Session 044 PD - Portfolio Optimization for Insurers: Balancing Multiple Objectives

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Session 44

Portfolio Optimization for Insurers: Balancing Multiple Objectives

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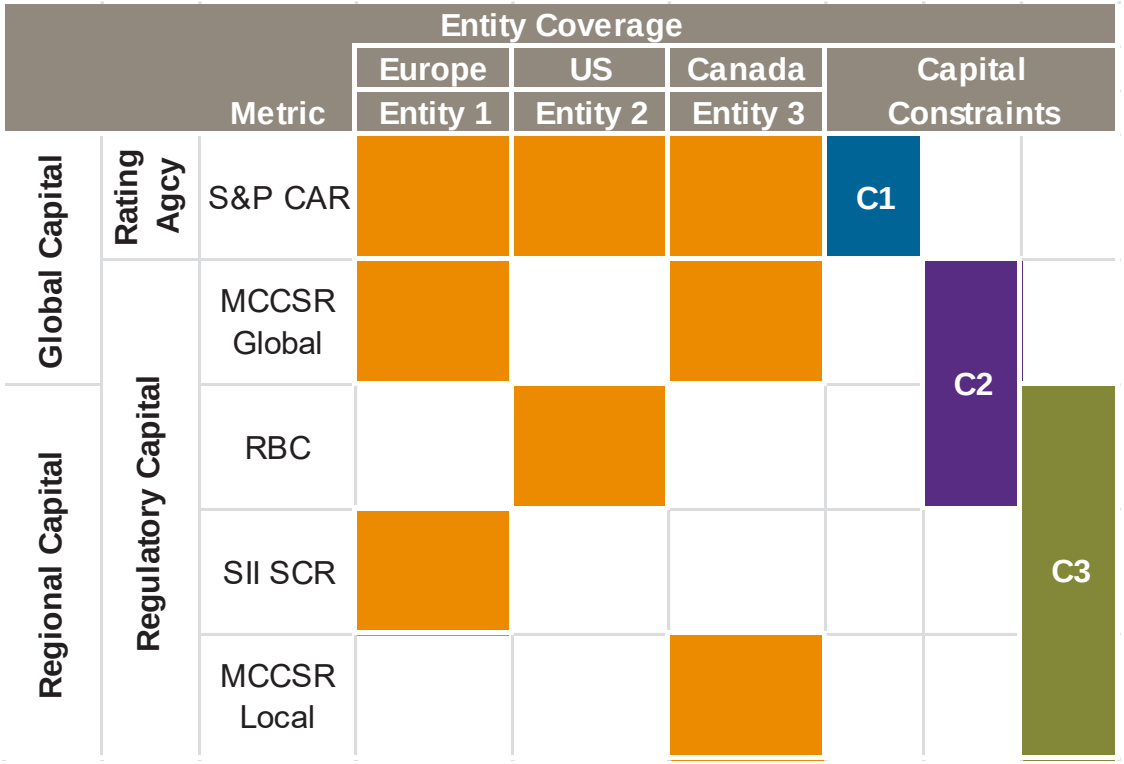
It is complicated

Optimizing asset allocation for an insurer is often a huge multi-dimensional “puzzle”

- Multiple external stakeholders
  - Regulators
  - Rating agencies
  - Investors and lenders
  - Policyholders
- Varying capital requirements across the globe, e.g:
  - RBC regulatory capital in US
  - Solvency II regulatory capital in Europe
  - Rating agency capital (e.g., S&P CAR; BCAR)
- Organizational complexities
  - LOB’s crossing Legal Entities’ borders
- Multiple internal stakeholders
  - Underwriting
  - Investment function
  - Actuarial department
  - Risk management / ALM
  - Etc.
- Different accounting standards that keep evolving and converging… not
  - GAAP
  - IFRS
  - Statutory accounting
  - Tax accounting

Example: Capital requirements for a global insurer

Correctly capturing overlapping capital/accounting requirements for a given insurer is very important



The capital constraint is Max(C1,C2,C3), where:
C1 is global rating agency capital requirement (S&P CAR)
C2 is the first global regulatory capital requirement (MCCSR Global ex-US plus US RBC)
C3 is the second global regulatory capital requirement (European SII SCR plus US RBC plus MCCSR Canada only)

- Reciprocity (aka equivalence) between US RBC and Solvency II makes things a bit easier for US subsidiaries of global European insurers
- In Canada subs are generally subject to MCCSR/LICAT
- For financial reporting most subs will care about the accounting regime of the parent company which is a listed public company, but the subs may prepare pro-forma GAAP/IFRS financials
- Many insurers in the US and Europe will have local accounting for regulatory purposes that is distinct from GAAP or IFRS—this accounting often determines the capacity for shareholder dividends and requirements for policyholder dividends

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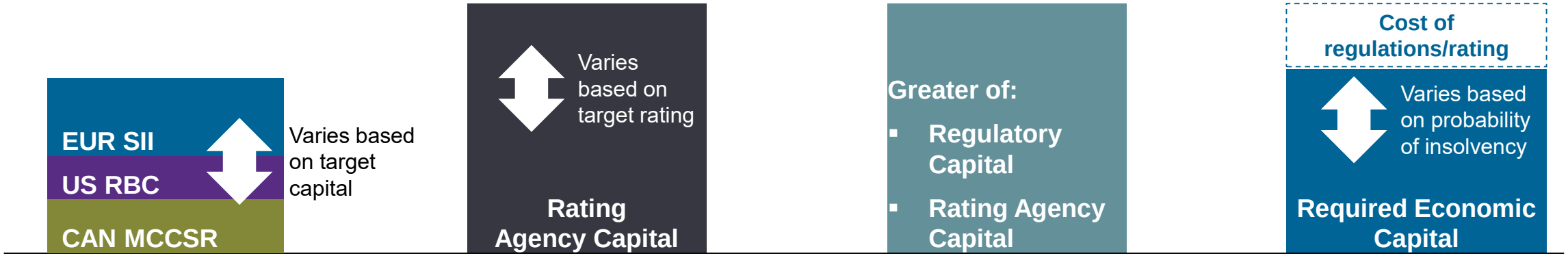
Regulatory, Rating Agency, and Economic Capital

Choose an asset allocation to minimize the greater of regulatory, rating agency, and economic capital



- A typical Life insurer gets large diversification on equity under RBC and on property under SII
- Canadian MCCSR has no diversification benefits

- S&P capital is often the binding constraint
- S&P provides very little asset diversification benefit and penalizes duration

- Binding constraint is the greater of rating agency and regulatory capital requirements

- REC is usually (but not always) less than regulatory/rating agency capital due to conservatism in other capital models

