Warrants

On 30th October 2008

Warrants

- ## Warrant Types
  - Warrants are tradable securities which give the holder right, but not the obligation, to buy (call) or to sell (put) an underlying asset at a predetermined price (exercise price or strike price) on or up a certain date (European or American style)

- ## Underlying asset
  - The warrant price is derives from the value of an underlying asset. This can be a stock, an index, a basket or any other financial assets.

The exercise/strike price

- The exercise/strike price is predetermined price at which the investor can buy (call) or sell (put) the underlying asset in the future.

- The relation between the strike price of a warrant and the current market price of the underlying assets determines whether a warrant is
  - Out-of-the-money
  - In-the-money
  - At-the-money

The exercise/strike price

- **Out-of-the-Money**
  - Call warrant is out-of-the-money when the underlying asset price is below the warrant strike price.
  - Put warrant is out-of-the-money when the underlying asset price is above the warrant strike price.

The exercise/strike price

- ## At-the-money
  - Call or put warrant is at-the-money when the underlying asset price is equal to warrant strike price

The exercise/strike price

- **In-the-Money**
  - Call warrant is in-the-money when the underlying asset price is above the warrant strike price.
  - Putt warrant is in-the-money when the underlying asset price is under the warrant strike price.

Warrants

- **The Premium**
  - The warrant price is called as the premium.
- **The Ratio**
  - The ration, or share unit per warrant, is the fraction of a single unit of the underlying asset corresponding to a single warrant.
  - For example, Vodafone warrant with ration of 0.1 indicates that 10 warrants are needed to apply right to buy or sell one Vodafone share at the warrant strike price.
- **Minimum tradable**
  - The minimum tradable is a minimum quantity of warrants that investor can trade. The investor can trade the minimum of multiple of this minimum. (minimum is 10 warrants or it is also possible to trade 20, 30 warrants and so on)

