

HKU

ALM from an Investment Bank's Perspective

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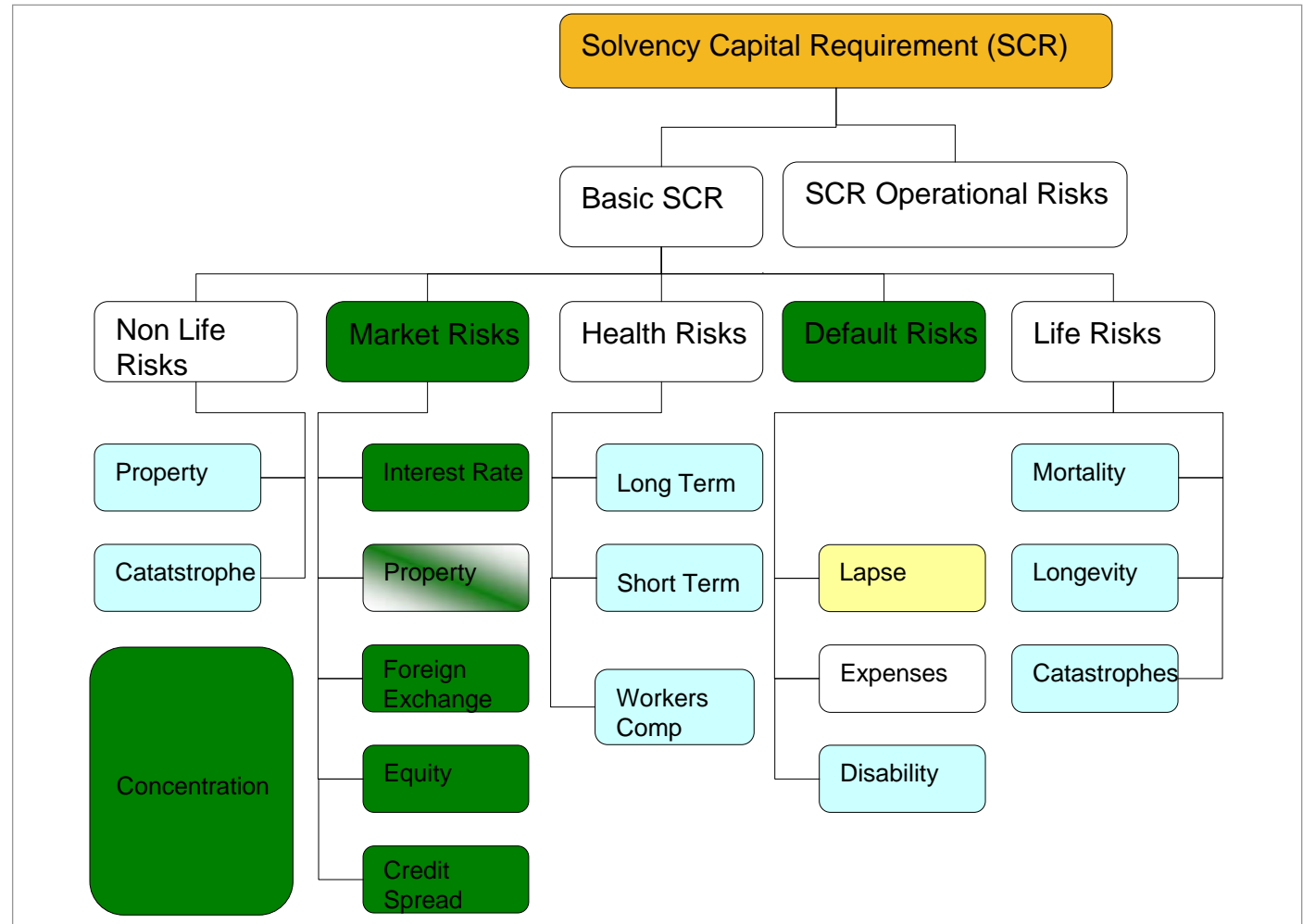
Section 1

Overview

Risks that can be Hedged in the Capital Markets

Based on proposed Solvency II's risk map

- Insurers' decisions to retain or hedge a particular risk should be, among other things, based on:
 - Is the risk predictable by the insurer?
 - Any statistical data/trend based on which to price the risk...etc?
 - Will the insurer be "rewarded" for taking certain risks, e.g. mortality risks
 - Do stakeholders of the insurers want or expect the insurer to take the risk?
 - Are the insurers likely to have enough free capital to absorb the loss should the risk move against the insurer?
 - Is the risk hedge-able, via reinsurance or capital market...etc?



Risks Hedgeable through traditional derivatives markets
Risks Transferrable to Capital Market through Securitization
Indirectly Hedgeable through traditional derivatives market

Assets, Liability and Capital

Under Proposed Solvency II

Calculation Overview

Assets

- Assets are valued at market value
- QIS 4 specifies that assets that are not currently held at market value should be revalued to fair value in accordance with the guidance provided in IAS 39

Liability

- Best estimate includes discretionary benefits
- Risk margin to cover non-hedgeable risks
- Cost of capital approach favoured in calculation of risk margin

Capital

- Solvency Capital Requirement (SCR) based on 1 in 200 year event (99.5th percentile)
- Some SCR reduction for management actions
- Minimum Capital Requirement (MCR) as floor
- Possible Pillar II ‘add-on’ to Solvency Capital Requirement

