

Derivatives for Directors

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Presentation Outline

- Regulatory perspective
 - Perspective, policies, process, procedures
- **“This stuff is not as hard as some people make it sound”**
 - Derivative types
 - Forwards, like a loan commitment
 - Futures, or standardized forwards
 - Swaps, a series of forwards
 - Options
- Research on Caps & Floors
- Completed Corridor transaction example
- Note on IRR reporting & hedge review

Regulatory perspective

- Perspective
 - **“A prudential derivatives strategy can offer considerable risk management benefits to an institution”** SRC Insights, Federal Reserve Board of Philadelphia, Q4 1999
- Policy, process, procedures
 - Banks should have established policies
 - Provided sample policy
 - Policies should include Board approved risk limits
 - Measure, manage, monitor, and control risks
 - Process and procedures should be well-documented

“This stuff is not as hard as some people make it sound”

- Look at gold and bond markets
- Analogy to LEGOS and building blocks



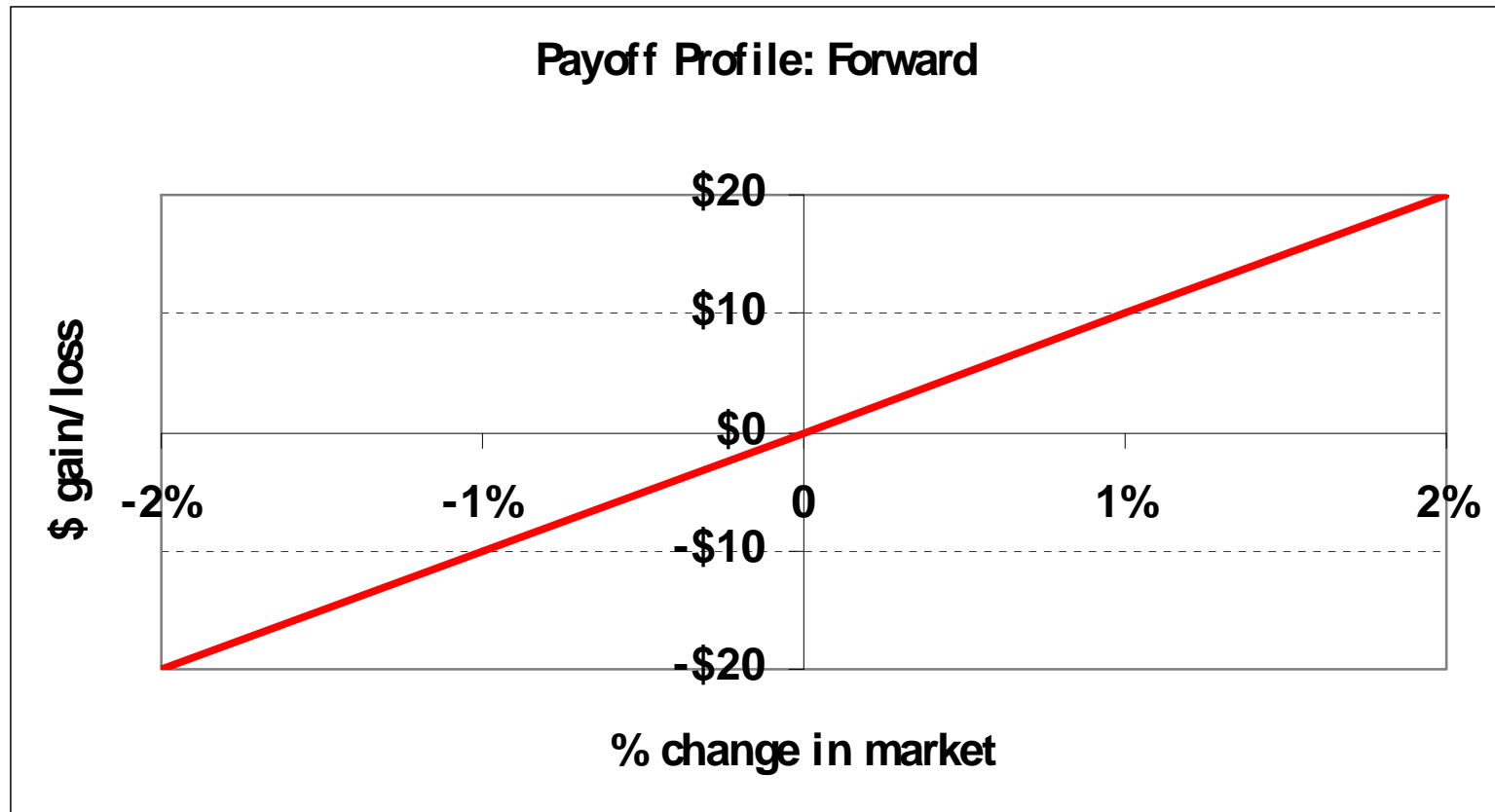
Gold: Physical, Forward, Futures

- Gold, \$400/oz.
 - You own an ounce of gold.
 - If the price goes go above \$400, you gain