Working example

- Call warrant
    - A call warrant is a tradable security which gives the holder the right but not the obligation to buy an underlying asset at strike price on or up to a specific date.
    - A call warrant gives the holder the possibility to benefit from an increase in the value of the underling asset, while limiting potential losses to the premium paid.
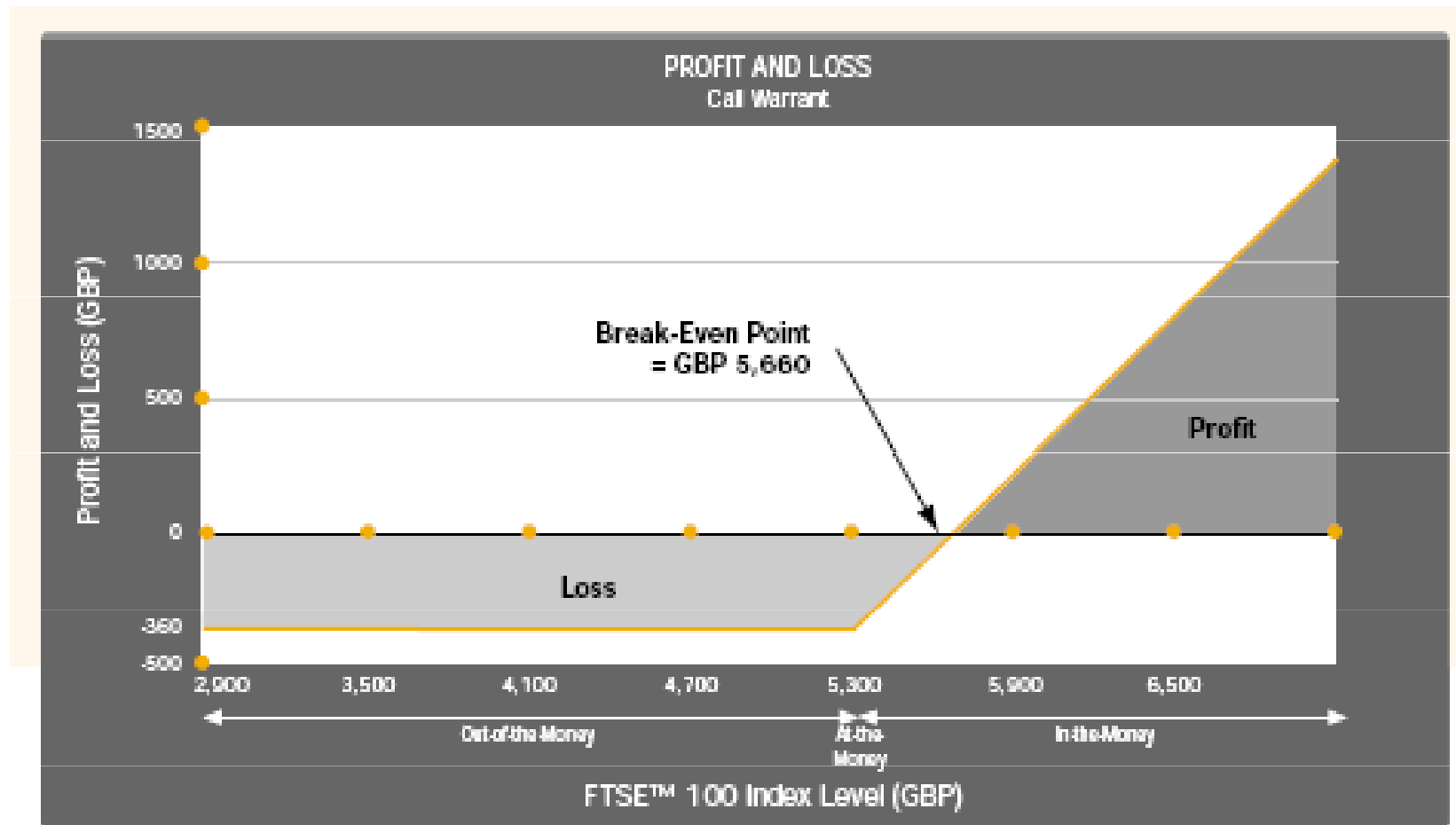
Working example

- Example
  - An investor buys Call Warrant on the FTSE 100 index quoted in GBP on the London Stock Exchange.
  - Investors participate in price development of index but it is not necessary to buy all shares.
  - At the time of the purchase
  - Value of the FTSE 100 index: 5.200 GBP
  - Ratio: 0.01
  - Price: 3,60 GBP
  - Strike price: 5.300
  - Maturity: 1 year
  - Currency: GBP

Working example

- Base on the above assumptions, the investor can calculate its break-even point at the maturity
  - Break-even point = Strike price +(price/ratio)
  - BEP=5.300 + (3,60/0,01)
  - BEP=5,660
  - Break-even point it is a point when is at the investor's will if he applies warrant or not.

BEP if investor buy 100 warrants

PROFIT AND LOSS
Call Warrant

Break-Even Point
= GBP 5,660

