

Quant Quiz: World Series Derivative

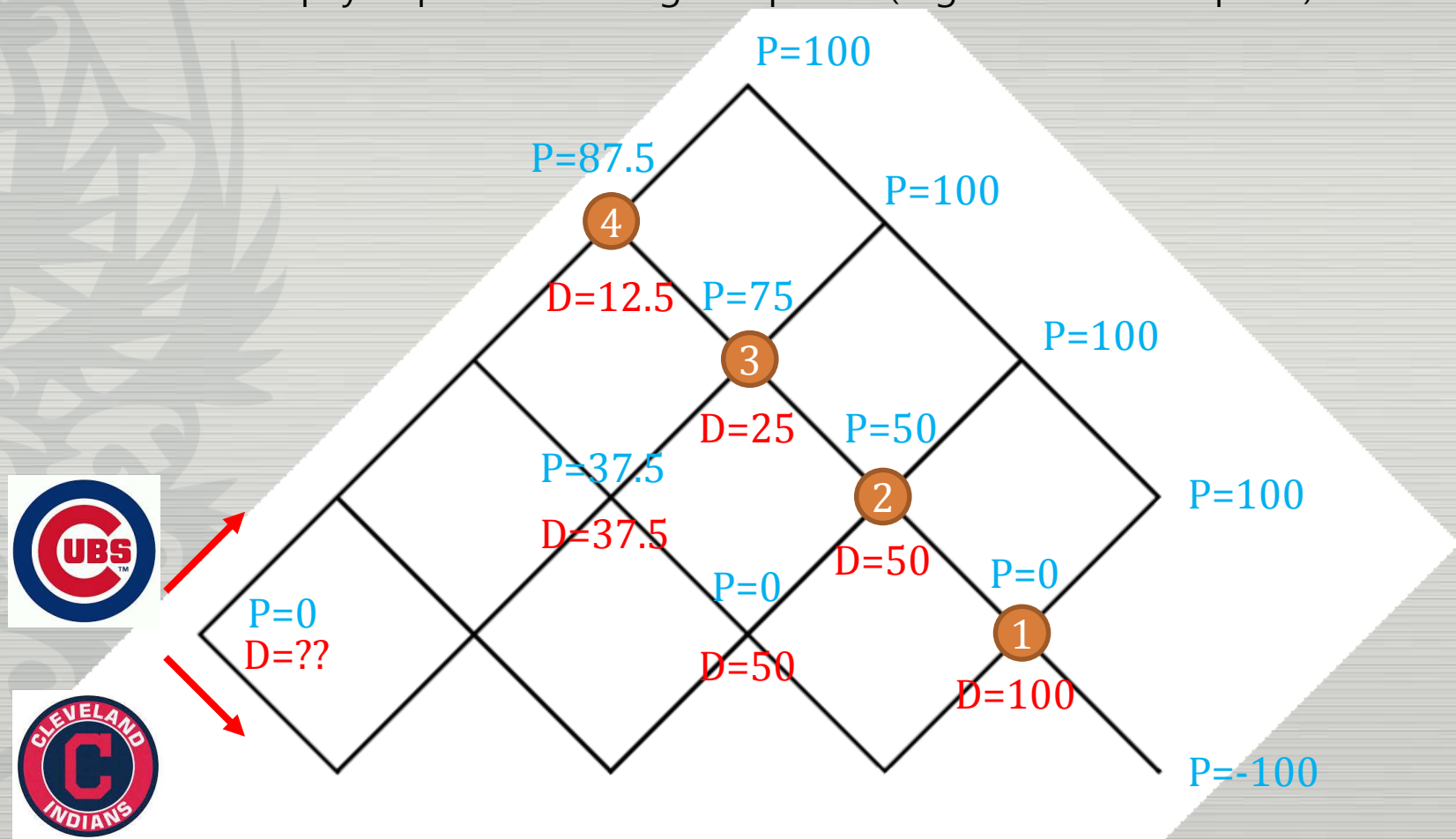


VS



- **Chicago Cubs vs Cleveland Indians (2016)**
- **Each game: underlying asset market**
 - ▣ You do 1-on-1 bet on each game with someone
 - ▣ Equivalent to broker/dealer market in finance
- **The World Series: derivative**
 - ▣ 4 wins out of 7 games
 - ▣ You get 100 if your team becomes the champion, lose 100 otherwise
- **How can you hedge the derivative using the bet on each game ?**

