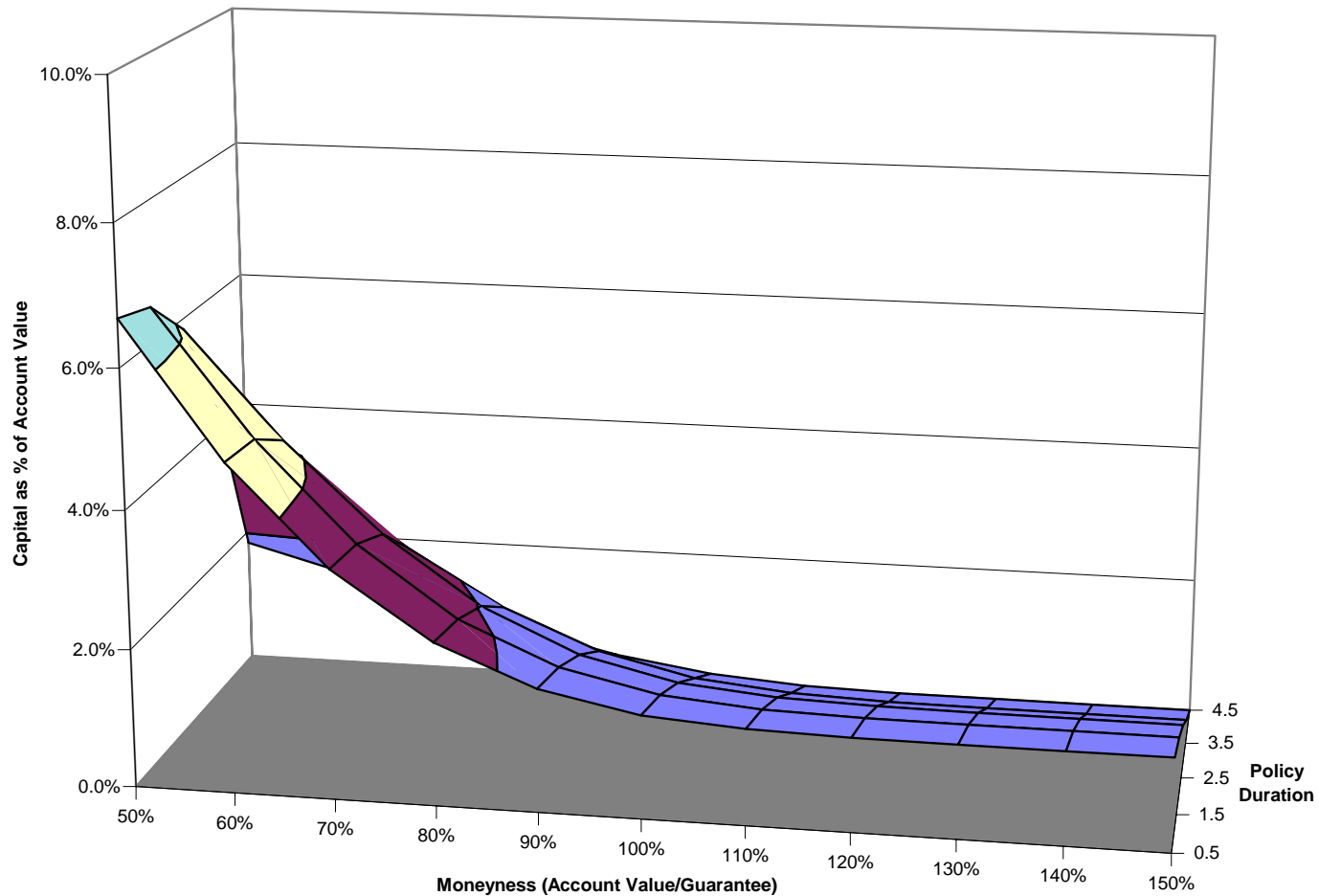
Volatility Stress - Vega Hedged





# GMAB Stress Analysis

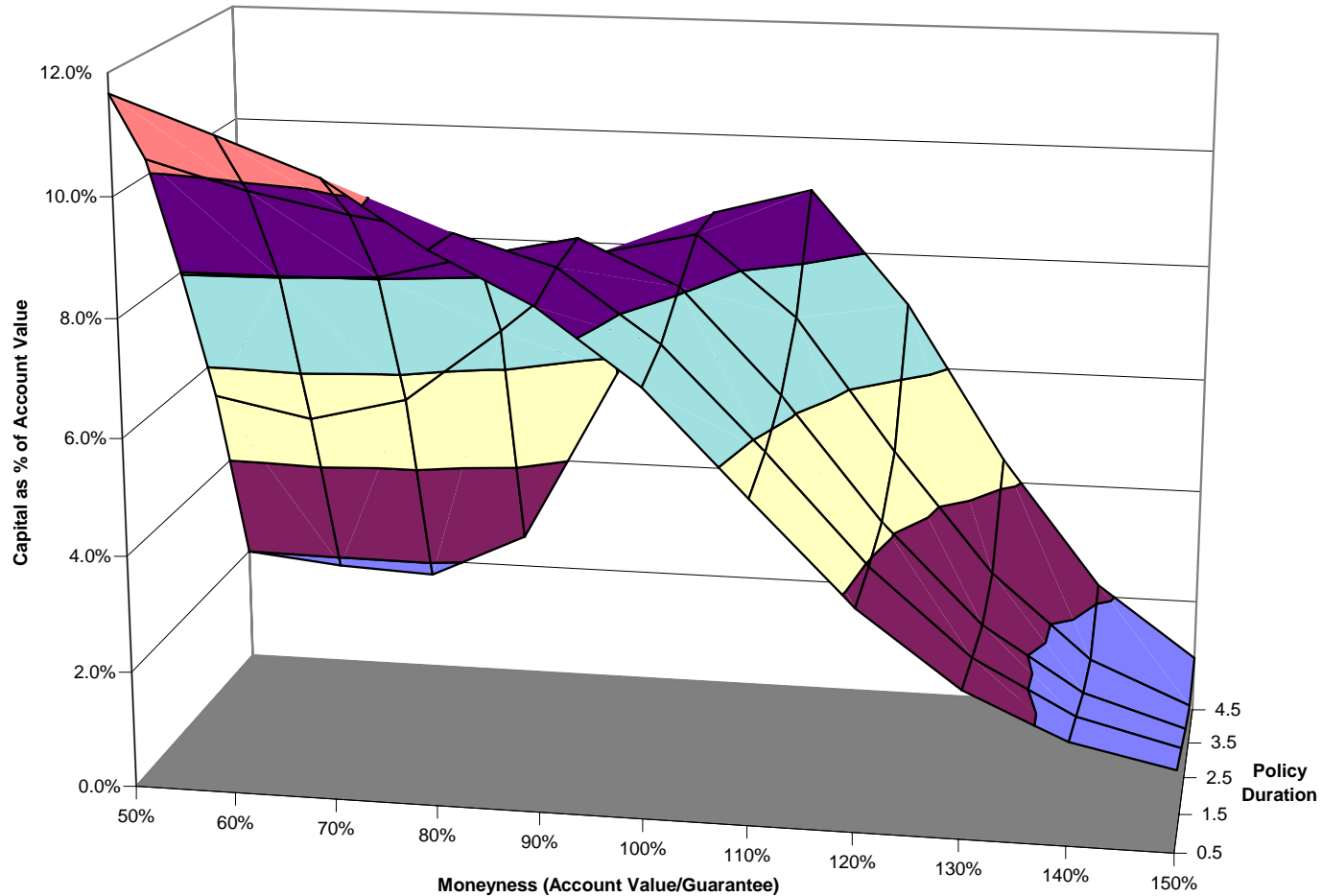
