Introduction to options

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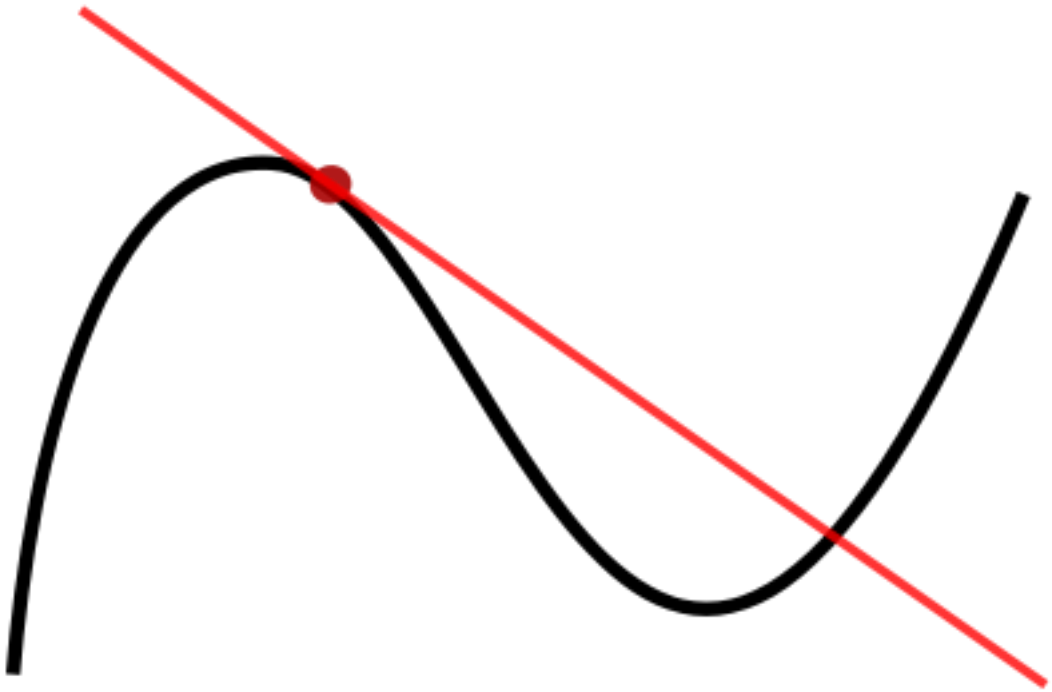
OPTIONS: DEFINITIONS