Source: J.P. Morgan Asset Management. For illustrative purposes only

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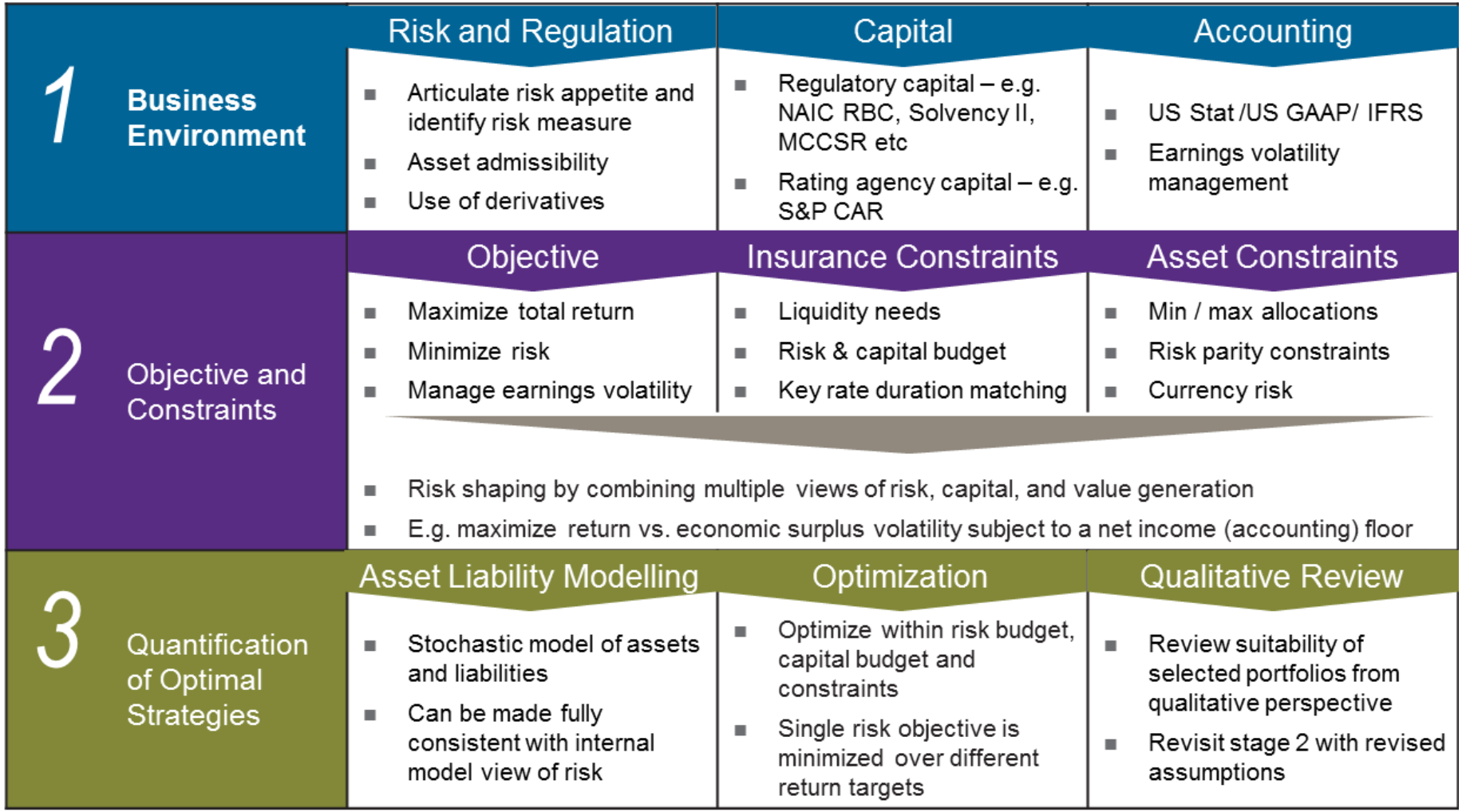
Asset Allocation Process



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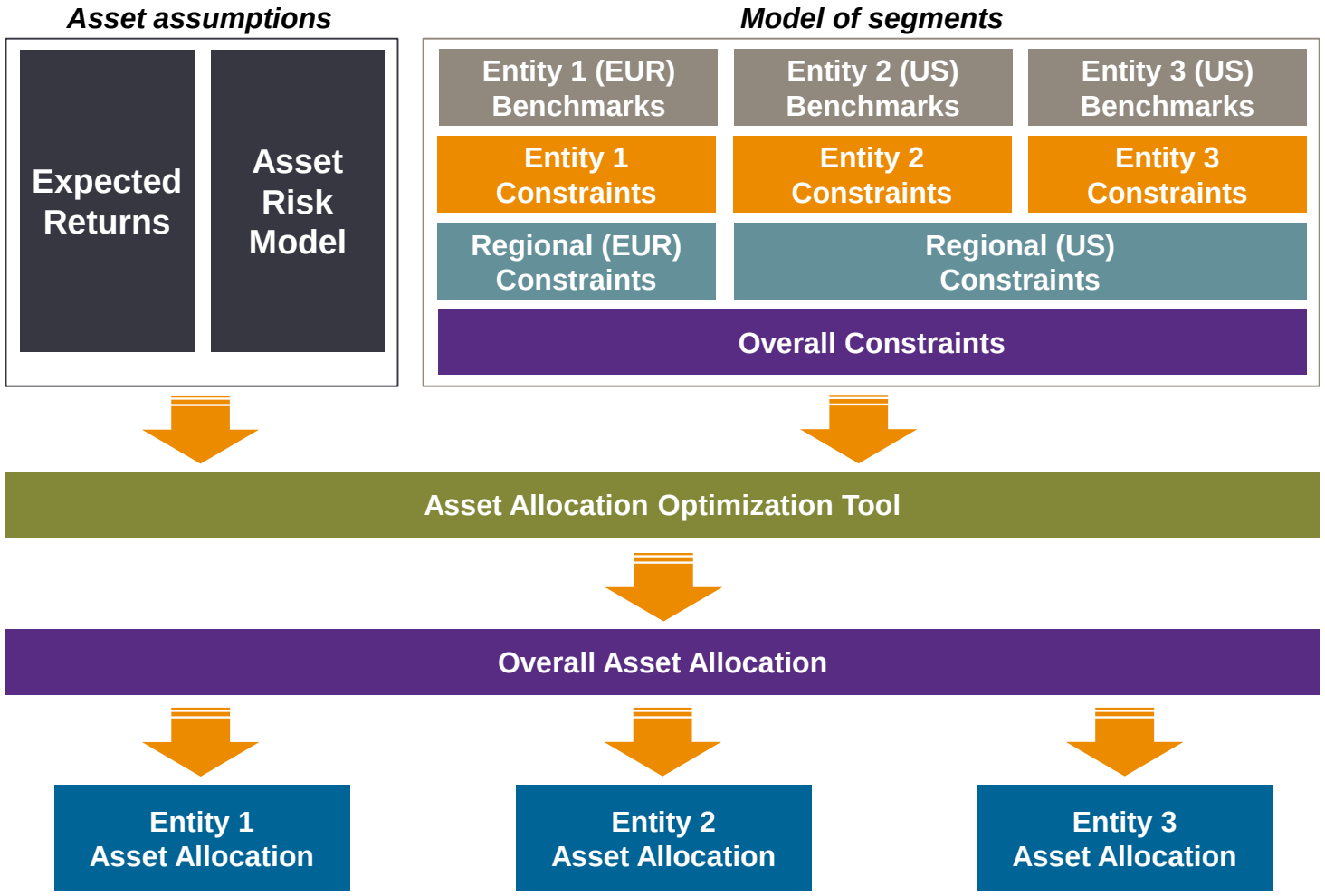
Top-Down Strategic Asset Allocation



- Minimize surplus risk by optimizing relative to liability benchmarks
- Maximize expected return for different sets of constraints
- Constraints can be enforced for each segment, regionally, and/or globally
- Asset allocation (AA) is optimal at the group level
  - But entity-level asset allocations satisfying all constraints are also determined
  - More efficient asset allocation for regulatory capital, rating agency capital, liquidity, etc
- AA can be set to minimize overall rating agency capital requirements
- For a given return target, the AA minimizes overall surplus risk while satisfying all entity level and group level constraints

Source: J.P. Morgan Asset Management. For illustrative purposes only.