Lapse Stress - No Hedge





# GMAB Stress Analysis

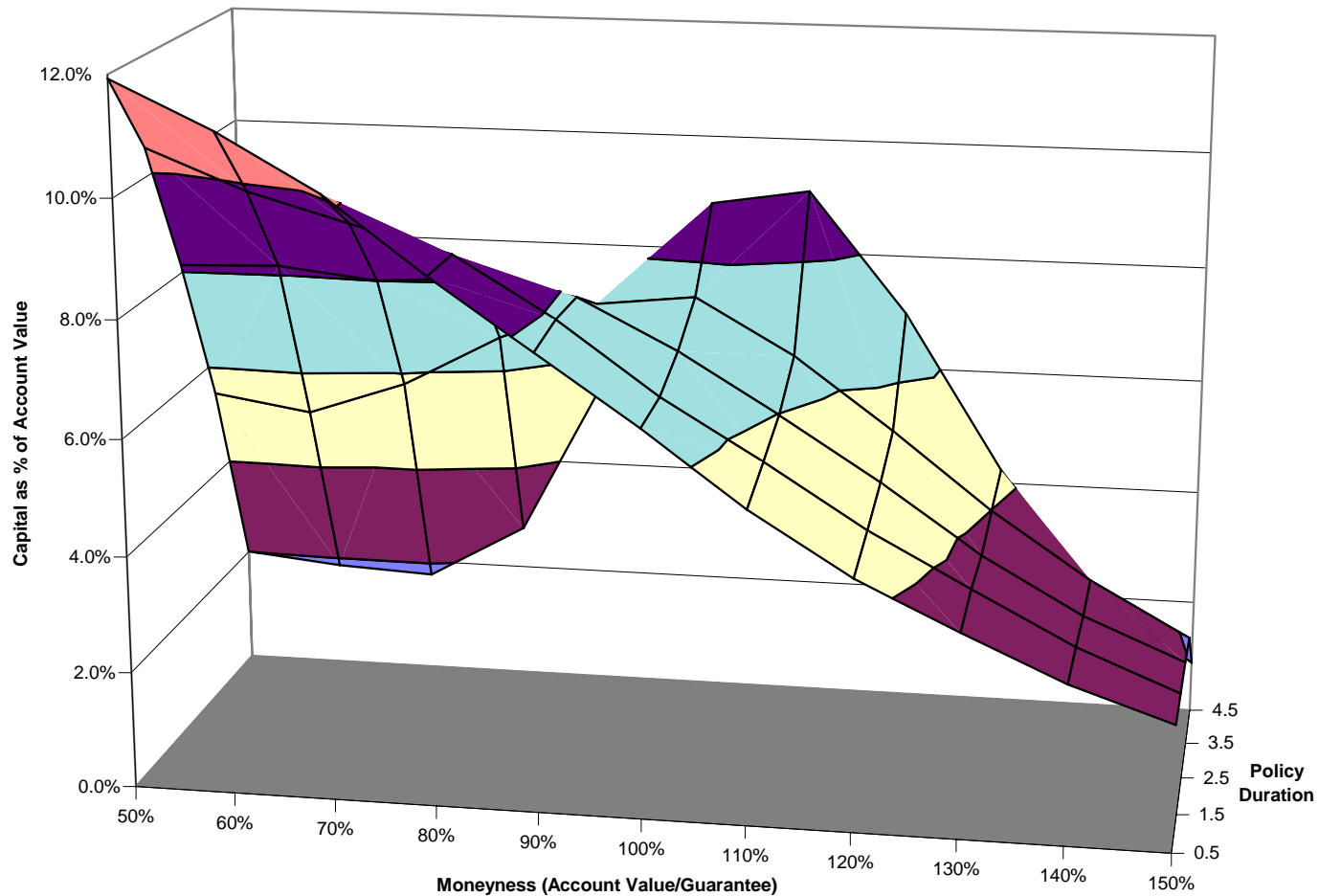
Combined Stress - Delta, Vega, Rho Hedged