Solvency II Balance Sheet



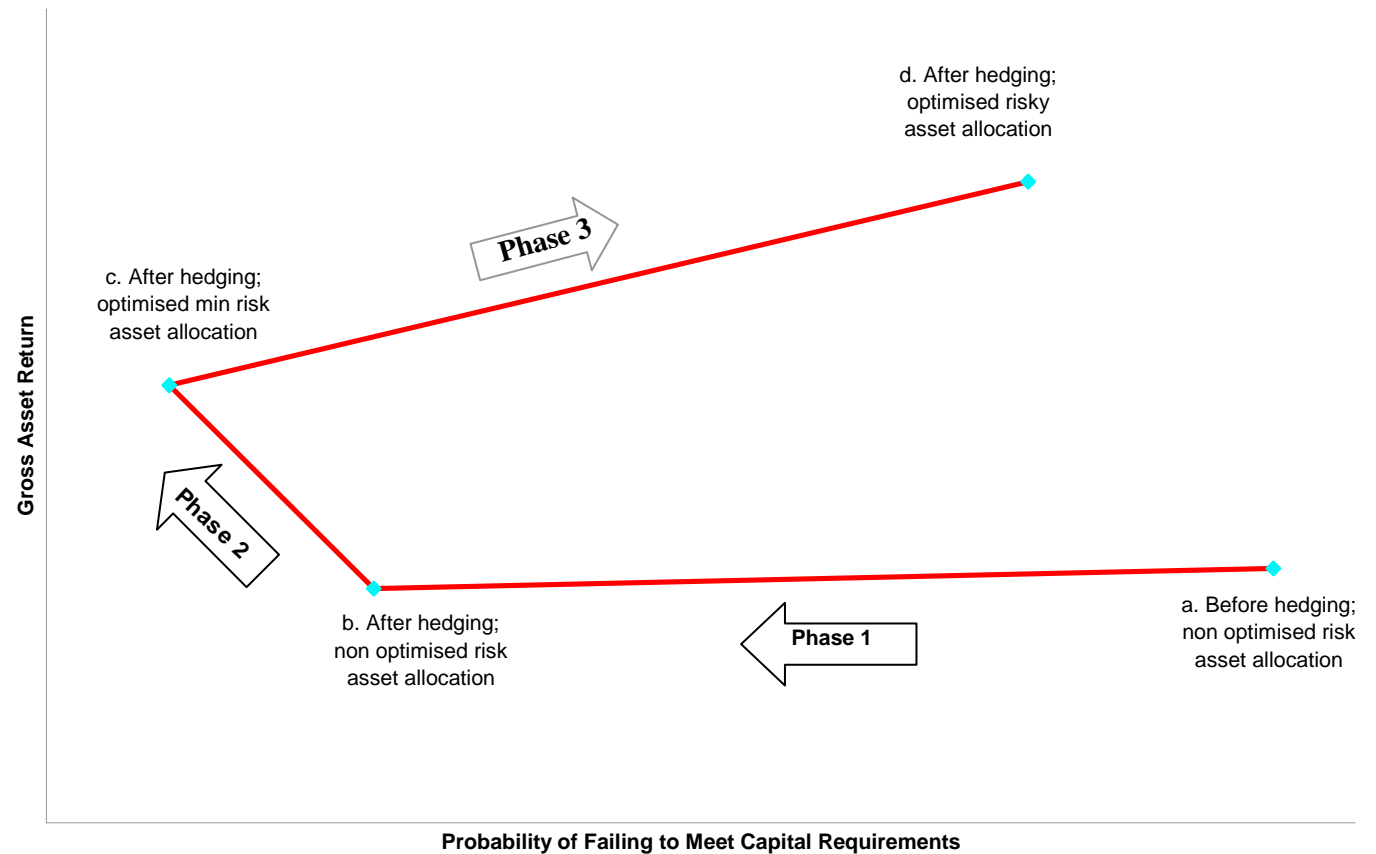
Section 2

ALM Approach

Return versus Risk: Where to Take Risk?

- Phase 1
 - Reduce duration / convexity risk, possibly through use of interest/inflation derivatives
 - Limited impact on expected return
- Phase 2
 - Maintain duration / convexity structure
 - Increase excess return via allocation to alternative assets
 - Diversification benefits lead to a further reduction in risk
- Phase 3
 - Risk budget has increased due to risk reduction in Phases 1 & 2
 - Increase risk to achieve higher asset returns