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Case Study: US Life and US P&C Insurer

Model of a fictional US insurance company with Life and P&C subsidiaries

- Life company:
  - 70% of the combined entity
  - Subject to US Life RBC assuming 450% target capital ratio
- P&C company:
  - 30% of the combined entity
  - Subject to US P&C RBC assuming 300% target capital ratio
- Total company:
  - Regulatory capital is the sum of Life and P&C RBC
  - Also subject to rating agency capital requirement (S&P CAR) assuming 125% target capital ratio

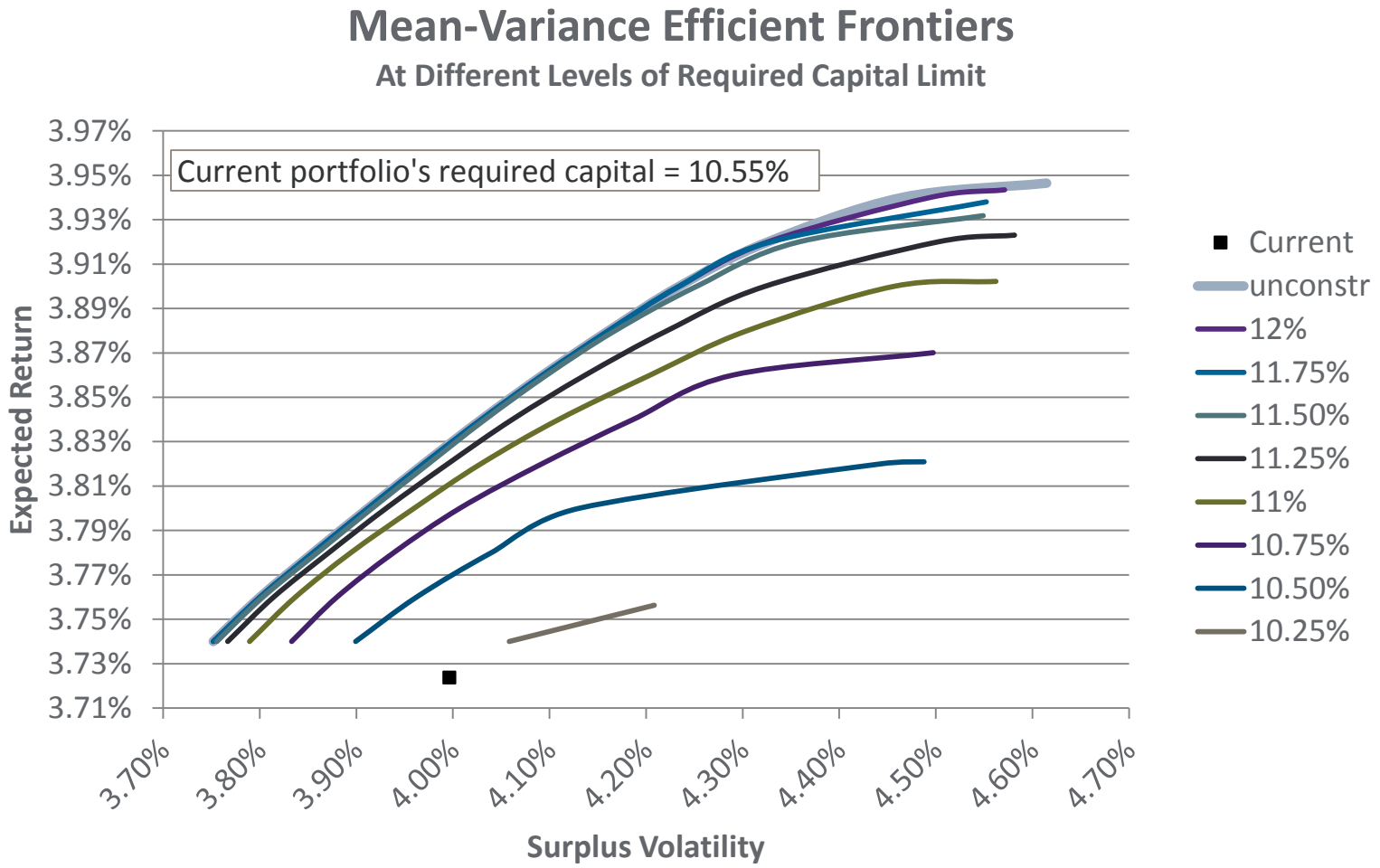
- Need to manage simultaneously against regulatory and rating agency capital
- Capital constraint thus becomes:

$$\max(450\% \cdot RBC_{Life} + 300\% \cdot RBC_{P\&C}, 125\% \cdot S\&P\ CAR) \leq C$$

where

- RBC_{Life} is the required Life capital
- $RBC_{P\&C}$ is the required P&C capital
- $S\&P\ CAR$ is rating agency required capital (applies to total company)
- C is the desired overall capital constraint level

Case Study: Efficient Frontiers



- Current allocation is suboptimal
  - Current scaled required capital is 10.55% of invested assets
- Can improve current allocation
  - Higher expected return
  - Same (or lower) surplus volatility
  - Capital requirements do not increase
  - E.g., move to the 10.50% capital line
- Can achieve additional outcomes if relax one of the risk metrics
  - Allow surplus volatility to increase from the current value of 4.00%
  - Allow more capital-intensive asset allocations