# GMAB Stress Analysis

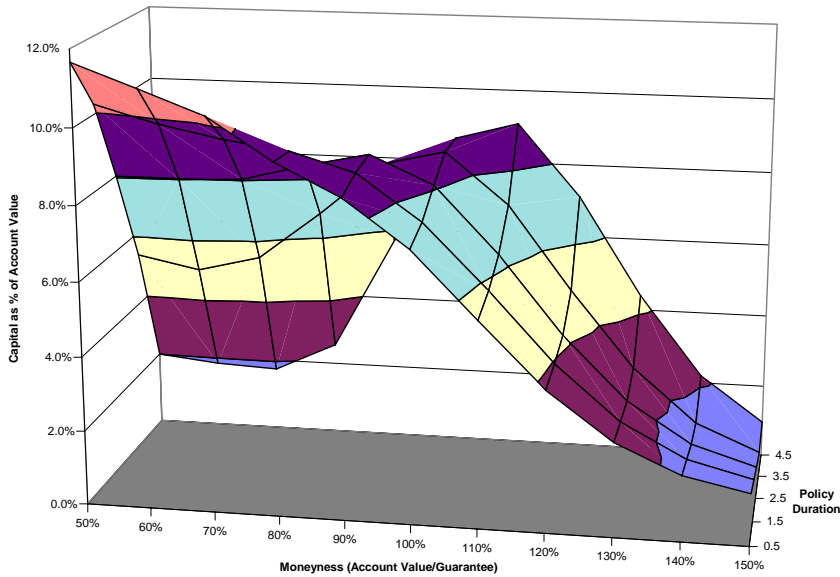
Combined Stress - Delta, Vega, Rho Hedged - No Ratchet