Profit

Loss

Profit and Loss (GBP)

FTSE™ 100 Index Level (GBP)

Out-of-the-Money

At-the-Money

In-the-Money

Scenario 1

- FTSE 100 index rises 20 % by maturity (6.240 points)

    - Payout = (underlying price – strike price) x ratio

    - Payout = (6.240-5.300)x0.01=9,4 GBP per warrant

    - Net profit = payout – warrant price

    - Net profit = 9,4-360 = 5,80 GBP per warrant

    - Return on investment [(Net profit/warrant price) x 100]=161 %

Leverage effect

- Underlying rises about 20 % by maturity
- Warrant rises about 161 % by maturity

Scenario 2

- FTSE 100 index falls 20 % by maturity (4.160 points)

- Payout = (underlying price – strike price)

- Payout = (4.160-5.300)

- Payout = - 1.140 - negative

- Payout = 0 (investor do not use its right to buy for strike price)

- Net profit = 0 – 3,60 = -3,60 GBP

  - Return on investment [(Net profit/warrant price) x 100]= -100 %

- Leverage effect
  - Underlying fells about 20 % by maturity
  - Warrant fells about 100 % by maturity

Put warrant

- Put warrant is a tradable security which gives the holder the right but not the obligation to sell an underlying asset at a predetermined price (strike price) on or up to a specific date.