Risk Versus Return



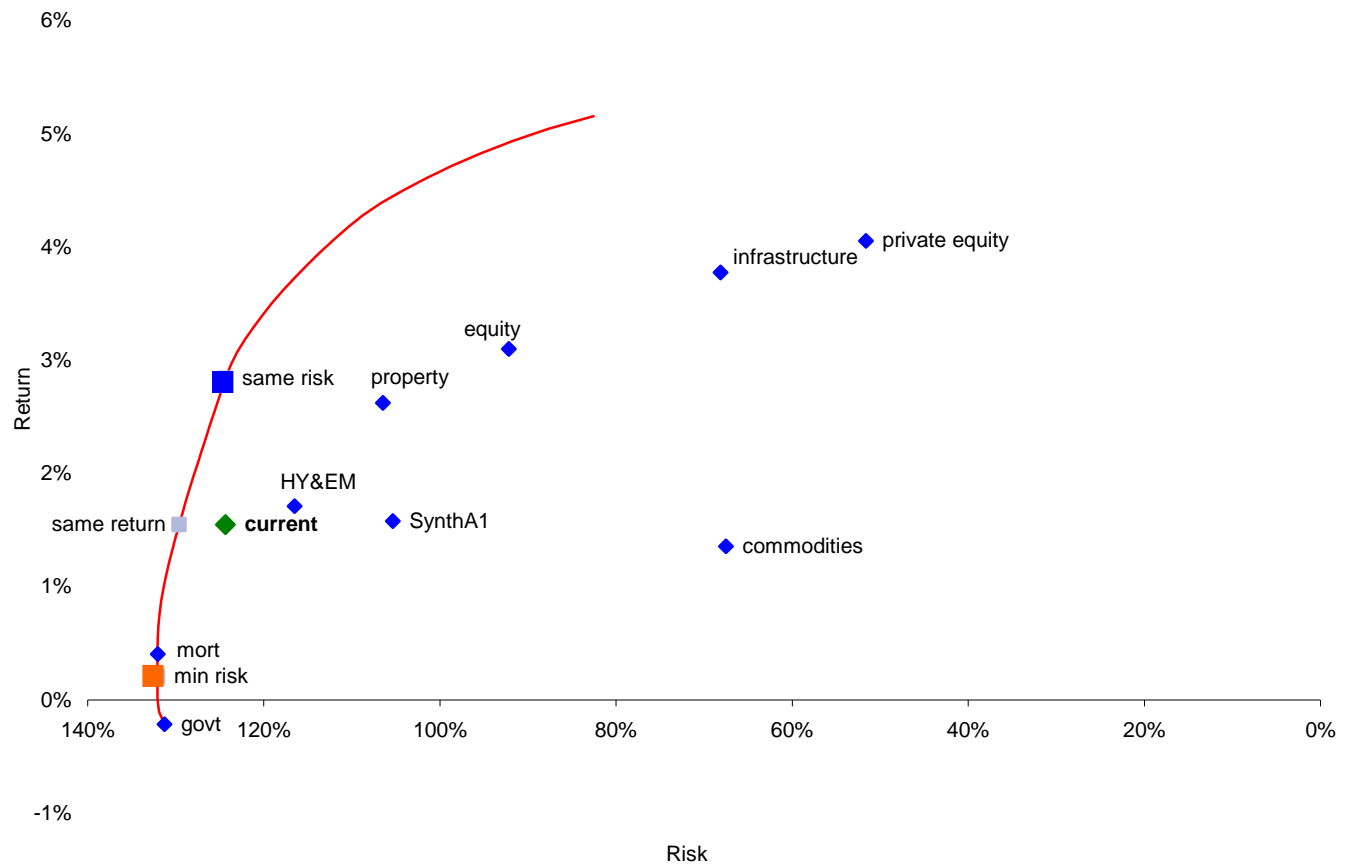
Efficient Frontier Output

10 Year Horizon

- For the chart on this page, the frontier is unconstrained, i.e. allocation to each asset class is allowed to vary freely
- Return on the vertical axis is defined as the mean log return in excess of EURIBOR
- Risk on the horizontal axis is defined as the mean of the worst funding ratio (Assets/Liabilities through time) in the worst 25% of scenarios
- The red frontier shows how the assets can be combined in order to minimise risk for a specified level of return
- The same return, same risk and min risk portfolios represent strategic allocations on the frontier

Efficient Frontier

Return = Average log geometric return above LIBOR; Risk = Mean pathwise capital in worst 25% of scenarios