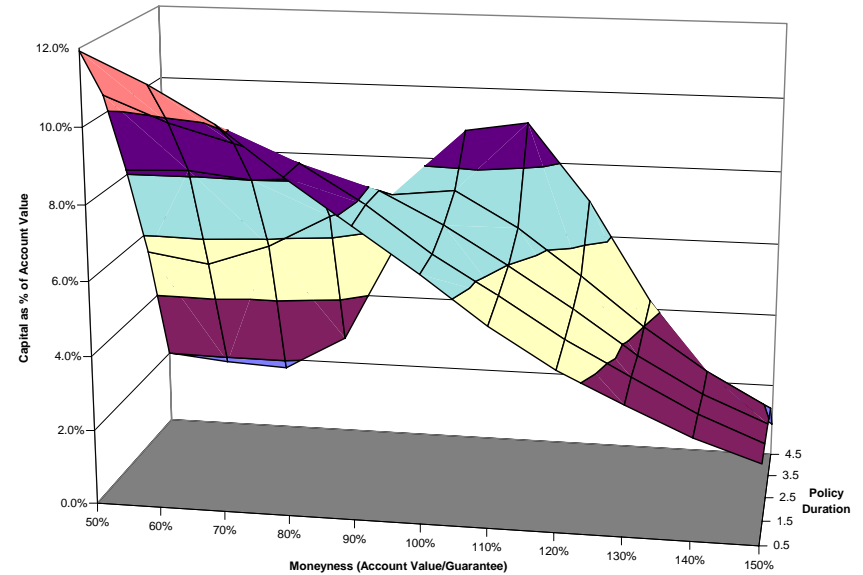


# GMAB Stress Analysis

Combined Stress - Delta, Vega, Rho Hedged



Combined Stress - Delta, Vega, Rho Hedged - No Ratchet

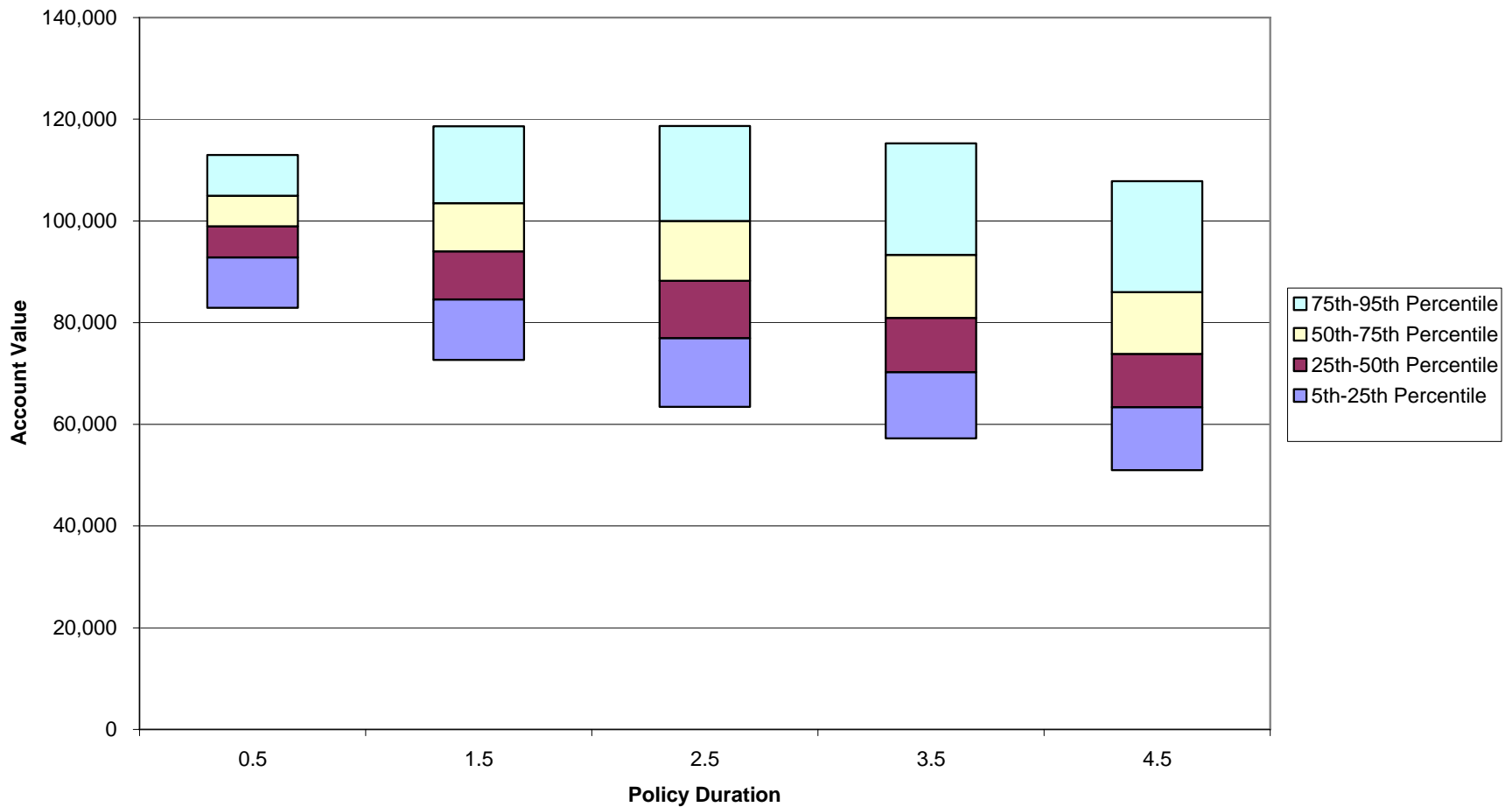






# GMAB Stochastic Analysis

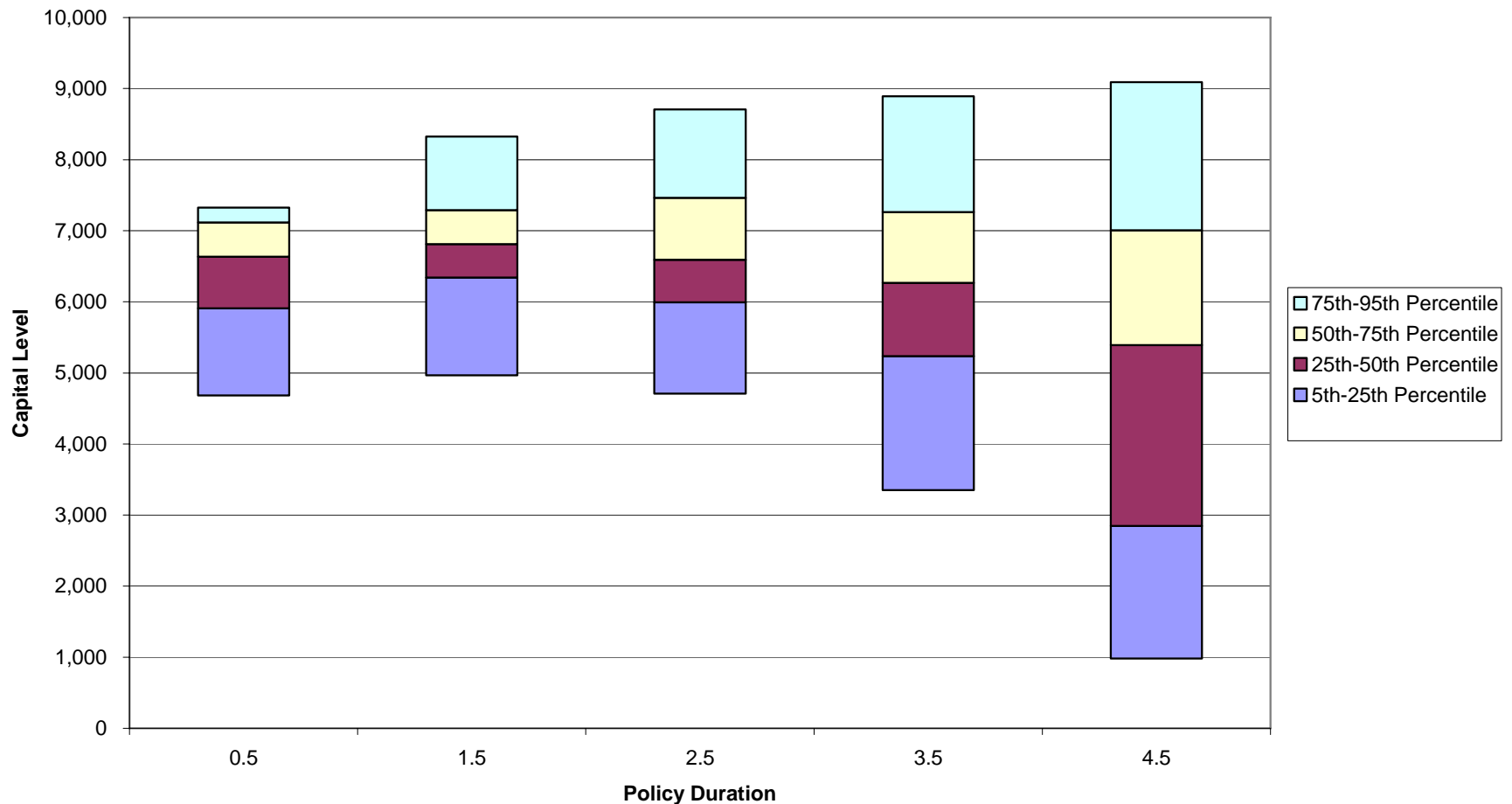
Account Value Distribution (Per Policy Issued)