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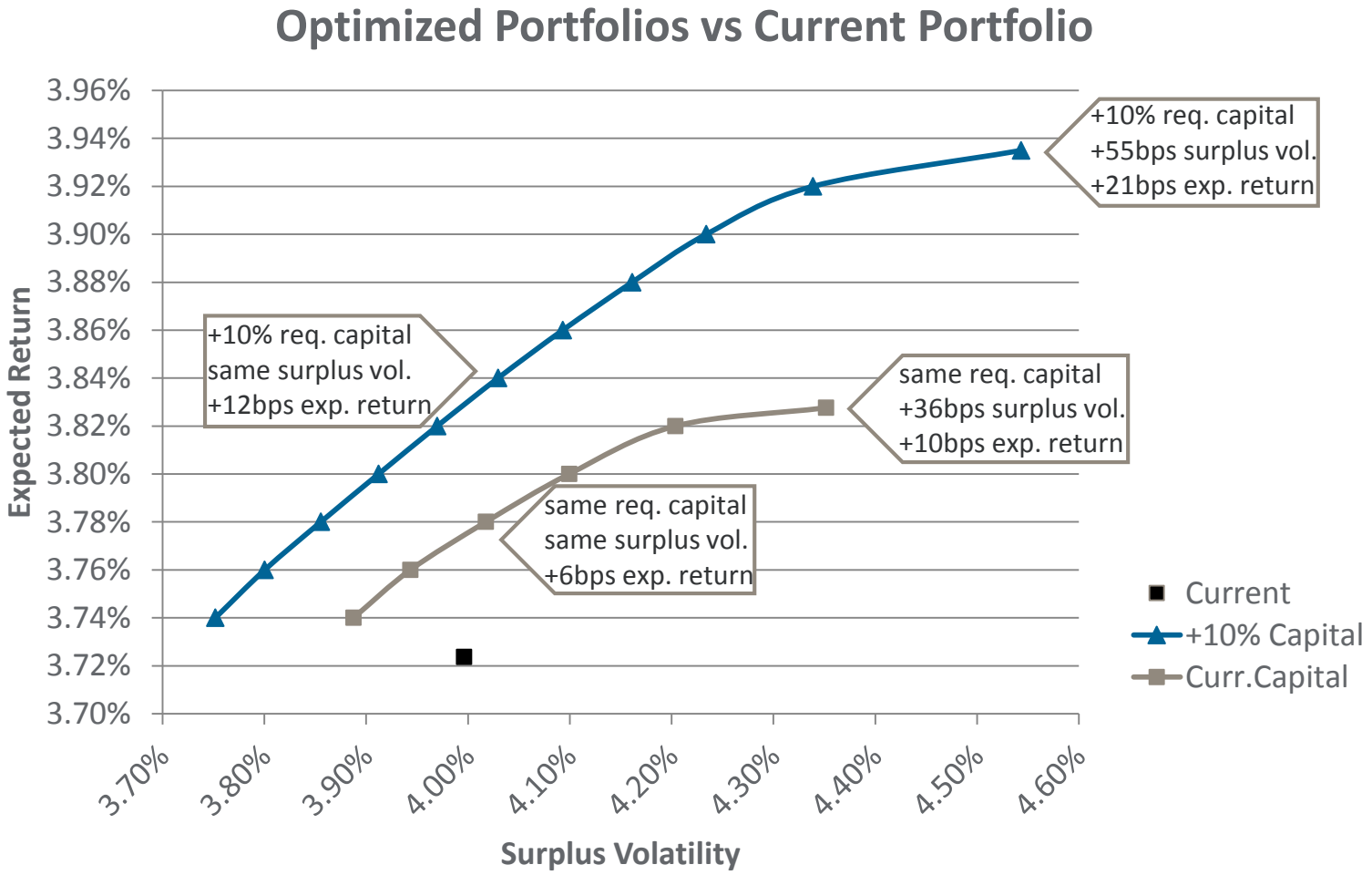
Case Study: Efficient Frontiers



- Current risk levels:
  - Extra 6 bps expected return
- Same surplus volatility, 10% higher capital
  - Extra 12 bps expected return
- Same capital, maximum ER
  - Extra 10 bps expected return
  - At the expense of +36 bps surplus volatility
- 10% higher capital, maximum ER
  - Extra 21 bps expected return
  - At the expense of +55 bps surplus volatility

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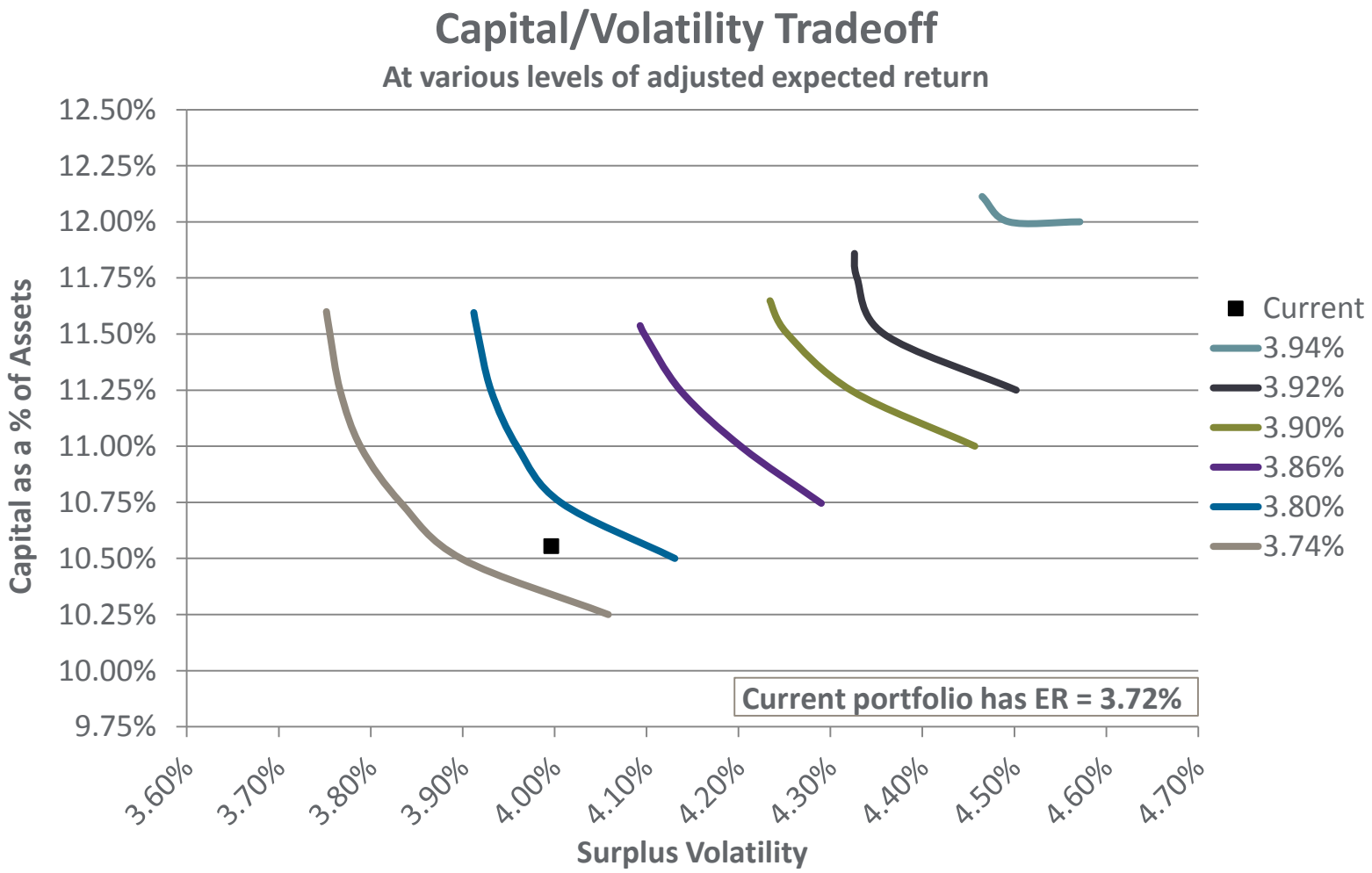
Case Study: Capital / Volatility Tradeoffs