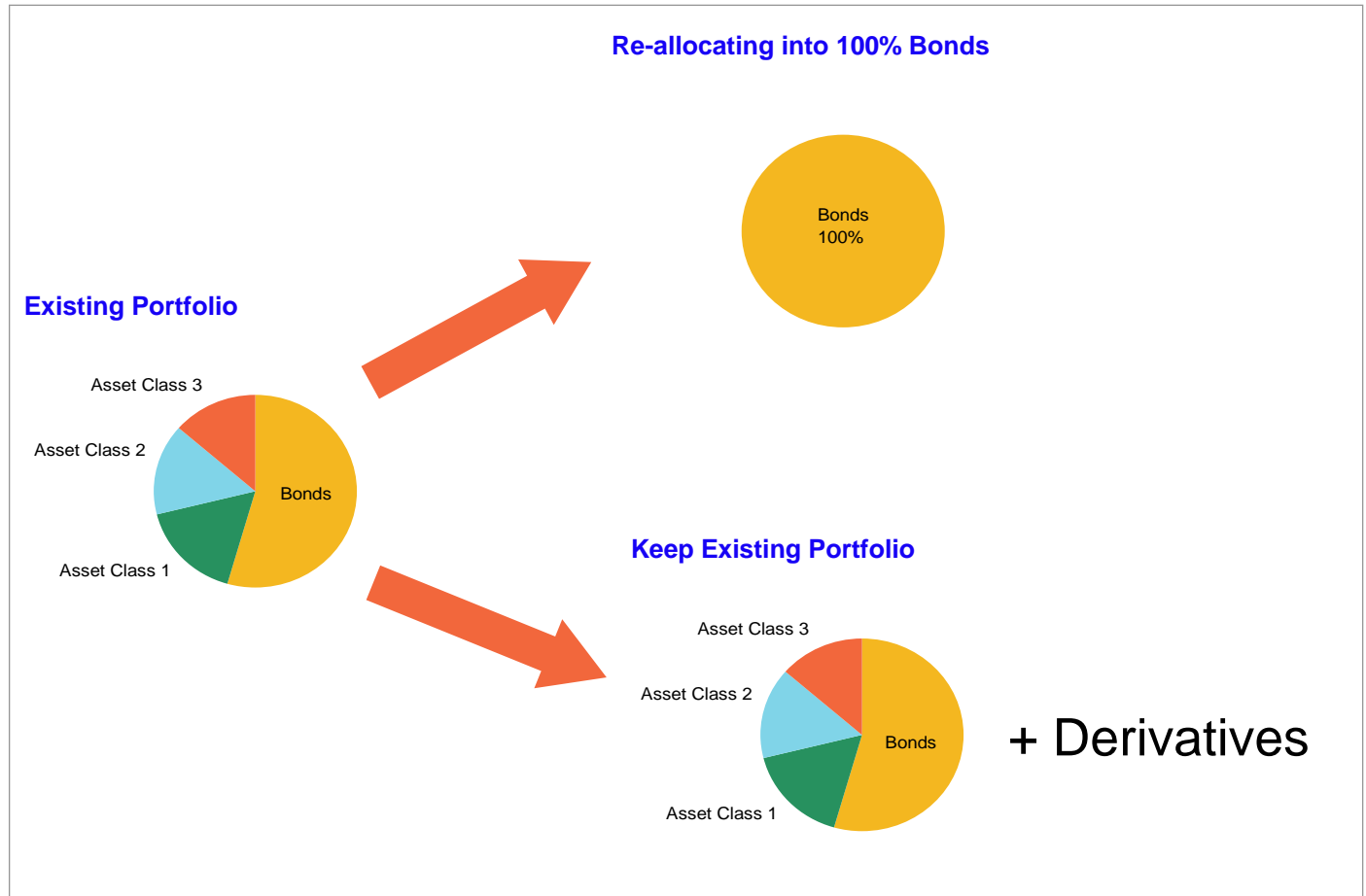
Section 3

Interest Rate Risk

So How to Remove Duration Mismatch

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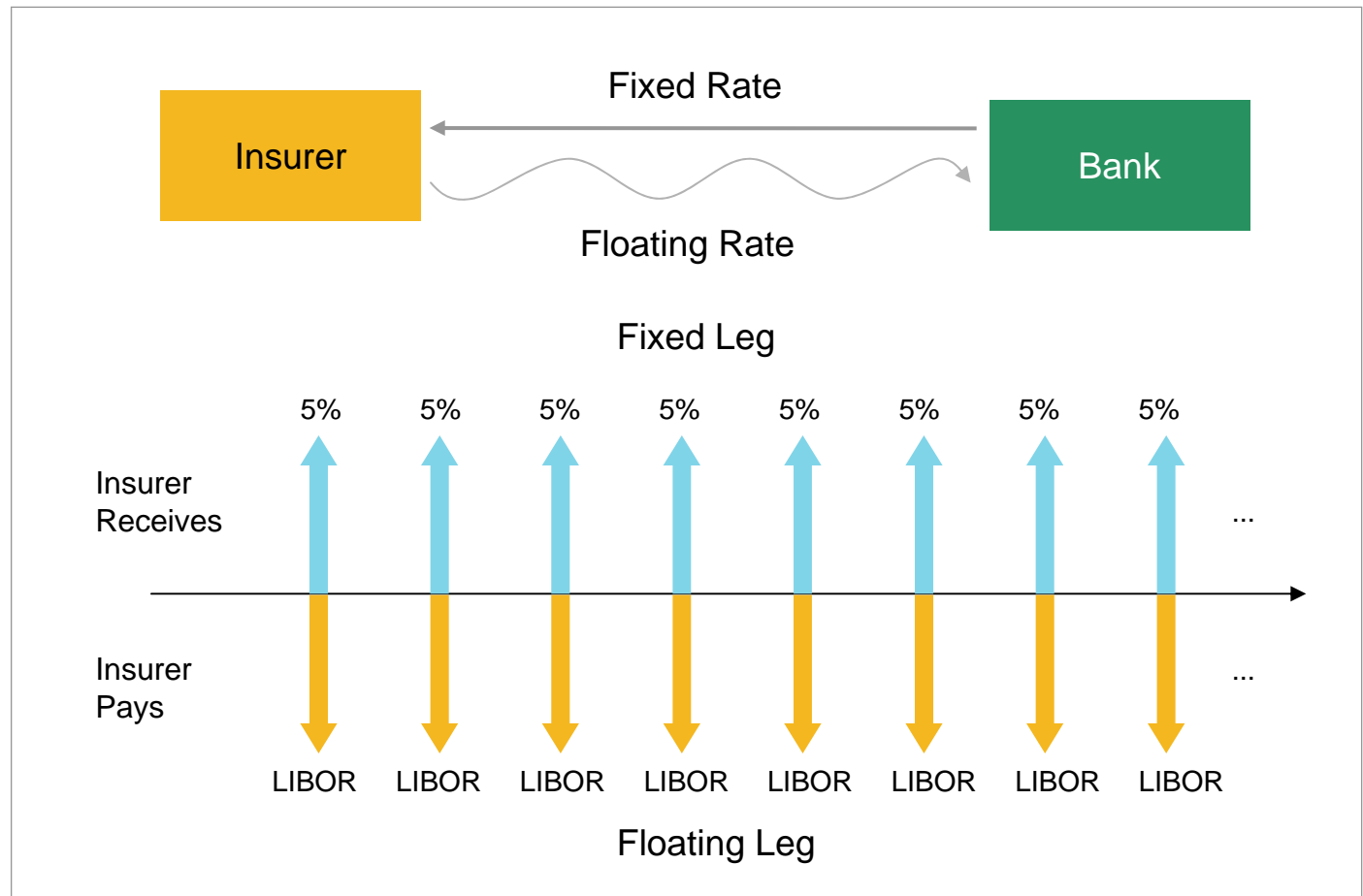
Notes

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What is an Interest Rate Swap

- Interest Rate Swaps are the most vanilla derivative instruments and have been in existence for more than 20 years
- The fixed rate, also known as the *swap rate*, is the weighted average of the expected LIBOR rates over the life of the swap
- An at-market swap as zero cost since the fixed leg and the floating leg has the same PV