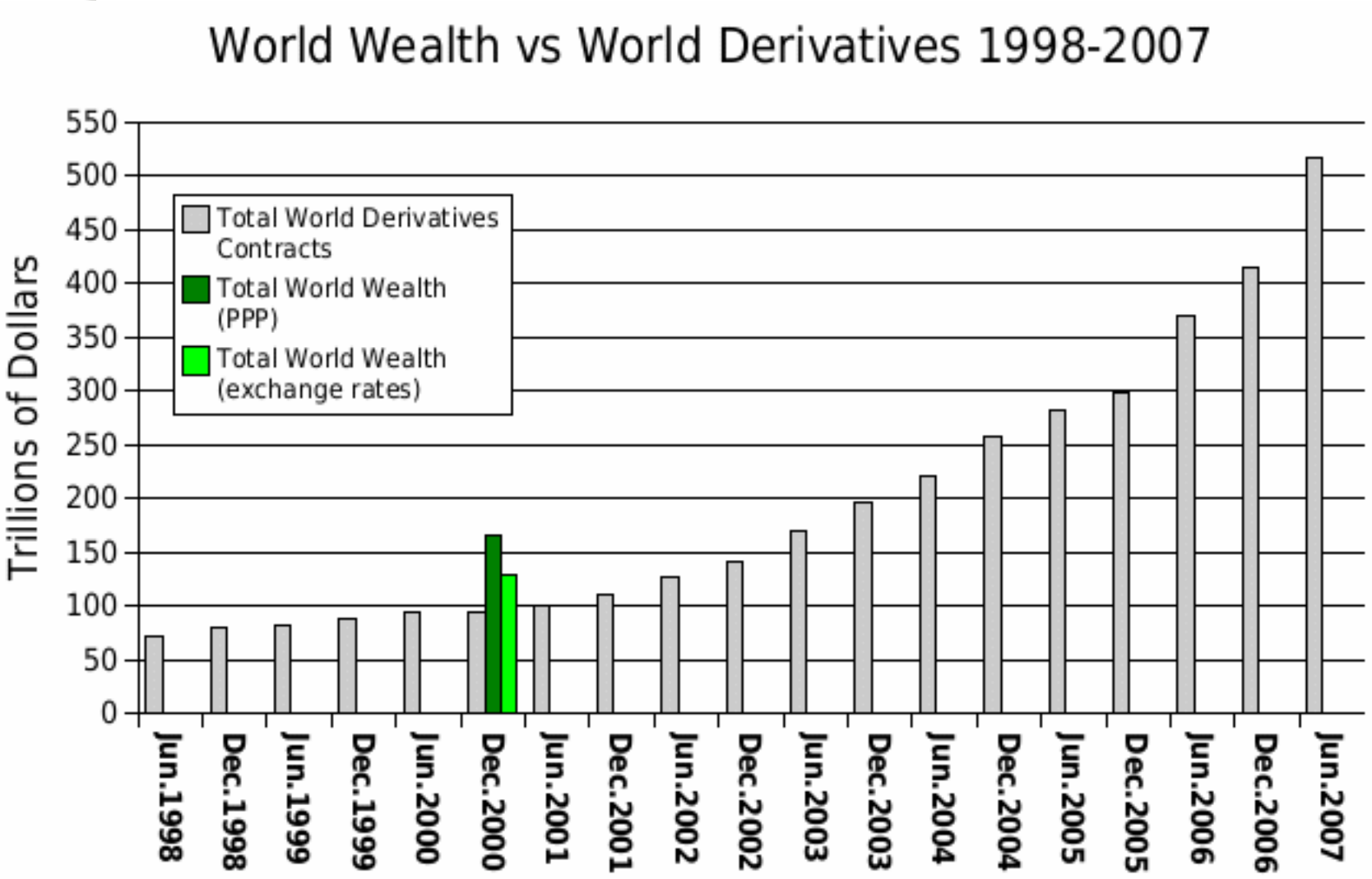
"By 2007 the trade in derivatives worldwide was one quadrillion (thousand million million) US dollars - this is 10 times the total production of goods on the planet over its entire history," says Stewart. "OK, we're talking about the totals in a two-way trade, people are buying and people are selling and you're adding it all up as if it doesn't cancel out, but it was a huge trade."

The Black-Scholes formula had passed the market test. But as banks and hedge funds relied more and more on their equations, they became more and more vulnerable to mistakes or over-simplifications in the mathematics.

After Black-Scholes it was the computer that said yes, or no

"The equation is based on the idea that big movements are actually very, very rare. The problem is that real markets have these big changes much more often that this model predicts," says Stewart. "And the other problem is that everyone's following the same mathematical principles, so they're all going to get the same answer."




World Wealth vs World Derivatives 1998-2007
Trillions of Dollars
550
500
450
400
350
300
250
200
150
100
50
0
Total World Derivatives Contracts
Total World Wealth (PPP)
Total World Wealth (exchange rates)
Jun.1998
Dec.1998
Jun.1999
Dec.1999
Jun.2000
Dec.2000
Jun.2001
Dec.2001
Jun.2002
Dec.2002
Jun.2003
Dec.2003
Jun.2004
Dec.2004
Jun.2005
Dec.2005
Jun.2006
Dec.2006
Jun.2007

- Finance has undergone a real revolution in the past 30 years:
  - free movement of currencies
  - creating a liquid market for companies
  - creating indexes allowing foreign investors to have information on a country.

- The great variability of these products has led market participants to request a transfer of risk.
- The insurance market could be interested... but new financial products were created by banks to ensure this transfer of risk: derivatives.

Definition

- « An option is a contract that gives the buyer the right, but not the obligation, to buy or sell an underlying asset at a specific price on or before a certain date. An option, just like a stock or bond, is a security. It is also a binding contract with strictly defined terms and properties. »

Example

- The idea behind an option is present in many everyday situations.
- Say, for example, that you discover a house that you'd love to purchase. Unfortunately, you won't have the cash to buy it for another three months.
  - You talk to the owner and negotiate a deal that gives you an option to buy the house in three months for a price of $200,000.
  - The owner agrees, but for this option, you pay a price of $3,000.