# GMAB Stochastic Analysis

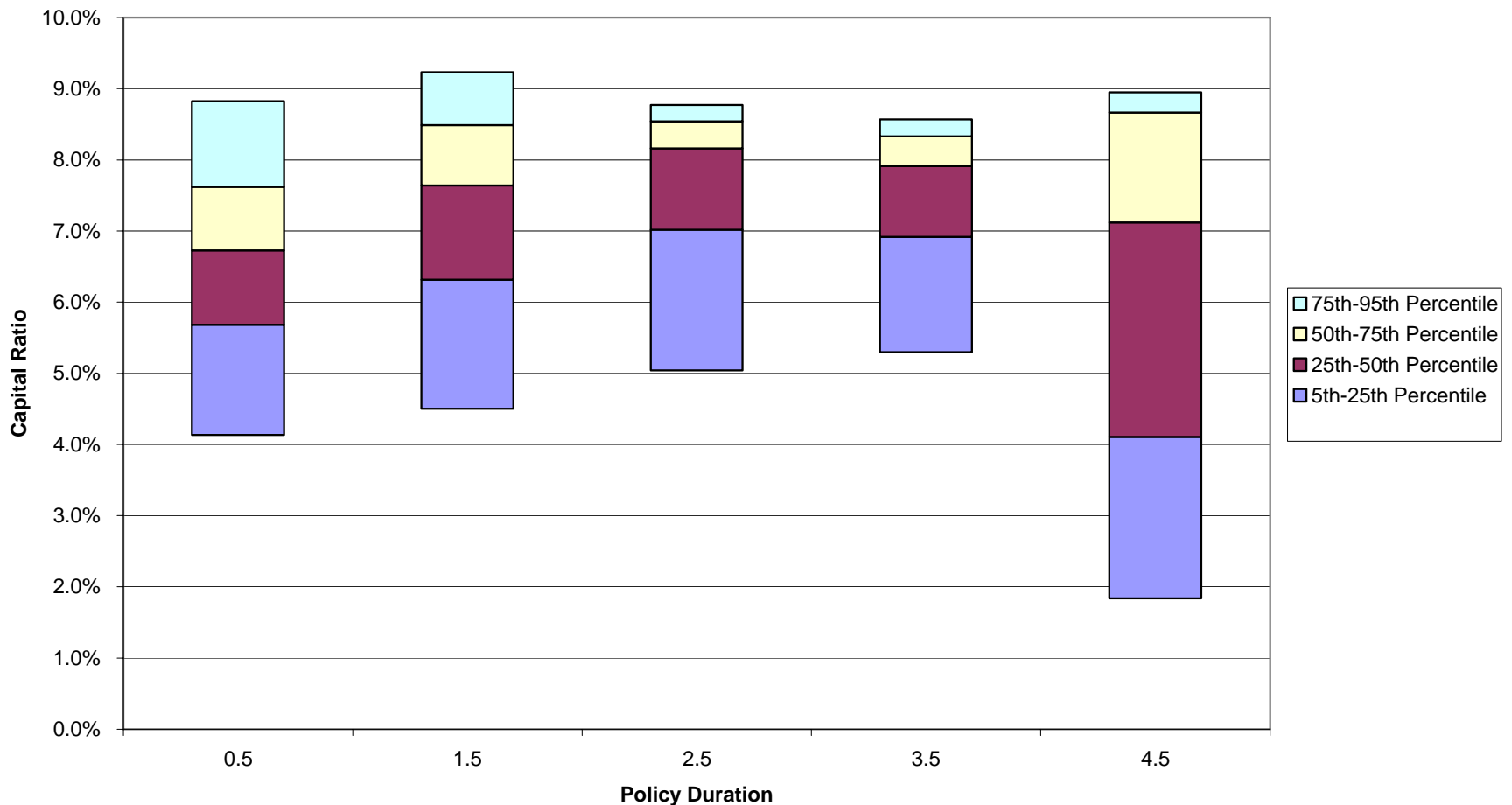
Capital Distribution (Per Policy Issued)