- Current allocation is suboptimal
  - Current asset portfolio's expected return is 3.72%
- Can improve current allocation
  - Lower required capital
  - Same (or lower) surplus volatility
  - Same or higher expected return
  - E.g., move to the 3.74% ER line
- Can achieve higher ER outcomes if relax one or both risk metrics
  - Allow surplus volatility to increase from the current value of 4.00%
  - Allow more capital-intensive asset allocations

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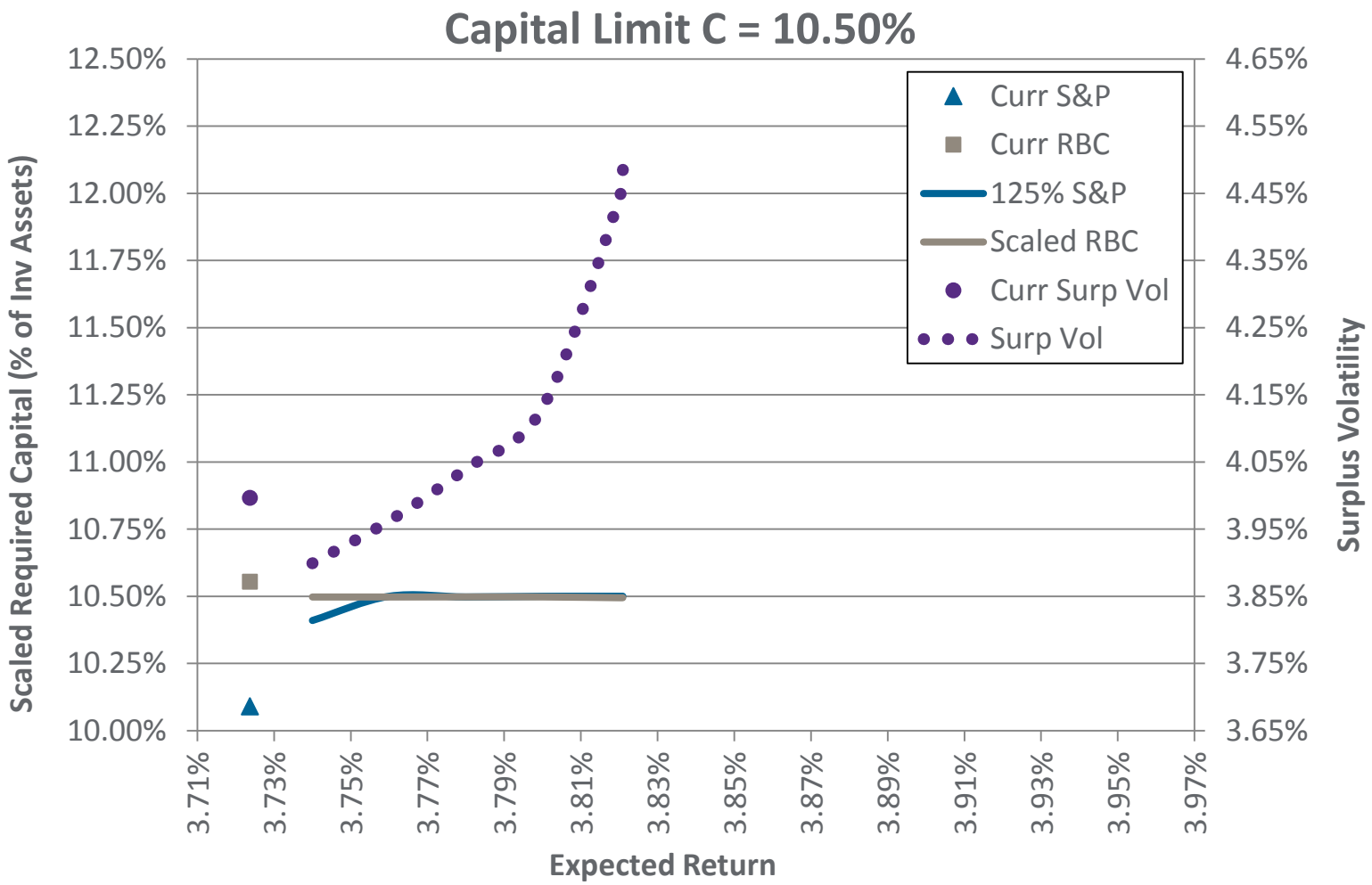
Case Study: Tighter Capital Constraint



- Current allocation is suboptimal
  - RBC is higher than S&P CAR
  - Surplus volatility can be lowered slightly
- Optimal allocations better balance capital utilization
  - RBC and S&P CAR are both binding
- ER can be increased at the expense of higher surplus volatility
  - But capital constraint is still enforced

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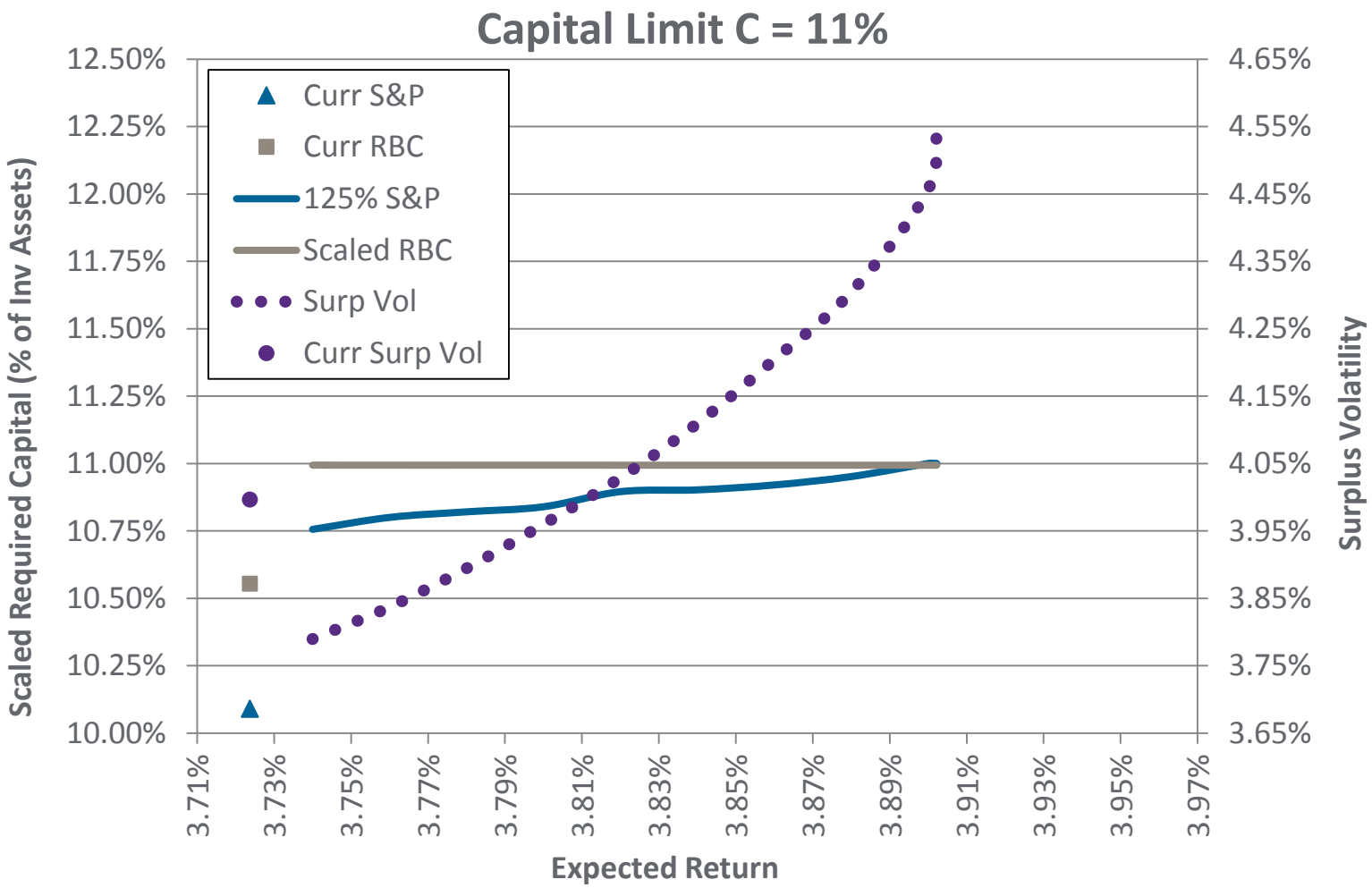
Case Study: Capital Constraint Less Tight