- It's discovered that the house is actually the true birthplace of Elvis! As a result, the market value of the house skyrockets to $1 million.
  - Because the owner sold you the option, he is obligated to sell you the house for $200,000.
  - In the end, you stand to make a profit of $797,000 ($1 million - $200,000 - $3,000).

- While touring the house, you discover not only that the walls are chock-full of asbestos, but also that the ghost of Henry VII haunts the master bedroom; furthermore, a family of super-intelligent rats have built a fortress in the basement.
  - Though you originally thought you had found the house of your dreams, you now consider it worthless.
  - On the upside, because you bought an option, you are under no obligation to go through with the sale. Of course, you still lose the $3,000 price of the option.

Underlying assets

- Undelying assets are:
  - Stocks
  - Exchange rates
  - Natural resources
  - Energy
  - Interest rates
  - Indices

- Derivative products are sold on 3 markets:
  - Regulated markets
  - OTC markets
  - Exchange-trade derivative contracts (ETD): specialized markets

Specialized markets

- London International Financial Futures and Options Exchange
- Chicago Board of Trade
- Chicago Mercantile Exchange
- The International French futures and options exchange
- Sydney Futures Exchange
- Singapore International Monetary Exchange Ltd
- Chase Manhattan Bank
- Bankers Trust
- JP Morgan
- Chrysolite Option Pricer

Derivatives products

- Derivative products are from 3 categories:
  - Forward and futures
  - Swaps (interest rate swaps, currency swaps, CDS)
  - Options (warrant, options, binary options)

Usefulness of derivative products

- They offer extremely important leverages
- they allow speculation
- they allow the coverage of risk
- they sometimes allow to do transactions when well even the underlying is not available
- they allow the creation of new opportunities or options...

- Options with a financial underlying asset:
  - Vanilla options:
    - European options
    - American options
  - Exotic options:
    - Quanto
    - Digital options
    - Barriers
    - Lookback options
    - Asian options
- Real options

Vanilla options

1. See deadline
2. Bid/Ask
3. The bourse de Montréal: all stock options have a quantity of 100 shares. Therefore, it is necessary to multiply these numbers by 100 to get the corresponding value of the contract.

Barrick Gold Corporation (ABX) - NYSE

35.54 ↓0.34(0.95%) 12:32PM EST - Nasdaq Real Time Price

Options

View By Expiration: **Nov 2012** | Dec 2012 | Jan 2013 | Apr 2013 | Jan 2014 | Jan 2015

Call Options — Expire at close Friday, 16 November, 2012

Strike	Symbol	Last	Chg	Bid	Ask	Vol	Open Int
32.00	ABX121117C00032000	3.25	0.00	3.55	3.65	50	47
34.00	ABX121117C00034000	1.95	0.00	1.62	1.66	11	25
35.00	ABX121117C00035000	0.74	↓0.26	0.81	0.83	120	684
35.50	ABX121117C00035500	0.44	↓0.26	0.49	0.51	146	85
36.00	ABX121117C00036000	0.25	↓0.18	0.26	0.28	348	2,074
36.50	ABX121117C00036500	0.13	↓0.13	0.13	0.15	141	1,109
37.00	ABX121117C00037000	0.06	↓0.10	0.06	0.07	171	3,105
37.50	ABX121117C00037500	0.08	0.00	0.03	0.04	367	565
38.00	ABX121117C00038000	0.02	↓0.03	0.02	0.03	34	2,423
38.50	ABX121117C00038500	0.10	0.00	N/A	0.02	1	13
39.00	ABX121117C00039000	0.02	↓0.01	N/A	0.02	7	2,489

Vanilla options

3. The number of options traded in the day is indicated in the column ”Volume”.
4. The "open interest" column: this is the number of options in the series still held by buyers, which is a proxy for the liquidity of the series.