 - If the price goes down below \$400, you lose
- Exchange of single future cash flows
 - You agree to buy an ounce of gold at \$400/oz. in the future. This is a contract, an over-the-counter contract (OTC)
 - If the price goes go above \$400, you gain
 - If the price goes down below \$400, you lose
 - You agree to buy an ounce of gold at \$400/oz. in the future from the Chicago Mercantile Exchange. This is an exchange-traded futures contract.
 - If the price goes go above \$400, you gain
 - If the price goes down below \$400, you lose

Forwards

- Forward market commitment
 - Agree to buy x at price y in 3 months
 - If price goes higher than y , bank gains
 - If price goes lower than y , bank loses
- Forward borrowing (from FHLB) commitment
 - Agree to borrow x at fixed rate y in 3 months
 - If rate goes higher than y , bank gains
 - If rate goes lower than y , bank loses

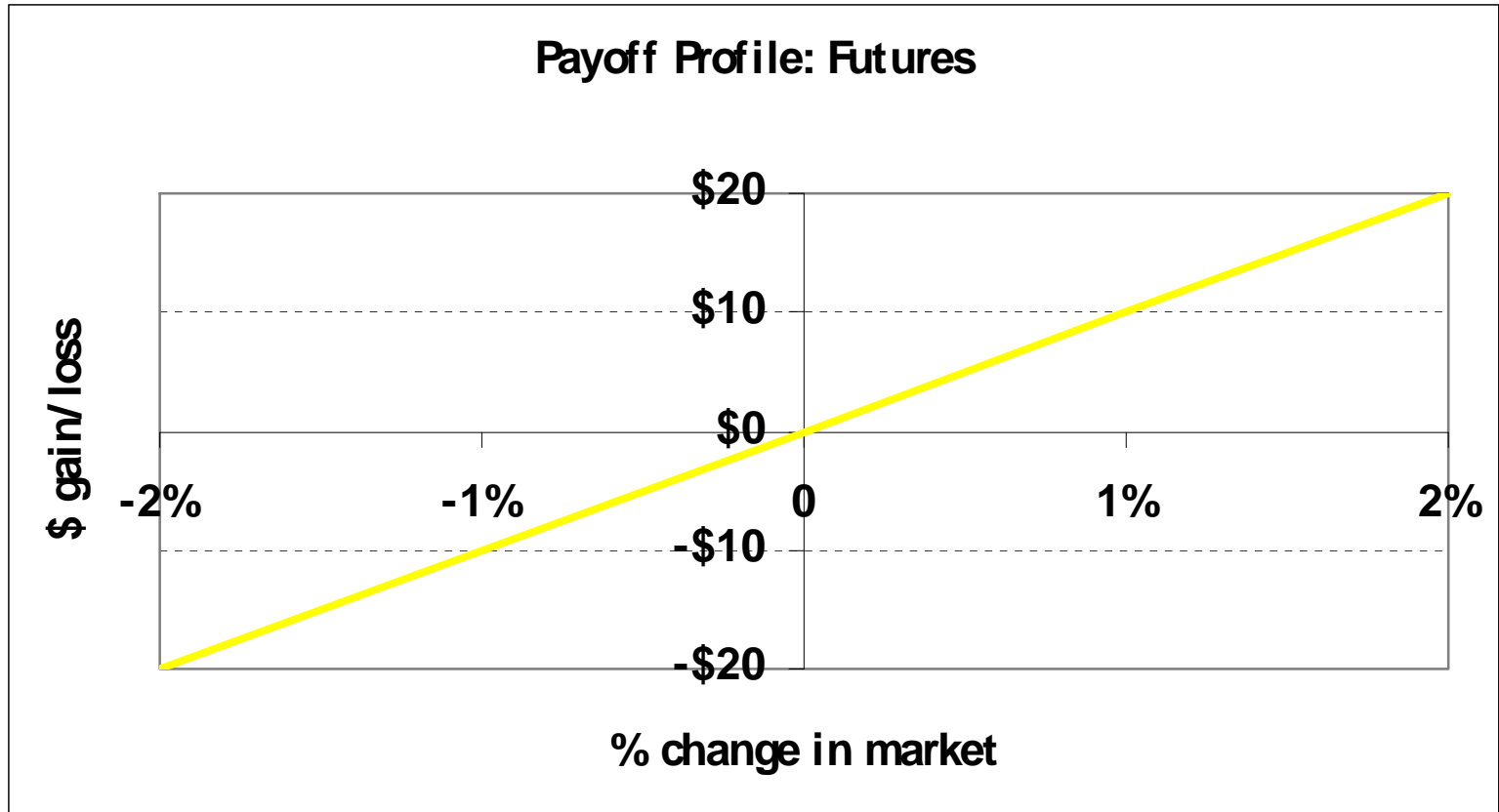
Payoff Profile: Forwards



Futures: Standardized Forwards

- Futures market
 - Agree to buy x at price y in 3 months
 - If price goes higher than y , bank gains
 - If price goes lower than y , bank loses
- Futures rate
 - Agree to sell fixed rate y at price x in 3 months
 - If rate goes higher than y , bank gains
 - If rate goes lower than y , bank loses