- RBC becomes the binding capital constraint
  - S&P CAR is only binding at the higher end of expected return range
- Higher ER can be achieved by allowing higher surplus volatility
- Lower surplus volatility can be achieved at the lower end of ER range

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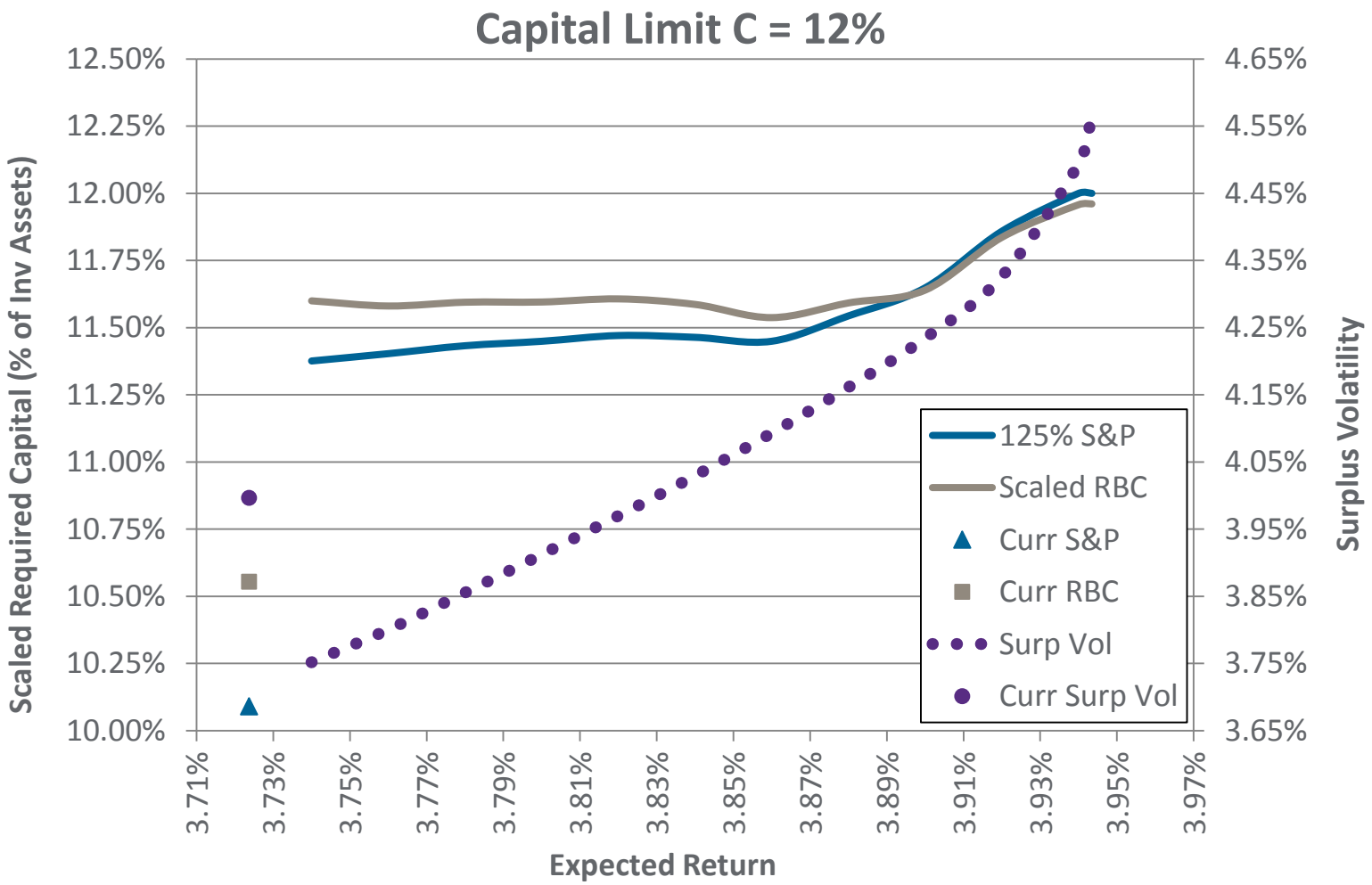
Case Study: Capital Constraint Relaxed Further



- Capital is no longer binding, except for the highest ER asset allocation
- RBC and S&P CAR lines cross!
  - S&P CAR is now a binding constraint at the highest ER point
  - As asset allocations shift towards higher expected returns, S&P CAR becomes a more onerous capital requirement compared to RBC
  - This challenges a conventional wisdom that only one capital requirement is always binding