Barrick Gold Corporation (ABX) - NYSE

35.42 ↓0.46(1.28%) 12:44PM EST - Nasdaq Real Time Price

Options

View By Expiration: Nov 2012 | Dec 2012 | Jan 2013 | Apr 2013 | Jan 2014 | **Jan 2015**

Call Options — Expire at close Friday, 16 January, 2015

Strike	Symbol	Last	Chg	Bid	Ask	Vol	Open Int
20.00	ABX150117C00020000	15.50	0.00	15.50	16.10	3	10
23.00	ABX150117C00023000	13.50	0.00	13.25	13.70	10	22
25.00	ABX150117C00025000	11.99	0.00	11.95	12.25	20	2,280
28.00	ABX150117C00028000	12.80	0.00	9.90	10.45	1	6
30.00	ABX150117C00030000	9.90	0.00	8.90	9.20	3	50
33.00	ABX150117C00033000	7.70	0.00	7.50	7.75	1	13
35.00	ABX150117C00035000	6.75	↓0.15	6.65	6.90	10	65
37.00	ABX150117C00037000	6.50	0.00	3.55	8.45	13	13
38.00	ABX150117C00038000	5.80	0.00	5.65	5.80	4	176
40.00	ABX150117C00040000	5.20	↓0.10	5.00	5.15	11	646
42.00	ABX150117C00042000	4.40	0.00	4.30	4.55	1	871
45.00	ABX150117C00045000	3.80	0.00	3.65	3.80	3	850
47.00	ABX150117C00047000	3.35	0.00	3.15	3.40	1	18
50.00	ABX150117C00050000	2.86	0.00	2.73	2.87	20	154
55.00	ABX150117C00055000	2.10	↓0.09	2.05	2.19	5	301

Put Options — Expire at close Friday, 16 January, 2015

Strike	Symbol	Last	Chg	Bid	Ask	Vol	Open Int
20.00	ABX150117P00020000	1.32	0.00	1.29	1.40	38	547
23.00	ABX150117P00023000	2.11	0.00	2.06	2.19	12	289

Vanilla options

- Vanilla options are options to buy (call) or sell (put) an underlying asset.
- The parameters are:
  - the due date or the maturity of the option: 3,6,9 months
  - the exercise (strike) for each of the deadlines above price
  - The premium

Vanilla options

- European options:
  - the option is exercised at maturity
- American options:
  - the option is exercised to maturity

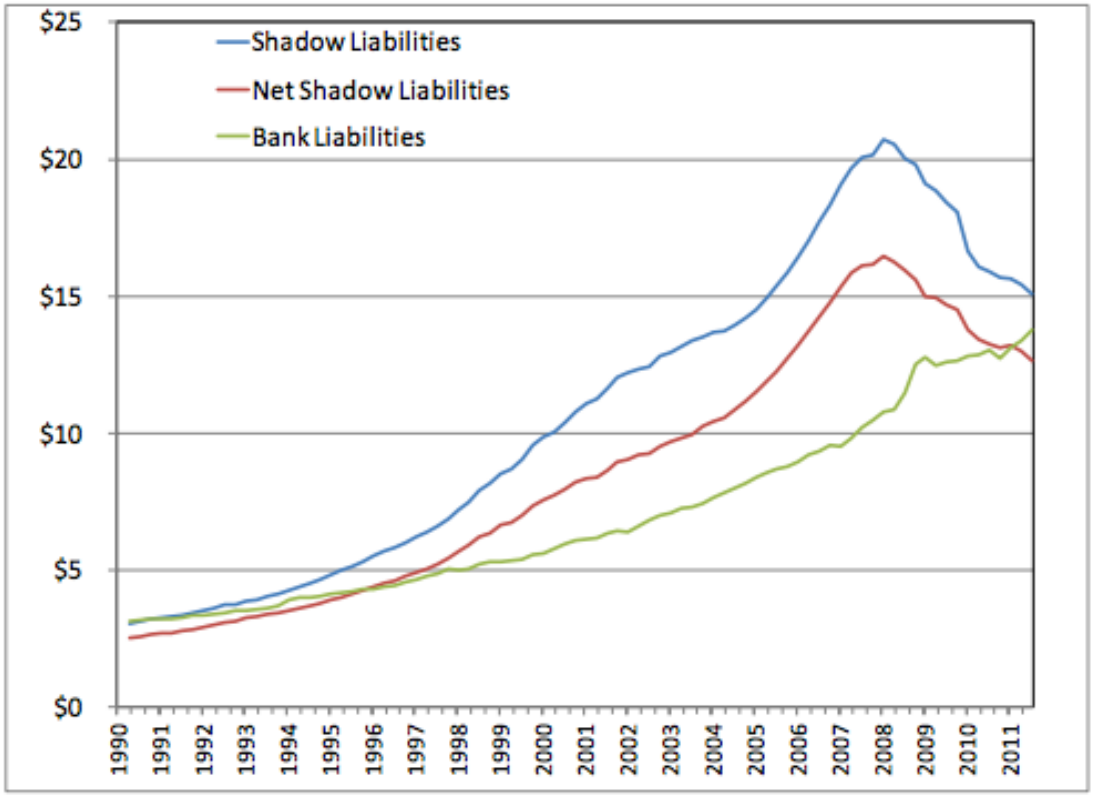
- Leverage with an option
- Overdraft and leverage of short sales