Illustration of Mechanics



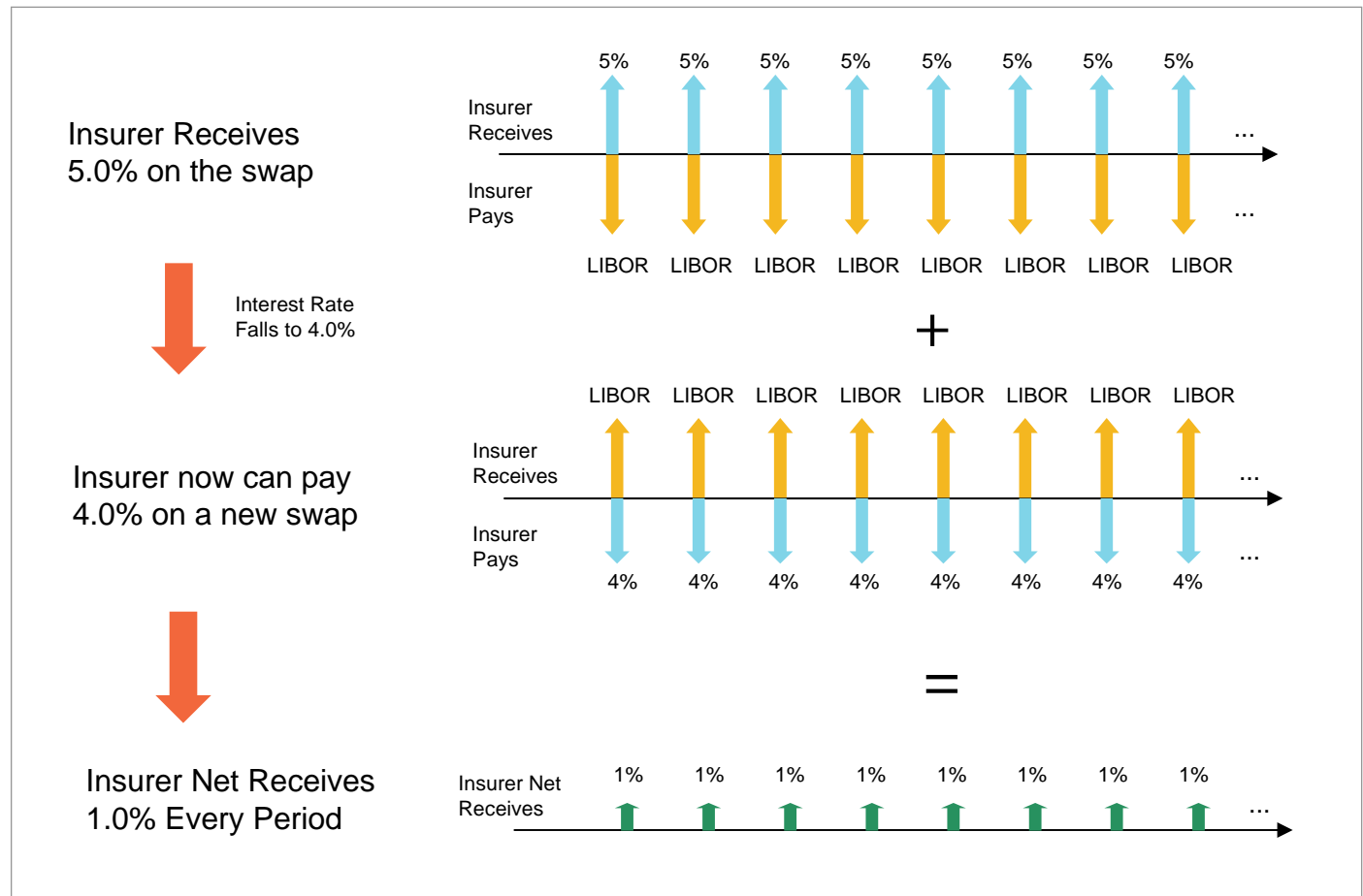
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Valuing an Interest Rate Swap

- The market value of an interest rate swap represents the PV of an annuity equivalent to the change in interest rates since the inception of the swap
- Economically, the interest rate sensitivity, i.e. duration, is the same as that of a fixed rate bond

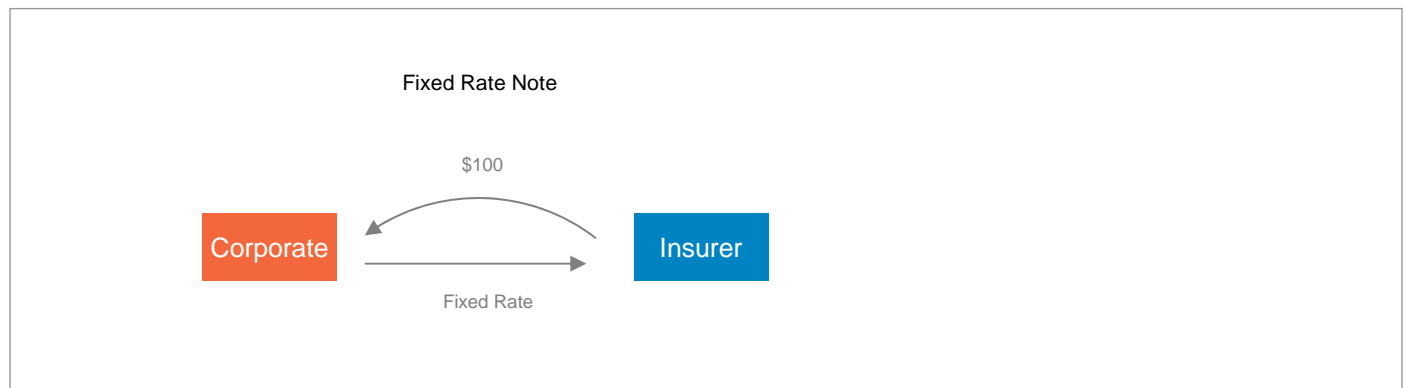
Illustration of Mechanics



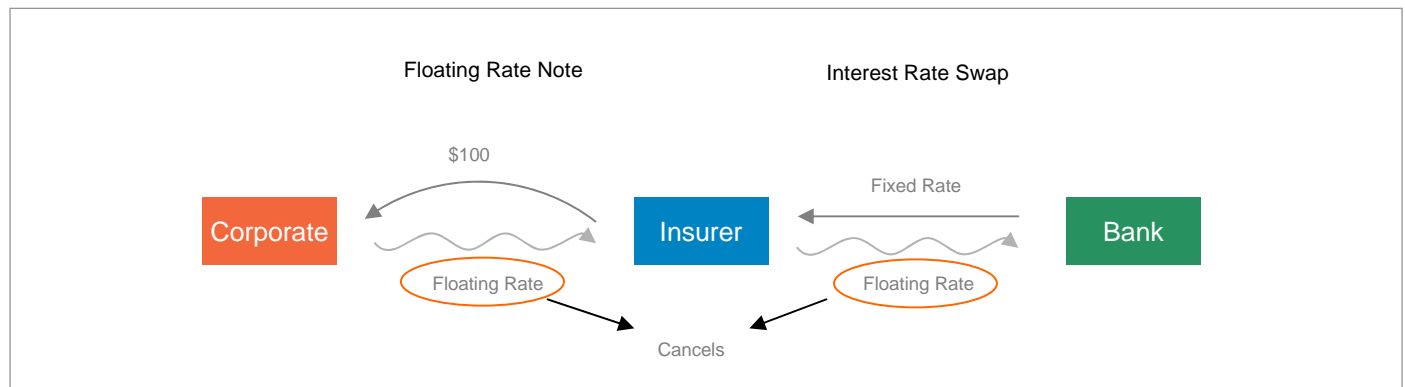
Duration of Swap = Duration of Fixed Rate Bond