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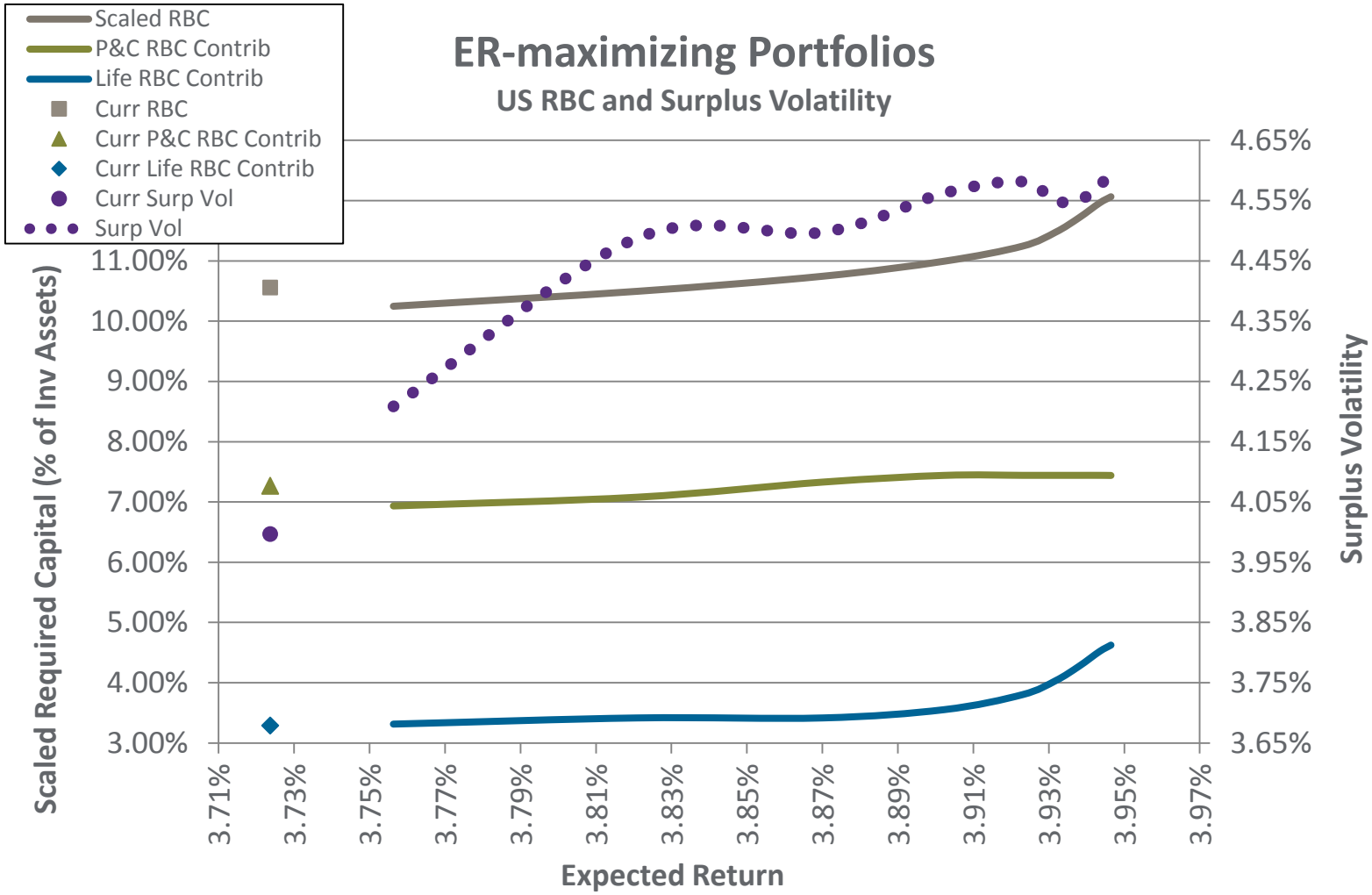
Case Study: ER-maximizing Portfolios



- Total RBC (gray line) is the sum of Life and P&C contributions
- Initially RBC increases in P&C entity (green line)
- Initially RBC stays roughly unchanged in Life (blue line)
- At some point, around C=11%, the situation reverses
  - P&C RBC stays flat
  - Life RBC increases

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Case Study: ER-maximizing Portfolios

Asset allocation changes driven by capital constraints

Life	Curr Portf	ER-Maximizing Portfolios: Deltas from the Current Portfolio								
		Capital Limit								
Asset Classes		10.25%	10.50%	10.75%	11.00%	11.25%	11.50%	11.75%	12.00%	12.25%
ALTS	**-**	**0.27%**	**0.32%**	**0.32%**	**0.36%**	**0.42%**	**0.48%**	**0.54%**	**0.60%**	**0.63%**
Infra	-	-	-	-	-	-	-	-	-	-
PE	-	0.27%	0.32%	0.32%	0.36%	0.42%	0.48%	0.54%	0.60%	0.63%
RE	-	-	-	-	-	-	-	-	-	-
EQ	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Equity	-	-	-	-	-	-	-	-	-	-
HedgeFund	-	-	-	-	-	-	-	-	-	-
HY	**-**	**-**	**-**	**-**	**1.29%**	**1.49%**	**2.39%**	**3.31%**	**4.23%**	**4.62%**
BankLoans	-	-	-	-	-	-	-	-	-	-
HY	-	-	-	-	1.29%	1.49%	2.39%	3.31%	4.23%	4.62%
IG	**70.00%**	**-0.27%**	**-0.32%**	**-0.32%**	**-1.65%**	**-1.91%**	**-2.87%**	**-3.85%**	**-4.83%**	**-5.25%**
ABS/CMBS	-	-	-	-	-	-	-	-	-	-
Agcy	2.80%	-	-	-	-	-	-	-	-	-
Agcy RMBS	-	-	-	-	-	-	-	-	-	-
CLO	3.50%	-	-	-	-	-	-	-	-	-
CML	14.00%	-	-	-	-	-	-	-	-	-
Corp A	40.85%	1.57%	-	-	-0.72%	-	-1.40%	-1.75%	-1.75%	-1.75%
Corp AA	0.00%	-0.00%	-0.00%	-0.00%	-0.00%	-	-	-	-	-
Corp AAA	1.85%	-1.85%	-1.85%	-1.85%	-1.85%	-1.76%	-0.35%	-	-	-
CorpBBB	-	-	4.23%	4.23%	3.60%	3.34%	2.38%	1.40%	0.42%	-
IG EMD	2.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Muni	3.50%	-	-2.70%	-2.70%	-2.68%	-3.49%	-3.50%	-3.50%	-3.50%	-3.50%
NARMBS	-	-	-	-	-	-	-	-	-	-
Treasury	0.70%	-	-	-	-	-	-	-	-	-

P&C	Curr Portf	ER-Maximizing Portfolios: Deltas from the Current Portfolio								
		Capital Limit								
Asset Classes		10.25%	10.50%	10.75%	11.00%	11.25%	11.50%	11.75%	12.00%	12.25%
ALTS	**6.77%**	**-1.05%**	**-0.60%**	**-0.35%**	**0.49%**	**0.49%**	**0.49%**	**0.49%**	**0.49%**	**0.49%**
Infra	-	-	-	-	-	-	-	-	-	-
PE	6.17%	-0.45%	-	0.25%	1.09%	1.09%	1.09%	1.09%	1.09%	1.09%
RE	0.60%	-0.60%	-0.60%	-0.60%	-0.60%	-0.60%	-0.60%	-0.60%	-0.60%	-0.60%
EQ	**0.24%**	**-**	**0.03%**	**0.69%**	**-**	**-**	**-**	**-**	**-**	**-**
Equity	0.24%	-	0.03%	0.69%	-	-	-	-	-	-
HedgeFund	-	-	-	-	-	-	-	-	-	-
HY	**-**	**1.54%**	**1.06%**	**0.15%**	**-**	**-**	**-**	**-**	**-**	**-**
BankLoans	-	-	-	-	-	-	-	-	-	-
HY	-	1.54%	1.06%	0.15%	-	-	-	-	-	-
IG	**22.99%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**	**-0.49%**
ABS/CMBS	-	0.20%	0.98%	0.69%	0.87%	0.71%	0.70%	0.69%	0.69%	0.18%
Agcy	5.46%	-	-0.03%	-0.69%	-	-	-	-	-	-
Agcy RMBS	-	-	-	-	-	-	-	-	-	-
CLO	1.50%	-	-	-	-	-	-	-	-	-
CML	-	-	0.18%	0.47%	0.29%	0.45%	0.46%	0.47%	0.47%	0.10%
Corp A	4.38%	-	-	-	-	-	-	-	-	-
Corp AA	-	-	-	-	-	-	-	-	-	-
Corp AAA	-	-	-	-	-	-	-	-	-	-
CorpBBB	2.92%	-	-	-	-	-	-	-	-	-
IG EMD	1.20%	-	-	-	-	-	-	-	-	-
Muni	7.24%	-0.69%	-1.62%	-0.96%	-1.65%	-1.65%	-1.65%	-1.65%	-1.65%	-1.65%
NARMBS	-	-	-	-	-	-	-	-	-	0.88%
Treasury	0.30%	-	-	-	-	-	-	-	-	-