- Put warrant gives the holder the possibility to benefit from a decrease in the value of the underlying asset, while limiting potential lossess to the premium paid.

Put warrant

- Example

  - An investor buys Call Warrant on the FTSE 100 index quoted in GBP on the London Stock Exchange.

  - At the time of the purchase

  - Value of the FTSE 100 index: 5.200 GBP

  - Ratio: 0.01

  - Price: 2,45 GBP

  - Strike price: 5.000

  - Maturity: 1 year

  - Currency: GBP

Put warrant

- Base on the above assumptions, the investor can calculate its break-even point at the maturity

  - Break-even point = Strike price - (price/ratio)
  - BEP=5.000 - (2,45/0,01)
  - BEP= 4.755 GBP
  - Break-even point it is a point when is at the investor's will if he applies warrant or not.

Put warrant if investor buy 100 warrants
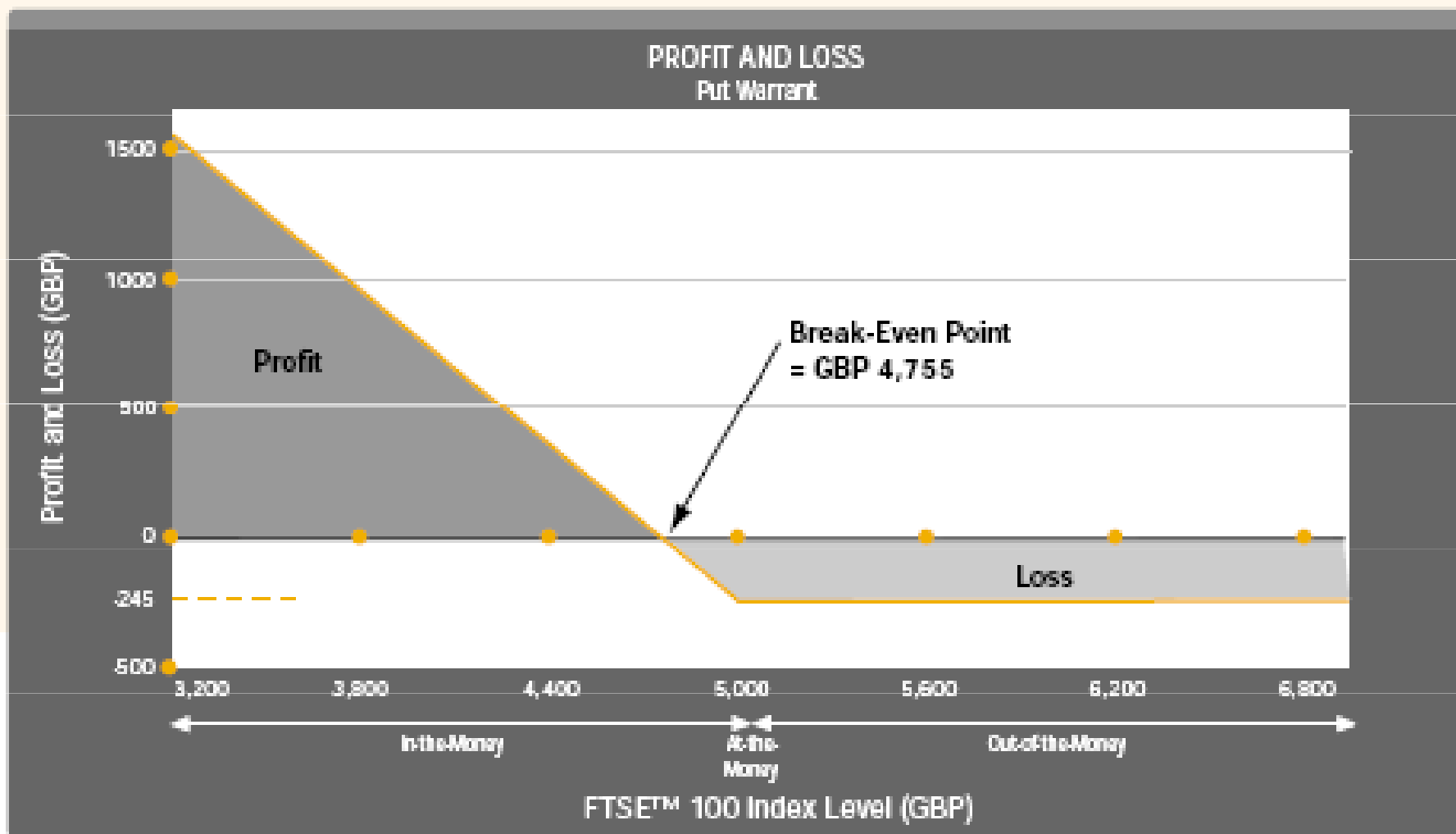
Scenario 1