- Option 1 and Option 2 have exactly the same cashflows
 - Therefore, they also have the same duration by definition
- Since a FRN has zero duration, it must be the case that the duration of an interest rate swap and the duration of a bond are exactly the same

Option 1: Buying a Fixed Rate Bond



Option 2: Buying a Floating Rate Bond and Enter into Interest Rate Swap



How do Swaps Help an Insurer's Balance Sheet...?

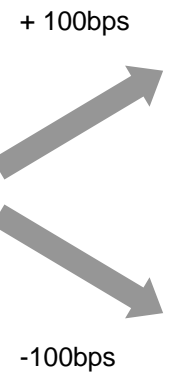
Illustration

Assumption:

Asset Value = 100
 Liabilities Value = 100
 Duration Mismatch = 10

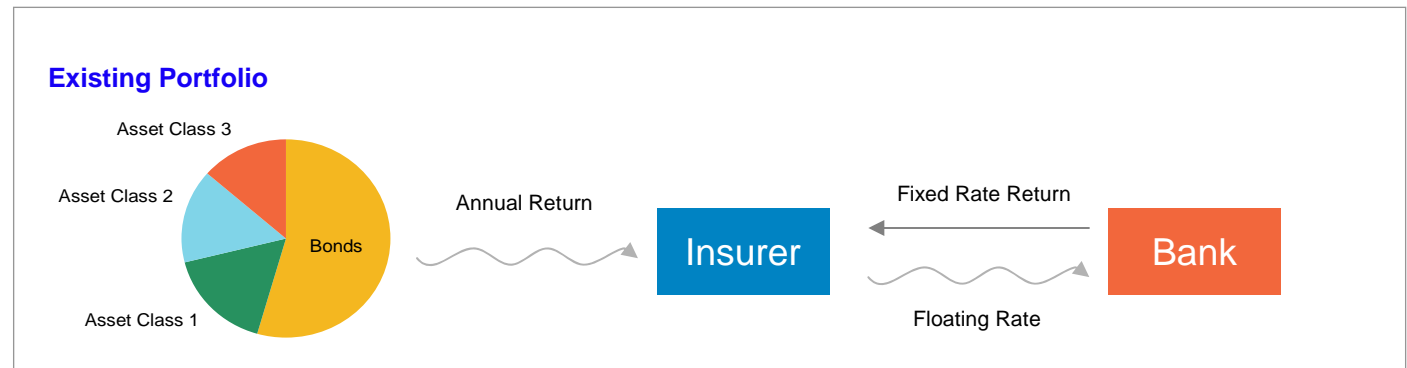


Derivative MTM = 0
 at inception of hedge



Putting it All Together...

Illustration



Advantage of this structure

- Do not have to dispose assets (equity, real estate, etc) at a time when valuations are low
- Duration mismatch can be solved quickly (i.e., no massive asset re-allocation needed)
- Separates duration considerations from investment decisions, maximizing investment efficiency

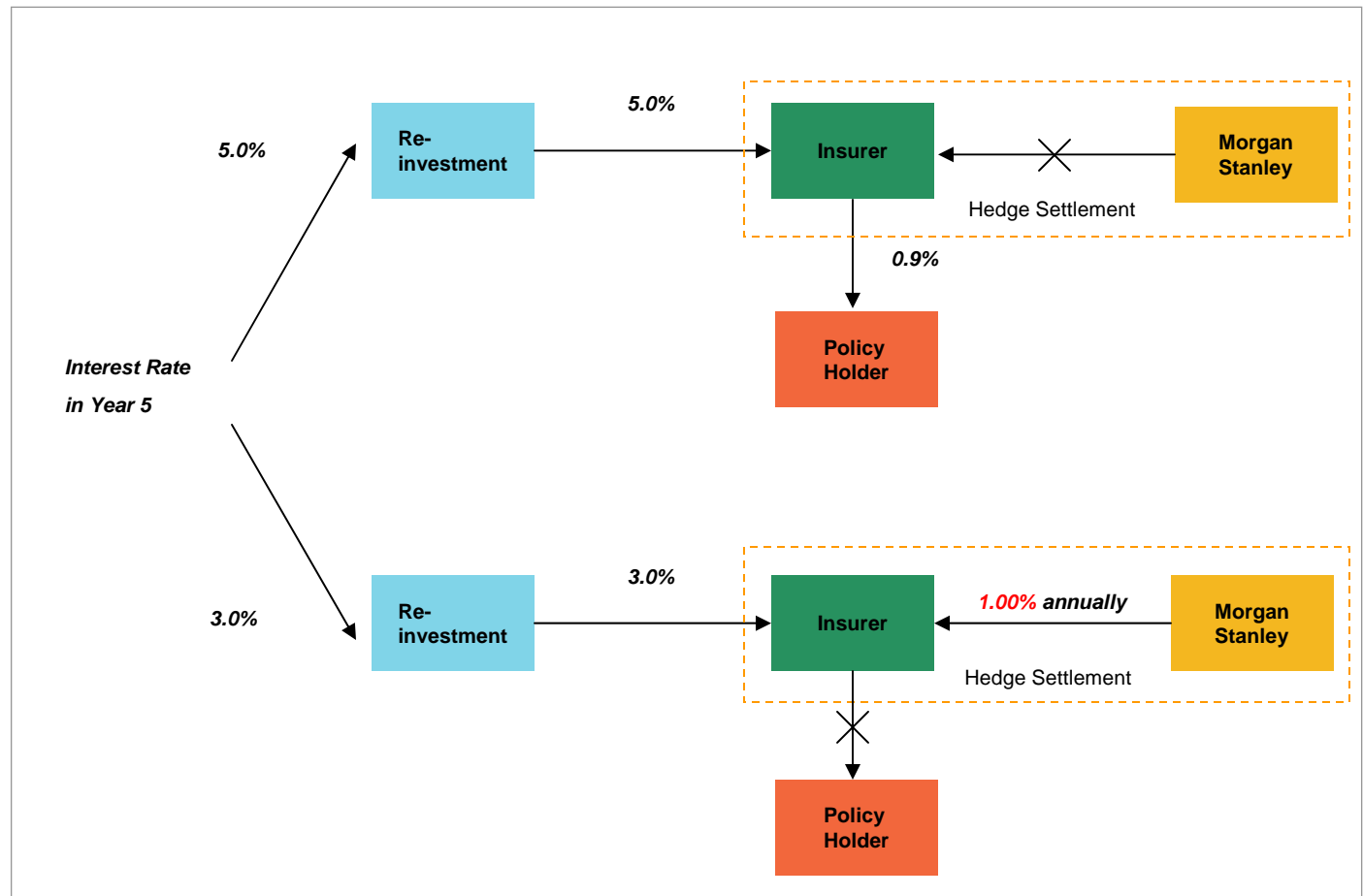
Consideration:

- Need to make sure accounting treatment is friendly

Hedging Asymmetrical Risk with Swaptions

- An option on interest rate swaps, or a *swaption*, can be used to hedge asymmetrical of re-investment risk
- Liability:
 - 10-year single premium policy which pays \$100 upfront and accrues at 1) 4% for the first 5 years and 2) a minimum of 4% but shares 90% of the upside if interest rates are above 4%
- Hedge:
 - The option (but not the obligation) to receive a fixed rate of 4% and pay floating rate for 5 years after the initial 5-year bond investment matures
- Result:
 - The asymmetrical *downside* risk can be totally eliminated

Hedging with a Swaption



Notes

1. For illustration purposes we assume a flat yield curve

Section 4

FX and Credit Risks

Making Investment Decisions

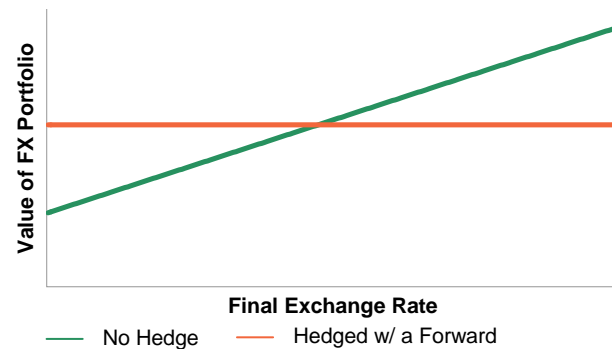
Separating FX and Investment Decisions

2008 Corporate Investment Grade Issuance

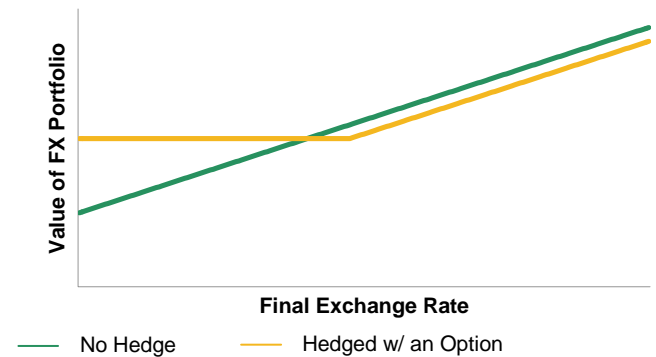


What to use: Forwards vs. Options

Hedging with FX Forwards



Hedging with FX Options

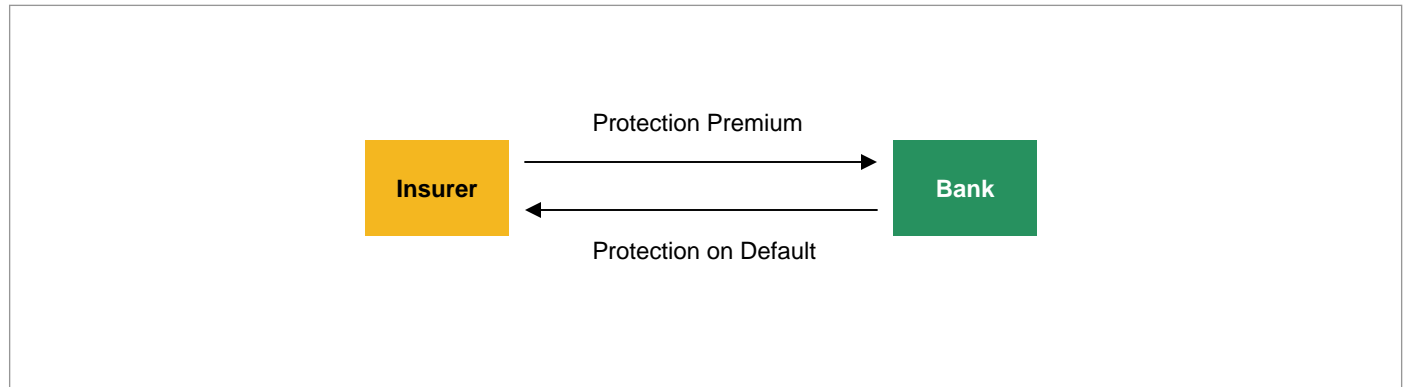


- Both options and forwards provide downside protection in a scenario where portfolio depreciates
- However, options allow the owner to benefit if portfolio currency appreciates
 - The asymmetrical payoff requires an upfront premium
- However, given that policy liabilities are mostly known and fixed, paying an upfront premium to maintain “redundant” upside may not be considered an optimal strategy