Payoff Profile: Futures



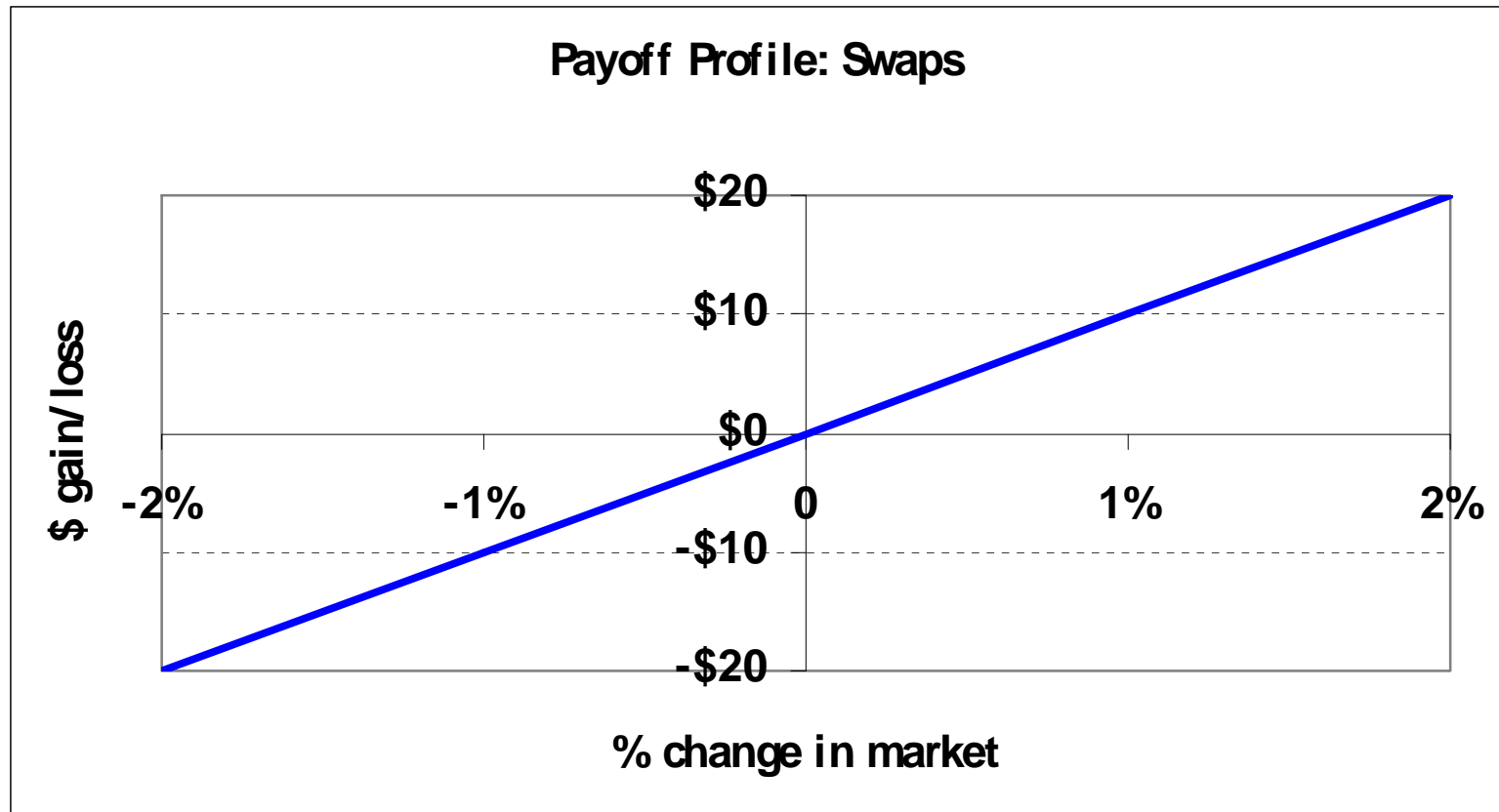
Derivative types

- Contractual cash exchanges
 - Forwards (red Lego)
 - Futures (yellow Lego)
 - Swaps (blue Lego)
- Optional cash exchanges
 - Options (green Lego)
 - Caps, Floors
 - Swaptions