# GMAB Stochastic Analysis

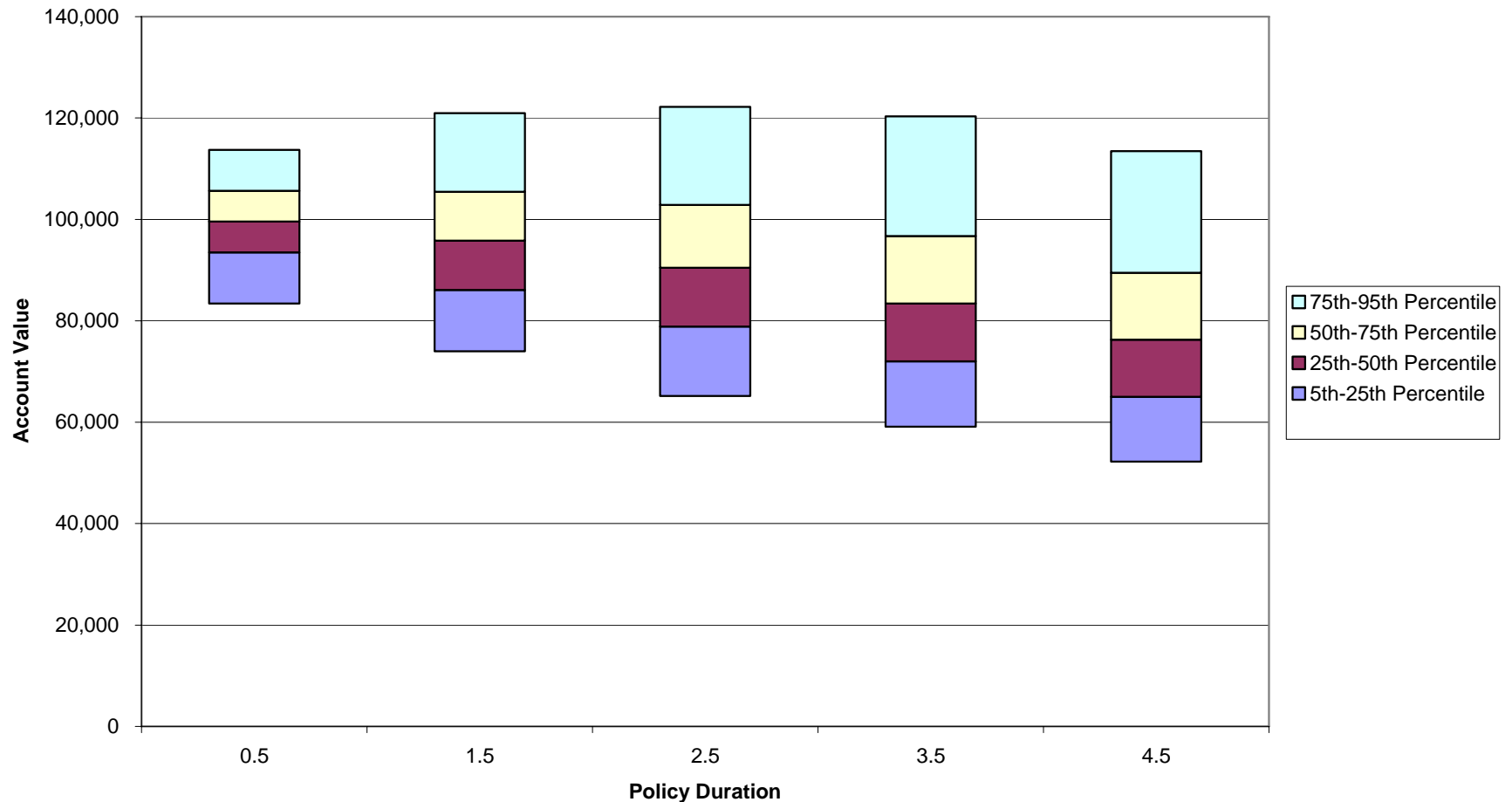
## Capital Ratio Distribution





# GMAB Stochastic Analysis

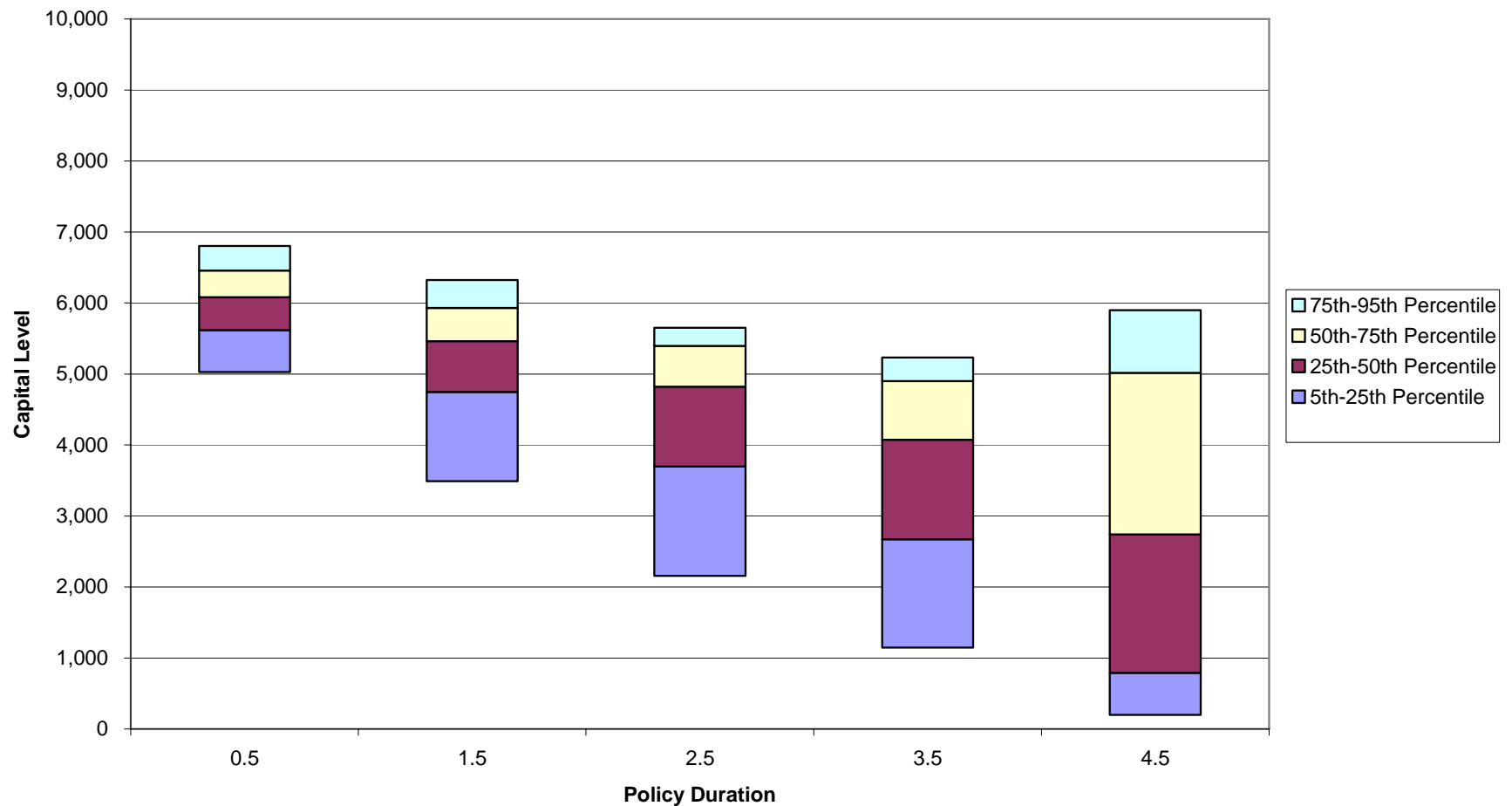
Account Value Distribution (Per Policy Issued) - Without Ratchet