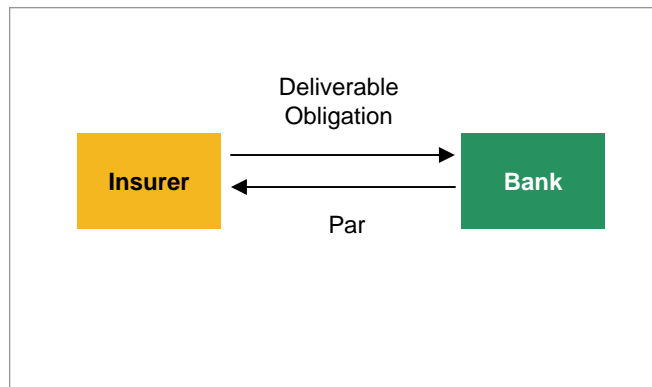
Credit Default Swaps

Mechanics

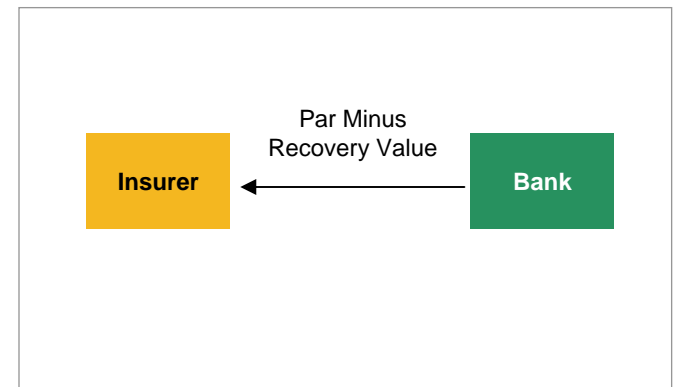
CDS Cashflows Before Maturity/Default



Physical Settlement in the Event of Default



Cash Settlement in the Event of Default



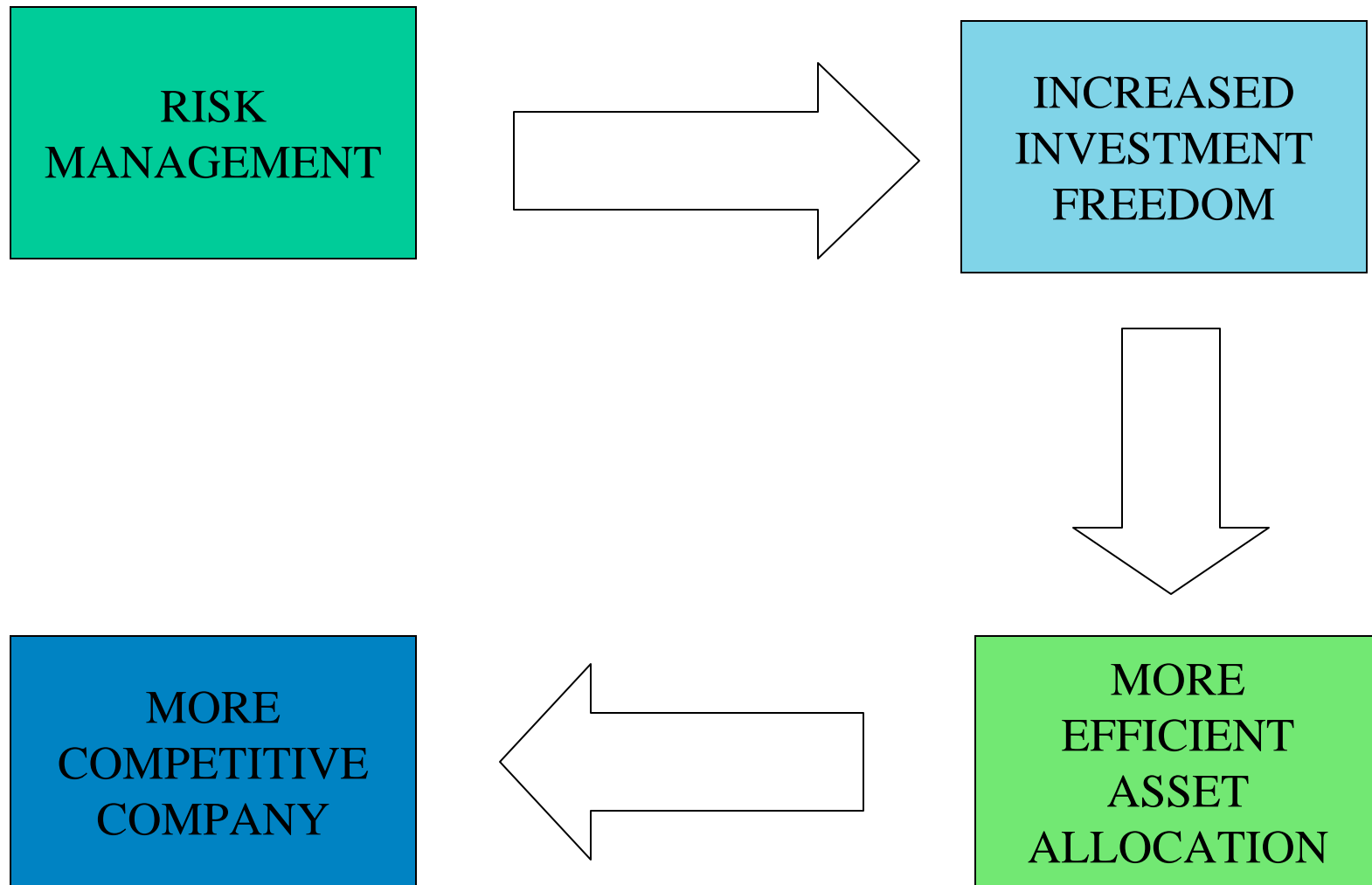
Section 5

Conclusion

CONCLUSION

Risk Management is about more than Risk Reduction

OTHER BENEFIT OF RISK MANAGEMENT



Section 6

Contact Information

CONTACT INFORMATION

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