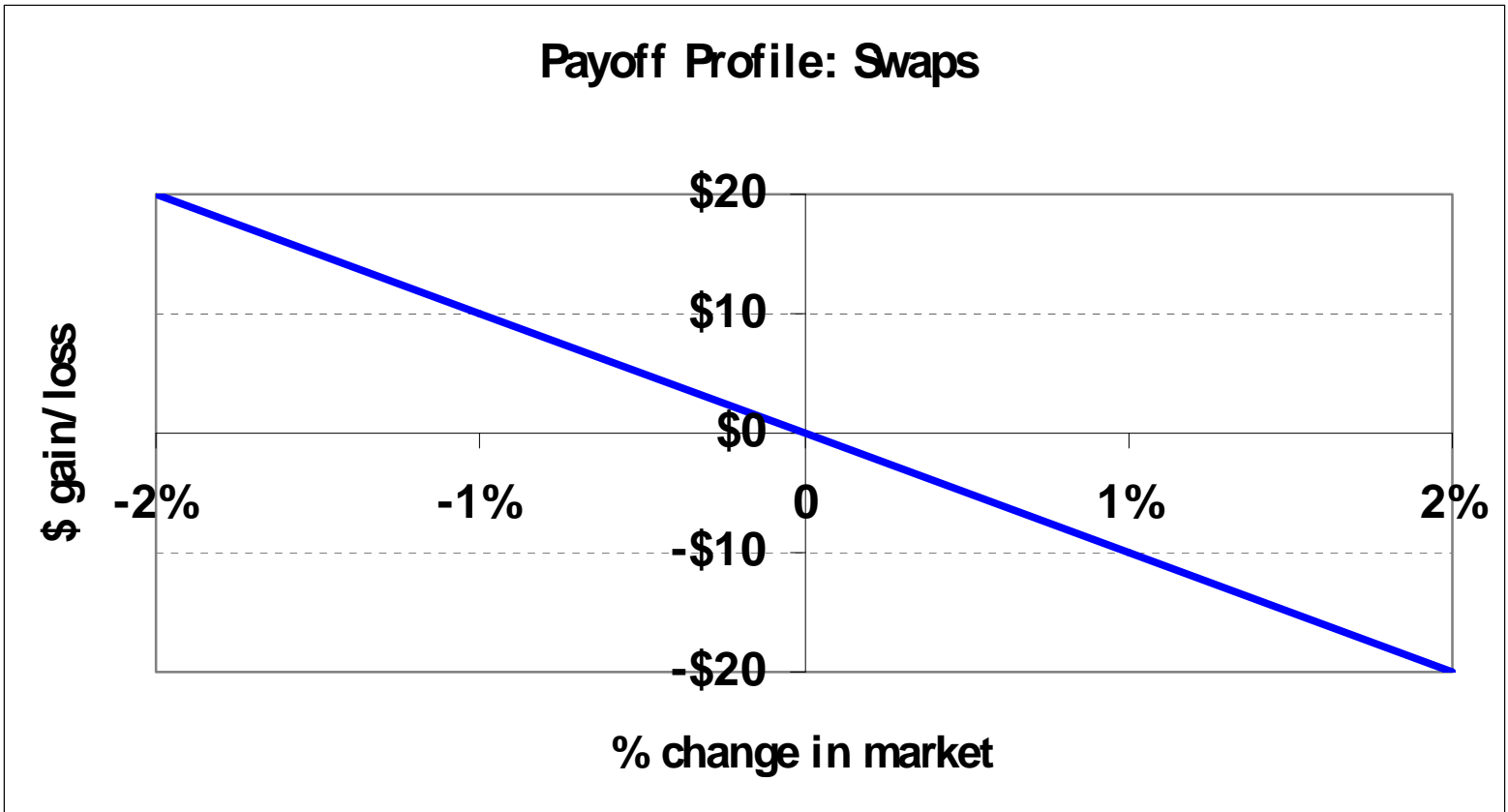
Swaps: A series of Forwards

- Swaps market (two cash flows)
 - Agree to exchange (swap) cash flow x for cash flow y in 3 months
 - If price of x goes higher than y , bank gains
 - If price of x goes lower than y , bank loses
 - Swaps are just a series of quarterly forwards
- Swaps rate
 - Agree to exchange (pay) fixed rate x , for (receive) floating rate y for in 3 months
 - If rate y goes higher, bank gains
 - If rate y goes lower, bank loses
 - Swap payer usually refers to fixed rate payer