- Solve from back to front (Backward Induction)
- Finite Difference – Numerical PDE method
- Application
 - What if the probability is p vs $1-p$?
 - What if 51 wins out of 101 games ?
 - What if the pay depends on the game points (Digital vs Linear Option)

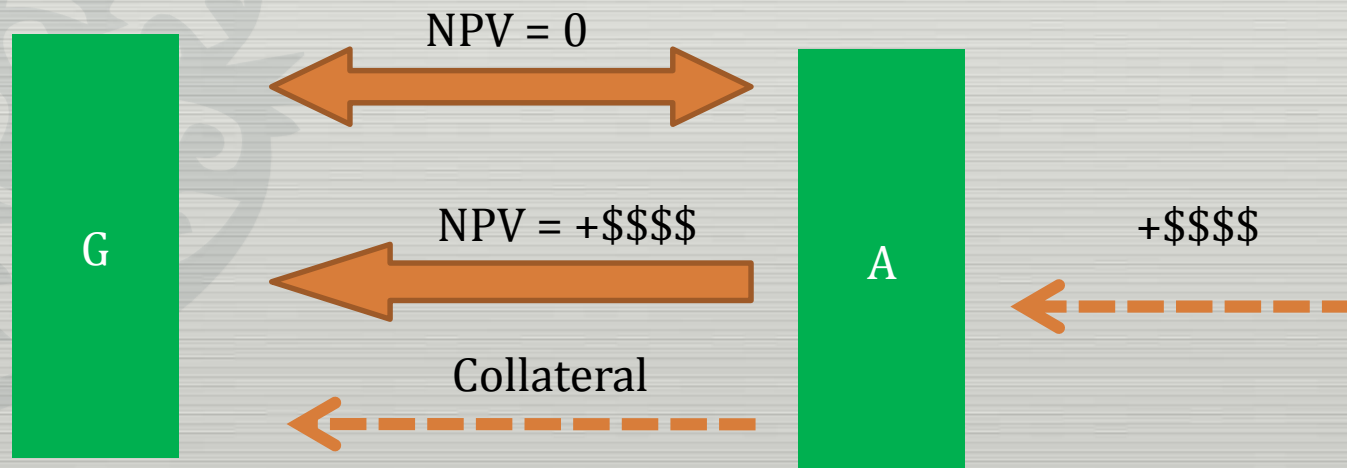


Some features of OTC derivative

- OTC (Over the counter), Bilateral (1:1): highly customized and non-standard
- High Leverage: zero initial cost for trading (Derivative vs Cash)
- Pricing model does NOT predict market (sell-side)
The model accurately adopts the underlying asset's market price
- Risk management begins from day 1 of the trade
- Derivative trading can disturb the underlying asset market
'tail wagging the dog'

Collateral Agreement

- **Derivative is a loan with variable value (even direction can change)**
- **Required to post collateral based on the current value**
 - ▣ Credit Support Annex (CSA) to ISDA master agreement
- **Counter-party's credit risk reduced → More trade, better liquidity**
- **Bilateral / Clearing house trades all requires collateral**
- **Fixed Income: market value significantly depends on the quality of the collateral**
Collateral Quality → Funding Cost → Pricing
- **Collateral: Cash, Treasury Bond, Stock, Currency ... Basket of all !**



Clearing House

- OTC / Bilateral Trade → Standardization of trade / Clearing House
- Risk netting, Collateral Posting, Standardized Valuation
- Mandatory reporting of trade: Swaps Data Repository
- Risk Compression / Tri-optima