- FTSE 100 index falls 20% by maturity – 4.160 point
- Payout = (Strike price – underlying price) x ration
- Payout = (5.000 – 4.160) x 0.01
- Payout = 8,40 GBP per warrant
- Net profit = payout – price
- Net profit = 8,40 – 2,45
- Net profit = 5,95 GBP per warrant
- Return on investment = [Net profit/warrant price x 100] = 243 %

Scenario 2

- FTSE 100 index rises about 20 % by maturity 6.240 points
- Payout (Strike price – underlying price)
- Payout = 0 (negative value -1.240 GBP)
- Net profit = 0 - 2,45
- Net profit = -2,45 GBP per warrant
- Return on investment [(Net profit / warrant price) x 100]= - 100%

Components of warrant's price

- The price of a warrant has two components:
  - Intrinsic value
  - time value
- This relationship is reflected in the equation:
  - *Warrant price = Intrinsic value + time value*
- Intrinsic Value
  - It is the amount by which the warrant is In-the-Money. This value is positive or zero.
  - Intrinsic value of call:
    - (Underlying price – strike price) x ratio
  - Intrinsic value of put:
    - (Strike price – underlying price) x ratio

Components of warrant's price
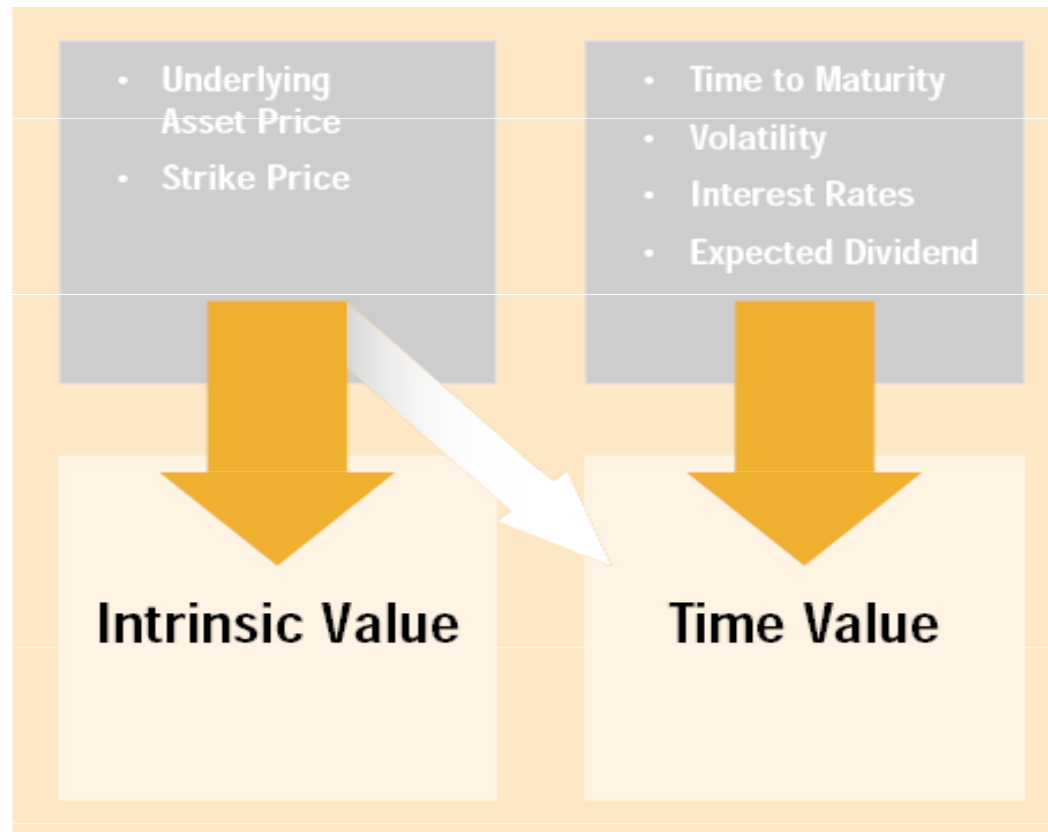
- ## Time value

  - Time value is the speculative component of the price of warrant. It reflects the probability of a warrant moving into the money before maturity.

  - The probability of the warrant being used is greater:

    - The longer the time to maturity
    - The higher the volatility of the underlying asset

Components of warrant's price

- Time value is lowest for a "deep" Out-of-Money warrant because of the low probability that warrant becoming in In-the-Money. The same situation is for deep In-the-Money warrant because of the low probability of it becoming Out-of-the-Money.

- The value is highest when the warrant is At-the-Money because a small movement in the underlying price move the warrant either In or Out-of-the-Money.

Factors Influencing the Price of a Warrants

- Factors influencing the price of a warrant
- Six major factors:

- Underlying Asset Price
- Strike Price

- Time to Maturity
- Volatility
- Interest Rates
- Expected Dividend

Intrinsic Value

Time Value

# Factors Influencing the Price of a Warrants

- **Influence of underlying asset price and strike price**
    - The price of At-the-Money warrant comprises only time value.
    - The price of Out-of-the-Money warrant comprises only time value.
    - The price of In-the-Money warrant comprises time value and intrinsic value.

Factors Influencing the Price of a Warrants

- **Influence of Time to Maturity**
  - The remaining time to maturity of a warrant has a substantial influence on its price. As the warrant maturity approaches its time value decreases. This process is know as a time decay.

- **The graph represents the loss of time value of a call warrant.**
  - At issue date the time value is maximum (100%)
  - At maturity date time value decreases to become 0%.
  - The decrees in time value is non-linear.
  - As a general rule warrants tend to lose most of their time value during the last third of their lives.