- The major problem is the calculation of the premium of the option (pricing):
  - How do I know if the premium on an organised market is the good evolution of the underlying probability?
  - How do I assess the premium of an option on an OTC market?
- There is also the problem of coverage (hedging):
  - How can the seller of the option, which affects the premium at time t = 0, produce a richness to the maturity date T?

- These last two questions are linked and are based on the assumptions:
  - modeling of financial markets and in particular assets assumptions of non-arbitrage (it is not possible to make a profit without taking risks).

Shadow banking

Figure 1: Shadow Bank Liabilities vs. Traditional Bank Liabilities, *$ trillion*[4]



Source: Flow of Funds Accounts of the United States as of 2011:Q3 (FRB) and FRBNY.

Usefulness of the options

- To have the feeling that uncertainty is a little more certain

Calls and Puts

- A call gives the holder the right to buy an asset at a certain price within a specific period of time.
  - Calls are similar to having a **long position** on a stock.
  - Buyers of calls hope that the stock will increase substantially before the option expires.

Calls and Puts

- A put gives the holder the right to sell an asset at a certain price within a specific period of time.
  - Puts are very similar to having a **short position** on a stock.
  - Buyers of puts hope that the price of the stock will fall before the option expires.

Participants in the options market

- There are four types of participants in options markets depending on the position they take:
  - 1. Buyers of calls
  - 2. Sellers of calls
  - 3. Buyers of puts
  - 4. Sellers of puts

- People who buy options are called **holders** and those who sell options are called **writers**;
- furthermore, buyers are said to have **long positions**, and sellers are said to have **short positions**.

- Here is the important distinction between buyers and sellers:
  - Call holders and put holders (buyers) are not obligated to buy or sell. They have the choice to exercise their rights if they choose.
  - Call writers and put writers (sellers), however, are obligated to buy or sell. This means that a seller may be required to make good on a promise to buy or sell.

WHY USE OPTIONS?

Why use options?

- Speculation
- Hedging

Why use options? Speculation

- You can think of speculation as betting on the movement of a security. The advantage of options is that you aren't limited to making a profit only when the market goes up. Because of the versatility of options, you can also make money when the market goes down or even sideways.

Why use options? Speculation

- Speculation is the territory in which the big money is made - and lost. The use of options in this manner is the reason options have the reputation of being risky. This is because when you buy an option, you have to be correct in determining not only the direction of the stock's movement, but also the magnitude and the timing of this movement.

Why use options? Speculation

- To succeed, you must correctly predict whether a stock will go up or down, and you have to be right about how much the price will change as well as the time frame it will take for all this to happen. And don't forget commissions! The combinations of these factors means the odds are stacked against you.

Why use options? Speculation

- So why do people speculate with options if the odds are so skewed? Aside from versatility, it's all about using leverage. When you are controlling 100 shares with one contract, it doesn't take much of a price movement to generate substantial profits.

Why use options? Hedging

- Think of this as an insurance policy. Just as you insure your house or car, options can be used to insure your investments against a downturn.
- Critics of options say that if you are so unsure of your stock pick that you need a hedge, you shouldn't make the investment.
- On the other hand, there is no doubt that hedging strategies can be useful, especially for large institutions.

Why use options? Hedging

- Even the individual investor can benefit. Imagine that you wanted to take advantage of technology stocks and their upside, but say you also wanted to limit any losses. By using options, you would be able to restrict your downside while enjoying the full upside in a cost-effective way.