Payoff Profile: Swaps Receiver



Payoff Profile: Swaps Payer



Swaps: Comparison to Bond Market

- Enter into a Receive Fixed Swap Agreement
 - Agree to receive 5 year swap rate based on \$1 million notional
 - Receive 5 year swap rate = 3.55%
 - Pay at 3 month LIBOR based on \$1 million notional
 - Costs 3 month LIBOR = 1.17%
 - Spread is $3.55\% - 1.17\% = 2.38\%$
 - What happens when rates change?
 - If rates go up, the spread narrows, the bank loses income
 - If rates go down, the spread widens, the bank gains income

Swaps: Comparison to Bond Market

- Bond market
 - Purchase a \$1 million 5 year FHLB bond.
 - Yields 5 year swap rate (3.55%) + 5 bps = 3.60%.
 - Borrow \$1 million at 3 month LIBOR
 - Costs 3 month LIBOR (1.17%) + 5 bps = 1.22%
 - Spread is $3.60\% - 1.22\% = 2.38\%$
 - What happens when rates change?
 - If rates go up, the spread narrows, the bank loses income
 - If rates go down, the spread widens, the bank gains income
- Note that the 5 bps spread on both sides nets to 0:
 - Net effect is to receive 5 year swap rate and pay 3 month LIBOR.
 - Same cash flows as an interest rate swap.

Forwards, Futures, and Swaps

- **Payoff profiles are the same**
- Contractual obligation to deliver or exchange something
- They differ in amount of credit (default) risk
 - Forwards and swaps are customized contracts
 - Counterparty risk
 - Futures are standardized and exchange-traded
 - Daily mark-to-market
 - Risk of exchange

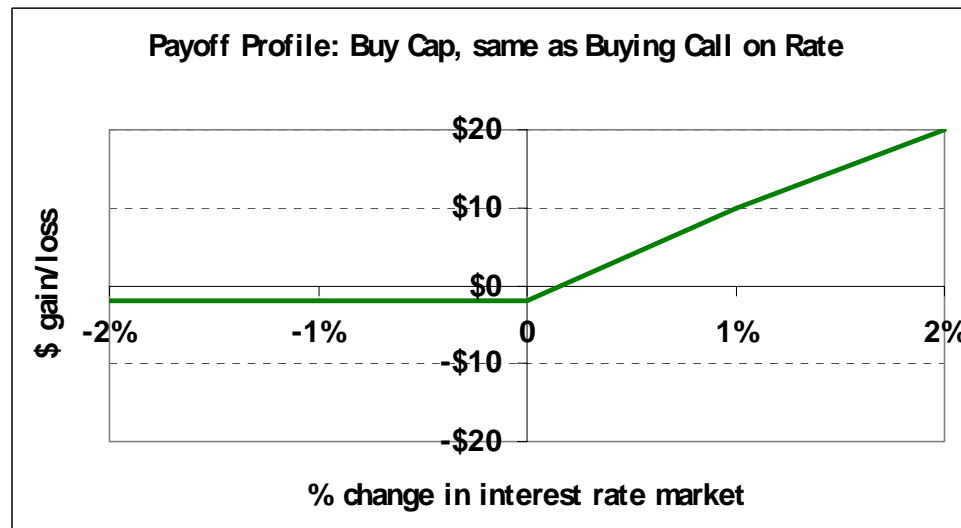
Options

- Options give the owner a right to something, not an obligation
- Only exercise when in your favor
- Can be looked at as an insurance cost
- Can be created from a combination of:
 - Forwards and risk-free securities (Treasuries)