Time Value

Time Value

NON-LINEAR DECREASE OF TIME VALUE OVER TIME
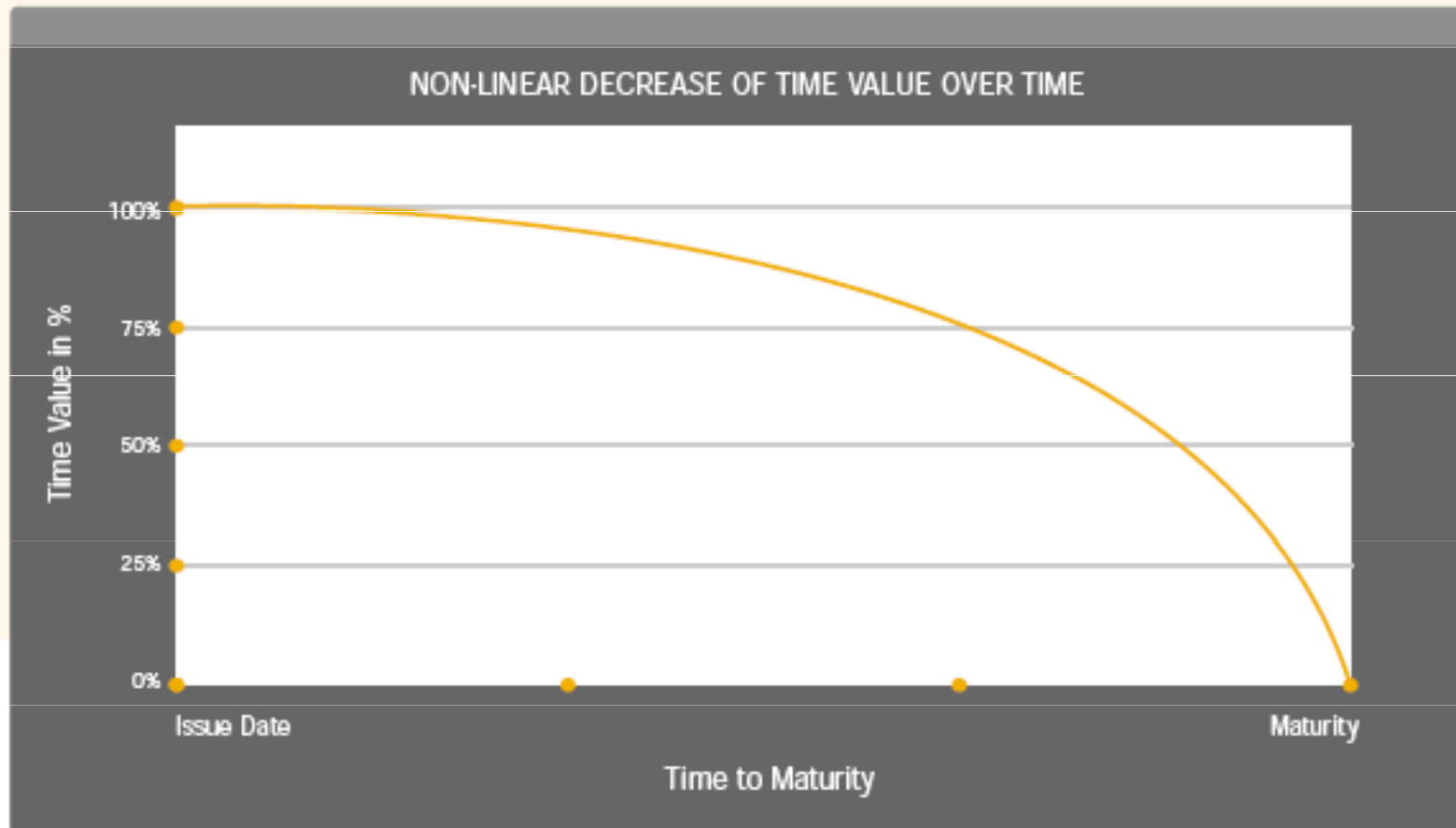
■ Influence of volatility

❑ Volatility measures the variation (but not direction) of an underlying asset price over a given period.

❑ Assuming all other factors remain constant an increase in volatility will result in an increase in a warrant's premium for both put and call warrants. The reason is that a higher volatility of the underlying asset's price increases the probability that the warrant will become In-the-Money.

❑ At-the-money warrants are the most sensitive to highly volatile underlying prices. Because small movement in the underling's price will move the warrant In-the-Money or Out-of -the-Money.