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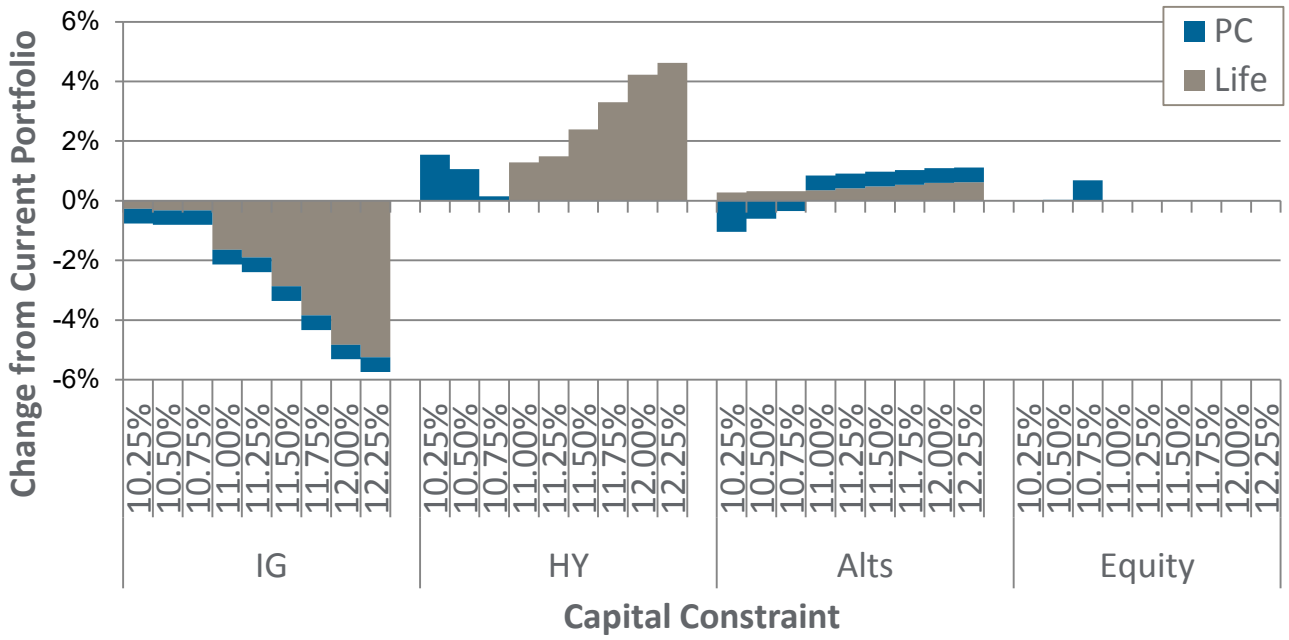
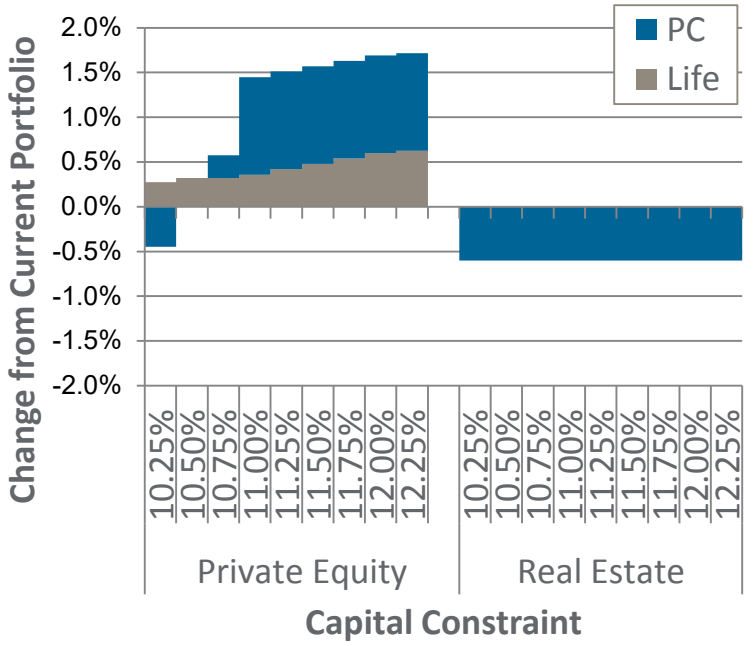
Case Study: ER-maximizing Portfolios

Asset allocation changes driven by capital constraints

Overall Asset Allocation



Alternatives



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Case Study: ER-maximizing Portfolios

Tight capital budget

- High Yield (HY) is added to P&C subsidiary first
  - HY carries a lower RBC charge in P&C than in Life, especially after diversification
- Private Equity (PE) is sold out of P&C subsidiary
  - PE has similar pre-diversification RBC charges in Life and P&C, but post-diversification PE charge is lower in Life

Less restrictive capital budget

- PE is added back to P&C entity
- Securitized assets and mtg. loans are increased in P&C
- In Life entity there is reallocation towards lower Investment Grade first, and then increasingly more towards High Yield

All capital budgets

- PE allocation is increased in Life
- Munis and Taxable Munies are sold from both entities
- Real Estate (RE) is sold out of P&C entity
  - RE has high RBC charge; treated as fixed income by Life RBC but as equity by P&C RBC
  - RE has the lowest S&P CAR charge among all equity and alternative asset classes

Conclusions

- Optimizing asset allocations for insurance companies is complex even in simple cases (haven't I said it enough times already?)
- Bottom-up optimal asset allocation:
  - Difficult, inconsistent, and to a large extent manual
  - Misses important interactions and tradeoffs
  - Leads to suboptimal outcomes
- Top-down optimal asset allocation:
  - Easier and more consistent, eliminates guesswork, can be significantly automated
  - Allows capturing all important interactions and tradeoffs
  - Can be really illuminating by uncovering unexpected, even counterintuitive dynamics