# GMAB Stochastic Analysis

Capital Distribution (Per Policy Issued) - GMAB Without Ratchet

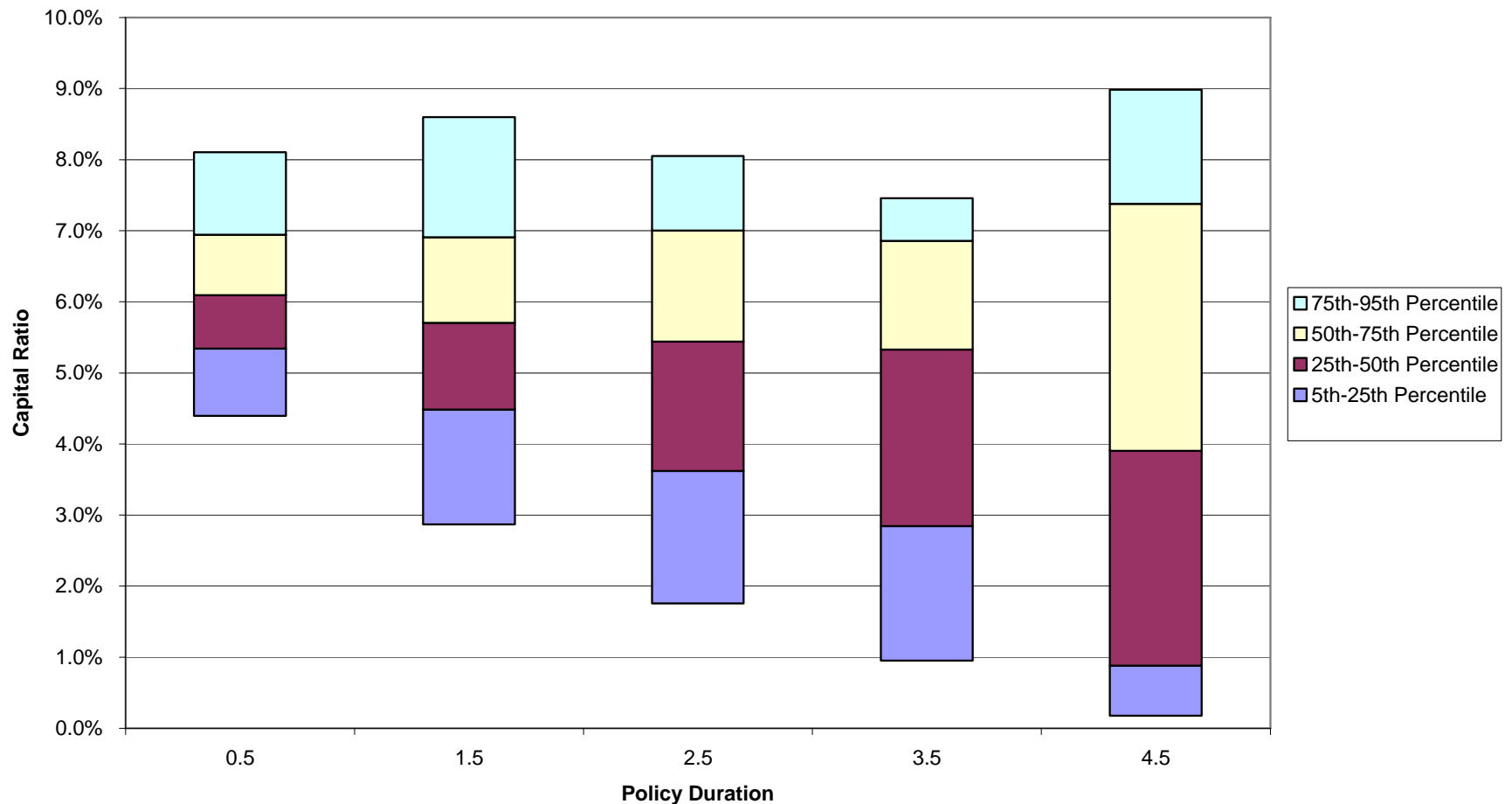






# GMAB Stochastic Analysis

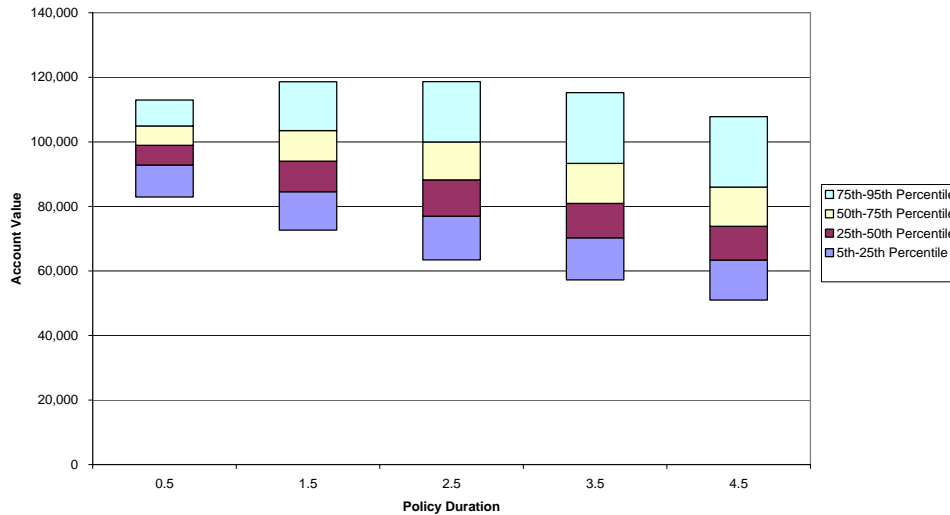
Capital Ratio Distribution - Without Ratchet



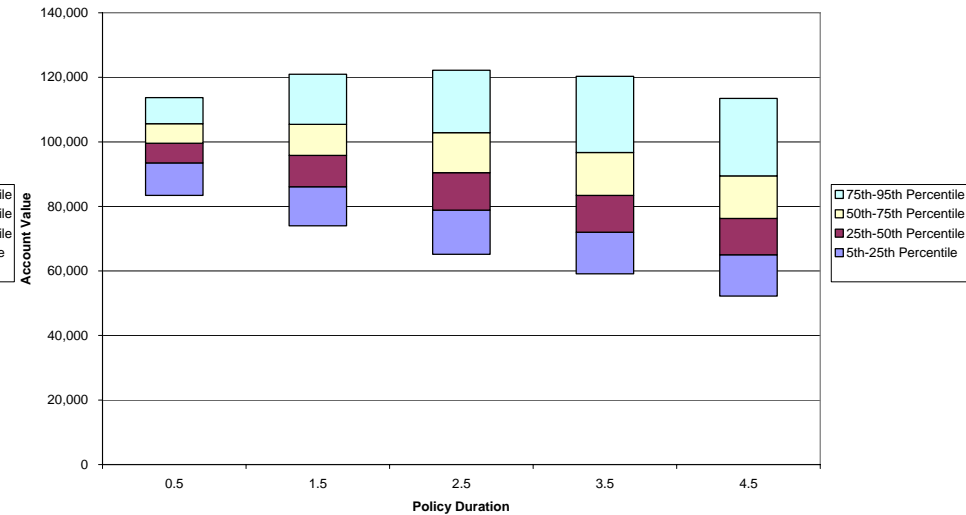


# GMAB Stochastic Analysis

Account Value Distribution (Per Policy Issued)