- **Influence of interest rates**
  - Changes in interest rates have a limited impact on the price of warrants.
- **Influence of expected dividends**
  - The dividend paid out during the life of a warrant affect the warrant's price.
  - Specially, higher expected dividend yields increase the value of a put warrant but decrease the value of a call warrant.
  - The higher the dividend paid on a stock the greater the amount by which the stock price will fall as a result. This has effect of moving call warrant further Out-of-the-Money and reducing it's value.
  - Conversely, dividends increase a put warrant will move closer to being In-the-Money and its value will rise.

Summary

- The effect of an increase of various factors on call and put warrant prices.

An increase in:	Call warrant price	Put warrant price
Underlying asset price	↗	↘
Strike price	↘	↗
Volatility	↗	↗
Time to maturity	↗	↗
Interest rates	↗	↘
Expected dividends	↘	↗

Sensitivity of warrant's price: „The Greeks"

- **Delta – Sensitivity to underlying asset price movements**
  - Delta measures the changes in a warrant's price following a unit change un the underlying asset's price, all other factors remaining constant.
    - For Calls – positive correlation
      - This results in a positive delta number, meaning that if an underlying asset's value increases (decreases), a corresponding call warrant's value also increases (decreases)
    - For Putts – negative correlation
      - This results in a negative delta number meaning that if an underlying asset's value increase (decrease) the put warrant value decrease (increase).

Strategies with warrant

- Warrants may be purchase to fulfill one or more the following investment strategies.

- Hedging of portfolio

- Put warrants offer the investor the opportunity to insure their portfolio against market downturns.

- Leverage effect

- Investor can use warrants to get higher revenues than those that would have been received with direct investment in the underlying asset.

Hedging a position

- An investor holding an underlying asset might wish to hedge their investment in order to protect them against uncertain market conditions. Rather then sell the investment and miss out on any potential rally, a put warrant may be purchase. The warrant provides:

  - protection against a fall in the asset price and
  - may also reduce the investor's transactional costs.

Example

- Let consider that investor holding 20.000 GBP of unit-linked funds benchmarked to the FTSE 100.

- Investor worried about short-term market downturn.

- The investor faces the choice between:

  - Selling their funds units and missing potential rally of the FTSE 100 index. In this case investor bears all transaction costs (plus any exit fees and bid/offer spread on fund unit), or

  - purchasing put warrants on the FTSE 100 index

- Assuming that the FTSE 100 index level is currently quoted at 5.000 GBP, characteristic of put warrant on the FTSE 100 index are following:
  - No. of underlying assets = 20.000/5.000 = 4 fund units
  - Spot price = 5.000 GBP
  - Strike price = 5.000 GBP
  - Premium = 3,20 GBP
  - Ration = 0,01 (100 warrants per share unit)
  - Delta = - 49 % - *sensitivity how changes warrant price if underlying price changed about unit*
  - Maturity = 1 year
  - Minimum tradable size = 100

- Following formula determines the number of warrants needed to cover the position:
  - No. of warrants to buy = No. of underlying assets / (ratio x delta)
    - 4 / (0,01 x 49%) = 816,3
  - An investor must trade a minimum quantity of warrants. In this case the minimum tradable size is 100 warrants, investor must choose between the purchase of 800 or 900 warrants.
  - Assuming that investor decided to buy 800 warrants at 3,20 GBP to cover position.
    - The investment will be:
      - Investment in warrants = No. of warrants x premium
      - Investment in warrants = 800 x 3,20 = 2,560 GBP

Three possible scenarios at maturity

- Scenario 1: FTSE 100 index decreased by 15 % to 4.250 points.
  - The FTSE 100 index position has decreased by 15% but the value of the put warrant has increased.
    - Loss of the FTSE 100 index position = 4 x (5.000 – 4.250)
    - Loss of the FTSE 100 index position = 3000 GBP
  - Put warrants value
    - No. of warrants x (Strike price – current underlying asset price) x ration
    - 800 x (5.000 – 4.250) x0,01 = 6.000
    - Profit of the put warrants = 6.000 – 2.560
    - Profit of the put warrants = 3.440
    - Net profit = 3.440 – 3.000
    - Net profit = **440 GBP**