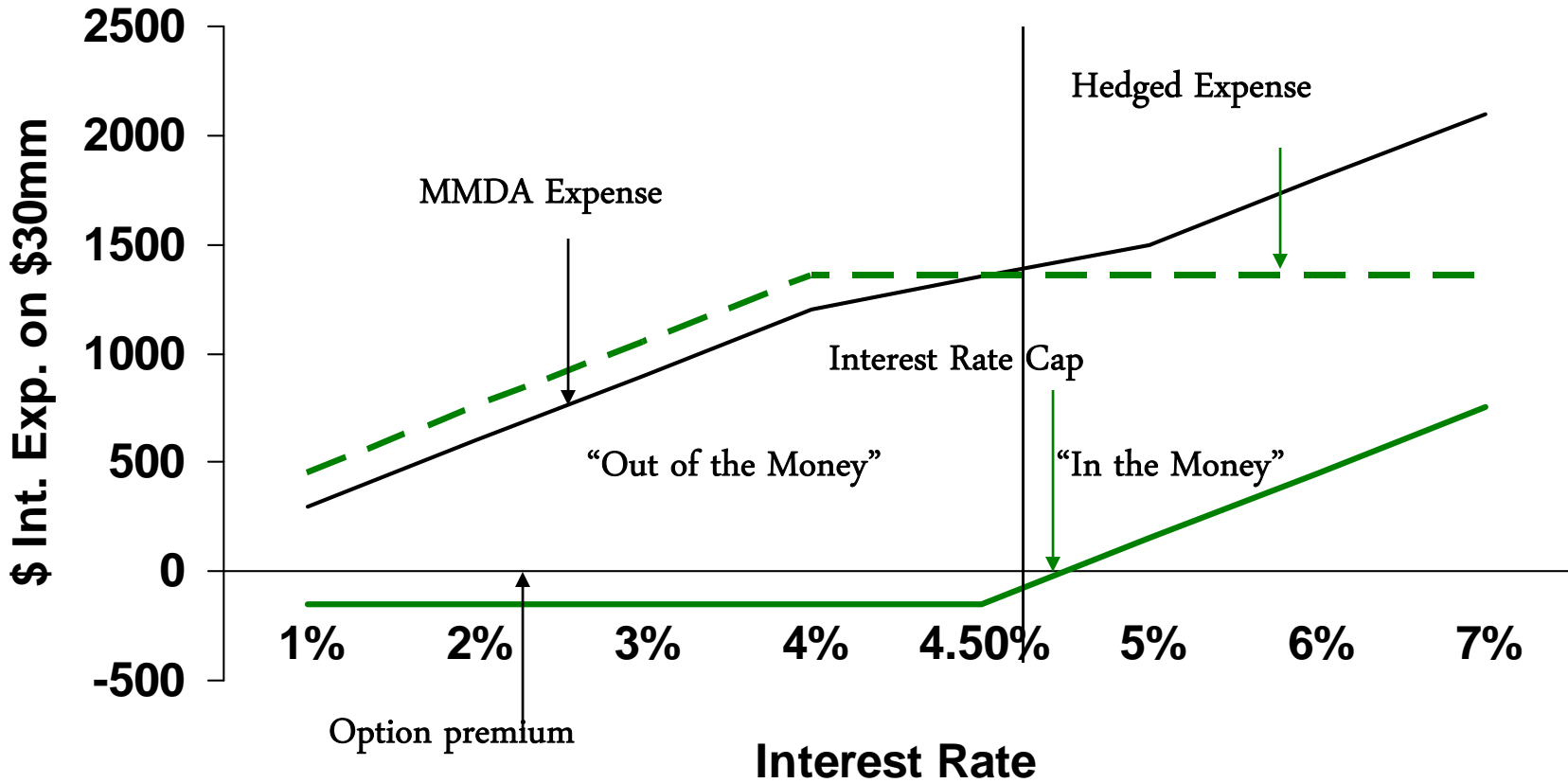
Options: Calls & Rate Caps

- Call Option
 - Potential to buy x at price y in 3 months?
 - If price of x goes higher than y , bank gains
 - If price of x goes lower than y , bank does nothing
- Call on Rate is a Rate Cap
 - Potential to receive rate spread x , if rates go higher than y in 3 months
 - Cap has an upfront premium, like insurance
 - If rate goes higher than rate y , bank gains
 - If rate goes lower than rate y , bank does nothing