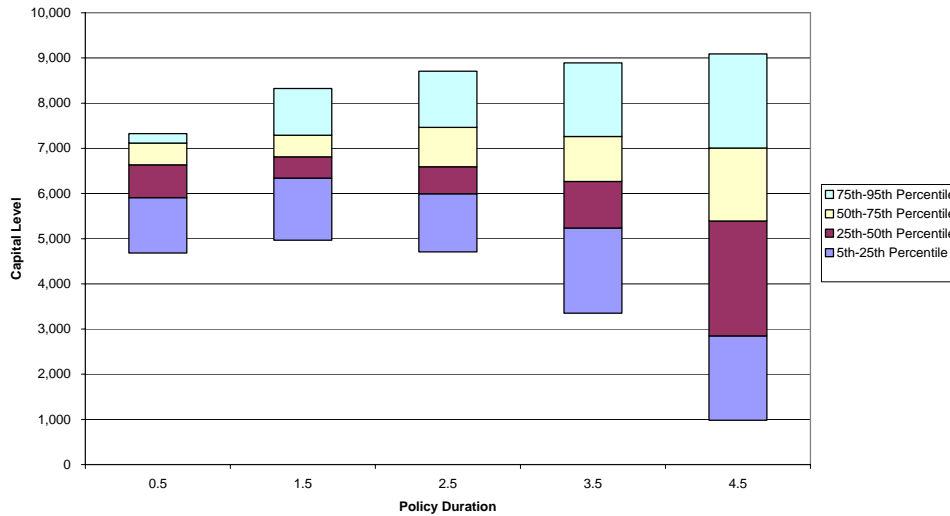
Account Value Distribution (Per Policy Issued) - Without Ratchet



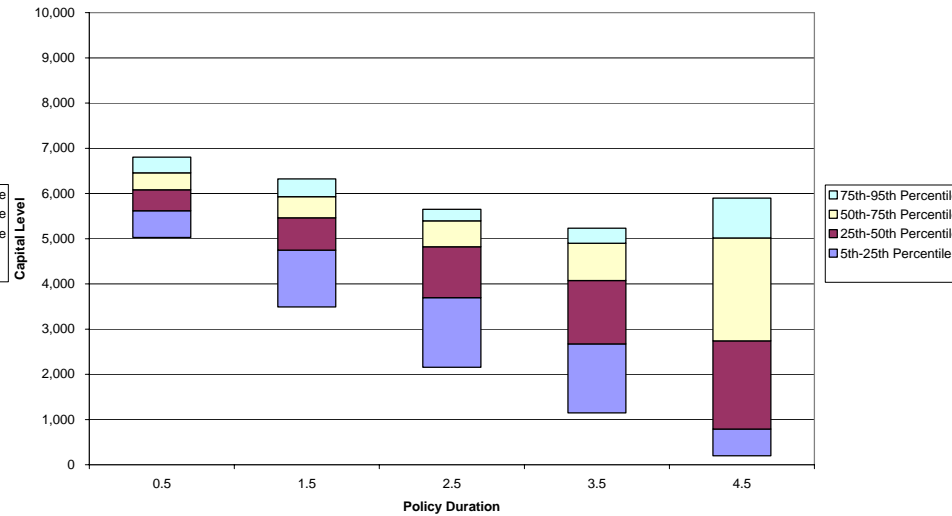


# GMAB Stochastic Analysis

Capital Distribution (Per Policy Issued)



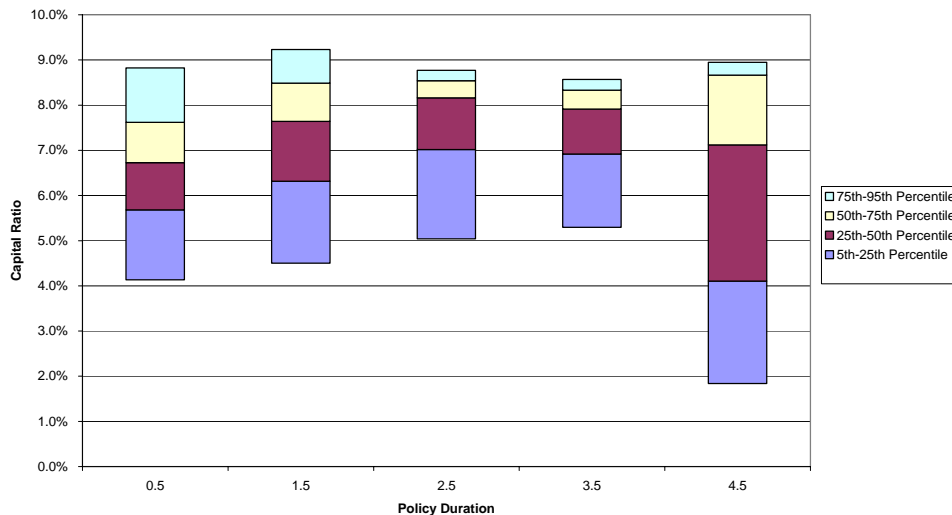
Capital Distribution (Per Policy Issued) - GMAB Without Ratchet



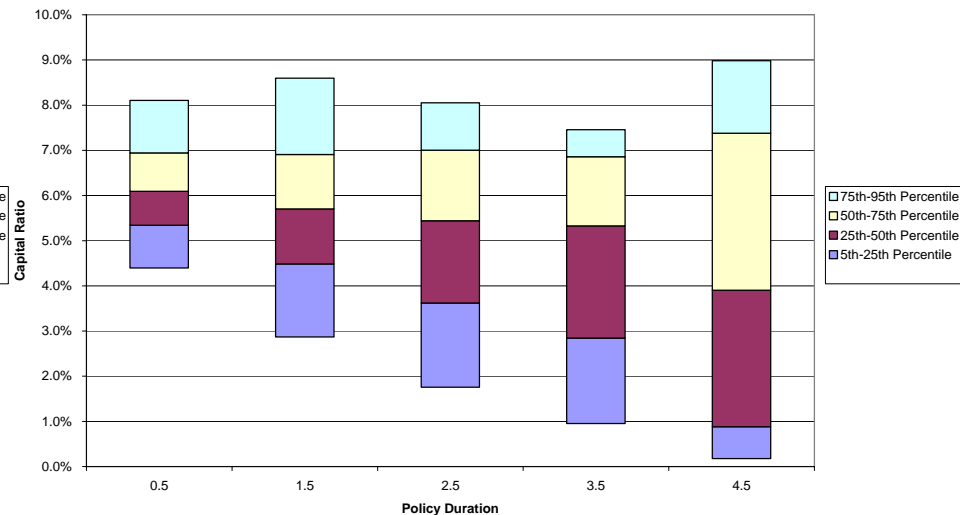


# GMAB Stochastic Analysis

Capital Ratio Distribution



Capital Ratio Distribution - Without Ratchet





# Economic Capital Model