Three possible scenarios at maturity

Portfolio Overview			
GBP	Maturity value	Original cost	Gain or (loss)
Fund units	17,000	20,000	(3,000)
Put warrants	6,000	2,560	3,440
Portfolio	23,000	22,560	440

Three possible scenarios at maturity

- Scenario 2:The FTSE 100 index level did not changed

  - The FTSE 100 index position has not changed in value, but investor loses the premium invested in the put warrants, which means a net loss of **2.560 GBP.**

Portfolio Overview			
GBP	Maturity value	Original cost	Gain or (loss)
Fund units	20,000	20,000	0
Put warrants	0	2,560	(2,560)
Portfolio	20,000	22,560	(2,560)

Three possible scenarios at maturity

- Scenario 3: FTSE 100 index increased by 15 % to 5.750 points.
    - The value of FTSE 100 index position has increase by 15% but the value of put warrants has decreased/
        - Gain of the FTSE 100 index position = 4 x (5.750 – 5.000)
        - Gain of the FTSE 100 index position = 3000 GBP
        - Put warrants value = No. of warrants x (Strike price – current underlying asset price) x ration
            - 800 x (5.000 – 5.750)x 0.01 -> it is negative therefore 0
            - Loss of the put warrants = premium invested = 2.560 GBP
            - Net profit = 3.000 – 2.560
            - Net profit = **440 GBP**

Three possible scenarios at maturity

Portfolio Overview			
GBP	**Maturity value**	**Original cost**	**Gain or (loss)**
Fund units	23,000	20,000	3,000
Put warrants	0	2,560	(2,560)
Portfolio	23,000	22,560	440

(Note: these calculations exclude transaction costs such as commissions and related fees).

Leverage Effect

- ## Leverage Effect
  - One of the fundamental advantages of buying a warrant as a opposed to buying the underlying asset directly resides in the leverage effect.
  - In an investor believes that the price of a specific asset will rise, he can increase his exposure by purchasing call warrants instead of direct investing in the stock market.
  - The leverage effect will amplify the stock exposure and the positive movements of the underlying asset, while limiting the risk to the initial premium.
  - Conversely, if an investor believes that the price of a specific asset will fall, he can buy put warrants and leverage his gain were the underlying assets to fall in price.

Example

- Let's consider an investor holding 400.000 GBP who believes that the price of stock will increase by 15 % in the next six months.
  - Scenario 1: The investor purchases shares directly
    - Stock price: 4,0GBP
    - Stock = Initial investment / stock price
    - Stock = 400.000 / 400 = 100.000 shares
    - After six months, if stock increased by 15%
      - New stock price = 4,60 GBP
      - New total investment value = 460.000
      - Total gain = 460.000 – 400.000
      - Total gain = 60.000
      - Performance = 60.000/400.000
      - Performance = **+15%**

Leverage Effect

- Scenario 2: The investor purchases put warrant with maturity 6 months.

  - Premium = 0,04 GBP
  - Strike price = 4 GBP
  - Ratio = 0,1 (10 warrants per share unit)
  - No. of warrants = Initial investment/premium
  - No. of warrants =400.000/ 0,04 = 10.000.000 warrants
  - Exposure on the underlying = No. of warrants x ration
  - Exposure on the underlying = 10.000.000 x 0,1
  - Exposure on the underlying = 1.000.000 shares
  - Investor will be able to buy 10.000.000 warrants on shares with the exposure on underlying asset equal to 1.000.000 shares.
  - After six months, if stock increased by 15%
    - Total warrants value = 10.000.000 x (4,6GBP – 4,0 GBP) x 0,1
    - Total warrants value = 600.000
    - Total gain = 600.000 -400.000
    - Total gain = 200.000
    - Performance = 200.000/400.000
    - Performance = **+50%**

Leverage Effect

- Due to leverage effect. The investment in warrants while keeping the same level risk and initial investment has amplified the exposure to the positive underlying performance.