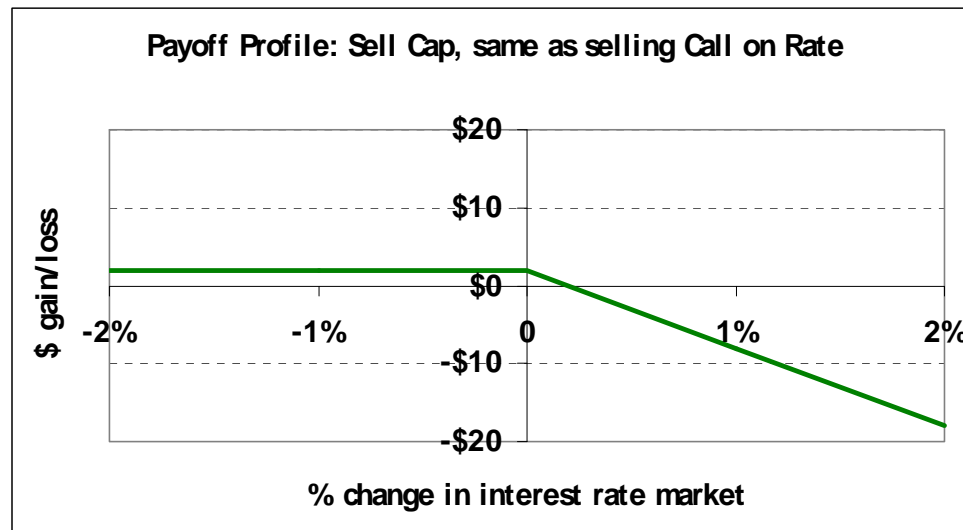
Payoff Profile: Buy Cap



MMDA & 4% Cap: \$30 million



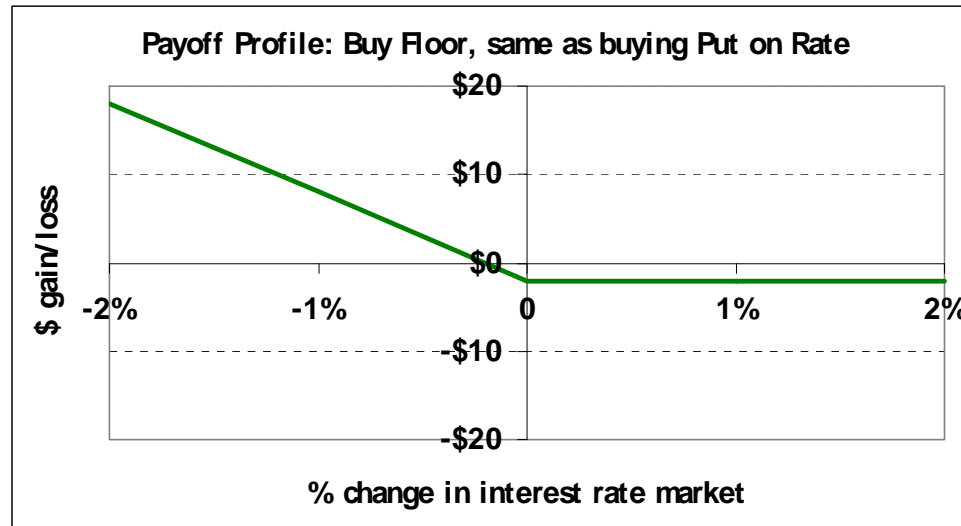
Payoff Profile: Sell Cap



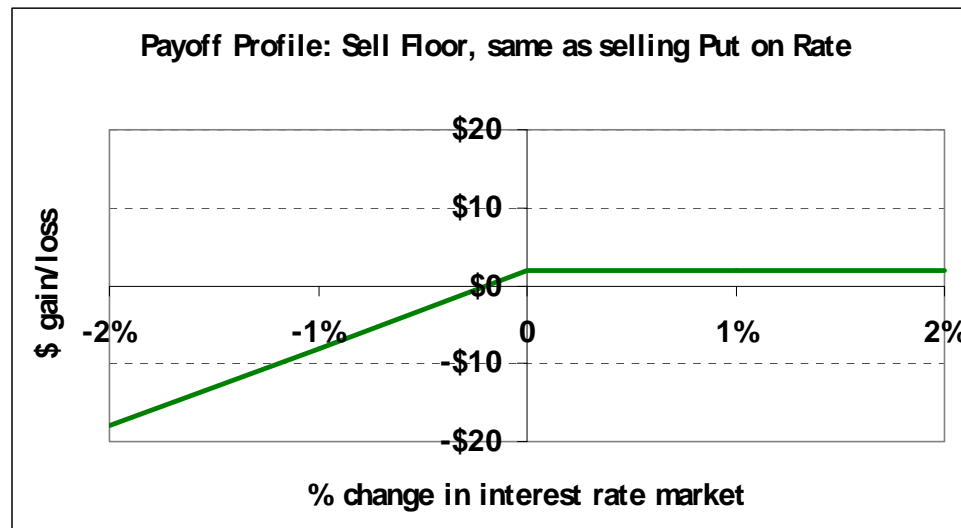
Options: Puts & Rate Floors

- Put Option
 - Potential to sell x at price y in 3 months?
 - If price of x goes lower than y , bank gains
 - If price of x goes higher than y , bank does nothing
- Put on Rate is a Rate Floor
 - Potential to receive rate spread x , if rates go lower than y in 3 months
 - If rate goes lower than rate y , bank gains
 - If rate goes higher than rate y , bank does nothing

Payoff Profile: Buy Floor



Payoff Profile: Sell Floor



Research on Caps & Floors

- 10 years 1991-2001
 - 1 year forward 3 month LIBOR is biased estimator
 - **Forward is too high 75% of time by 75 bps**
- Results, 10 yr. annualized return on:
 - **Buying “at the money caps” = -98%**
 - **Buying “at the money floors” = 43%**
 - Source: DB Global Markets

“This stuff is not as hard as some people make it sound”

- You know now how derivatives work
- Consideration of transaction costs (premiums) shift payoff lines up & down
- Consideration of differences left & right
- Combinations of blocks represent derivatives



LEGOs & Financial Engineering

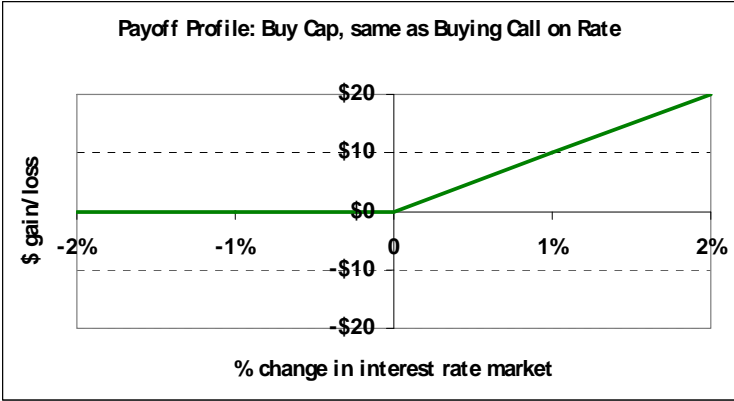
- You can build lots of stuff from putting LEGOs together
 - Buildings
 - Cartoon characters



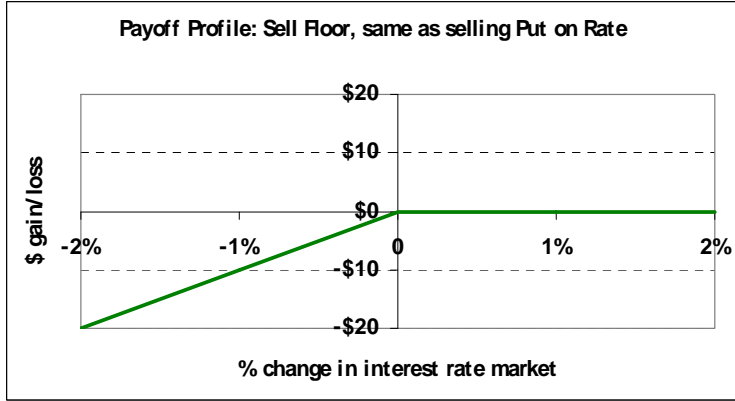
LEGOs & Financial Engineering

- You can build lots of stuff from putting derivatives together
- Options
 - **Buy cap + sell floor = Buy forward**
 - Sell cap + buy floor = Sell forward
 - Buy cap + sell cap = Corridor
 - Buy cap + option = Capton
- Swaps
 - Swap + forward = Forward swap
 - Swap + option = Swaption
 - **Fixed rate loan + pay fixed, receive floating swap = Floating rate loan**

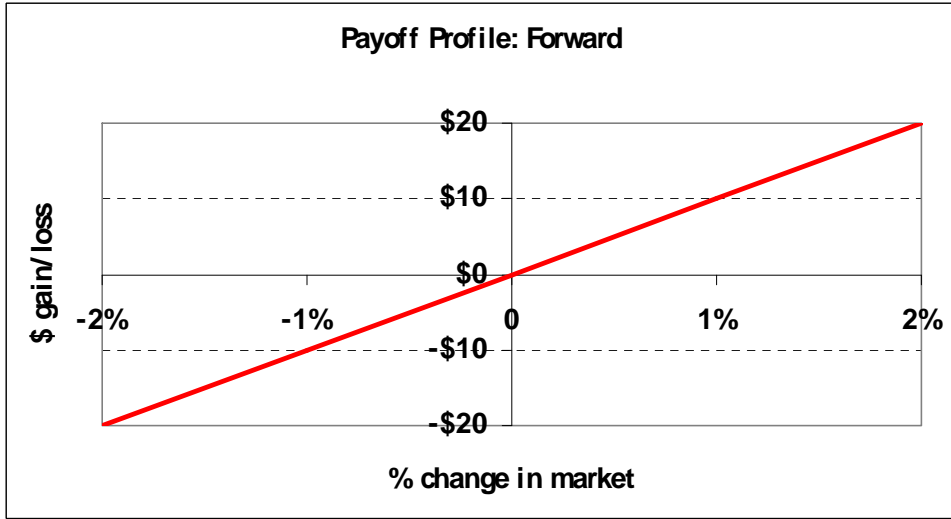
Buy cap + sell floor = Buy forward



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Combining option types

- Corridor
 - Buy cap at a lower strike & sell cap at a higher strike
- Collar
 - Buy a cap at a higher strike & sell a lower floor
- Swaption
 - Call or payer swaption, buyer has the right to become the fixed rate payer
 - Put or receiver swaption, buyer has the right to become the floating rate payer
 - Used to hedge mortgages and mortgage servicing

Thank you

Questions?

Comments?

Disclaimer & Sources

- Sources:

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- Smith, Smithson, Wilford, “Managing Financial Risk”, HarperBusiness, 1990
- Wilmott, “Quantitative Finance”, John Wiley & Sons, 2001
- Poorman, “Forward Rate Bias With Applications for Hedging”, Bank ALM, 2002