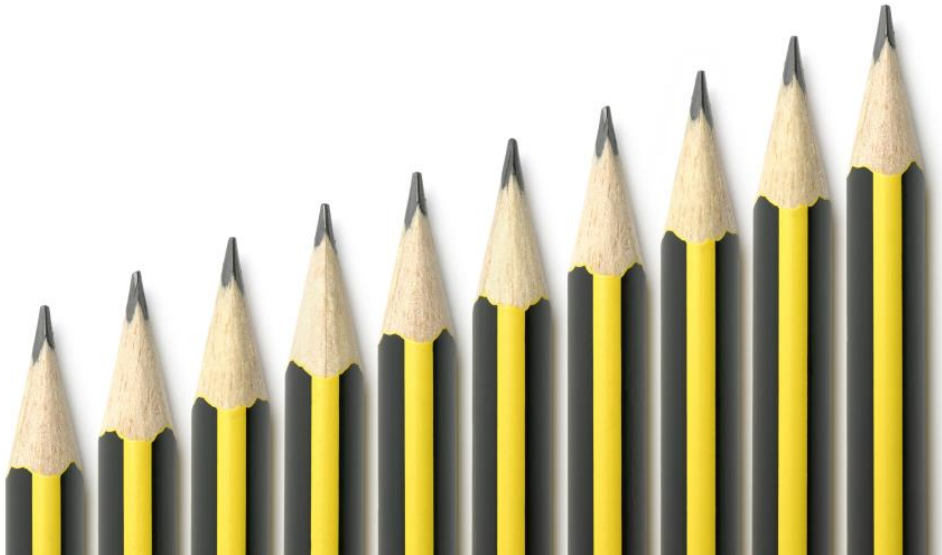
Deloitte.

Introduction to Derivative Instruments – Part 1

Link'n Learn

June 2014



Webinar Participants

Elaine Canty
Manager – Financial Advisory
Deloitte & Touche Ireland
ecanty@deloitte.ie
+353 1 417 2991

Christopher Seenan
Assistant Manager – Financial Advisory
Deloitte & Touche Ireland
cseenan@deloitte.ie
+353 1 417 4716

Preface

This presentation (along with Webinar Link'n Learn: Introduction to Derivative Instruments - Part 2) is designed to give an introductory overview of the characteristics of some of the more prevalent derivatives.

Further learning references regarding valuation and analysis of these instruments will be referenced at the end of this webinar.

Contents

1. Introduction

A derivative is a financial instrument whose value changes in response to changes in the value/level of an underlying variable.

Its value is derived from the value of the underlying. For example:

Interest rate swap	• value is derived from current spot and forward interest rates
Commodity forward	• value is derived from the spot value of the commodity
Equity option	• value is derived from the spot value of the equity

Other characteristics of derivatives

- There is either no initial net investment (e.g. interest rate swap) or an initial net investment that is smaller than would be required for other contracts with similar responses to market (e.g. an equity option).

- It is settled at a future date or series of future dates.

2. Interest Rate Swaps

Definition:

An Interest Rate Swap is an exchange of cash flows between two parties. The cash flows are based on the interest payments made on a nominal sum known as the principal or notional. The interest payments can be made at different rates, can be fixed or floating and can be made at different frequencies. A vanilla (or plain) swap normally involves exchanging fixed and floating rate payments on the same currency.

Therefore a swap is composed purely of two legs:

- receiving leg
- paying leg

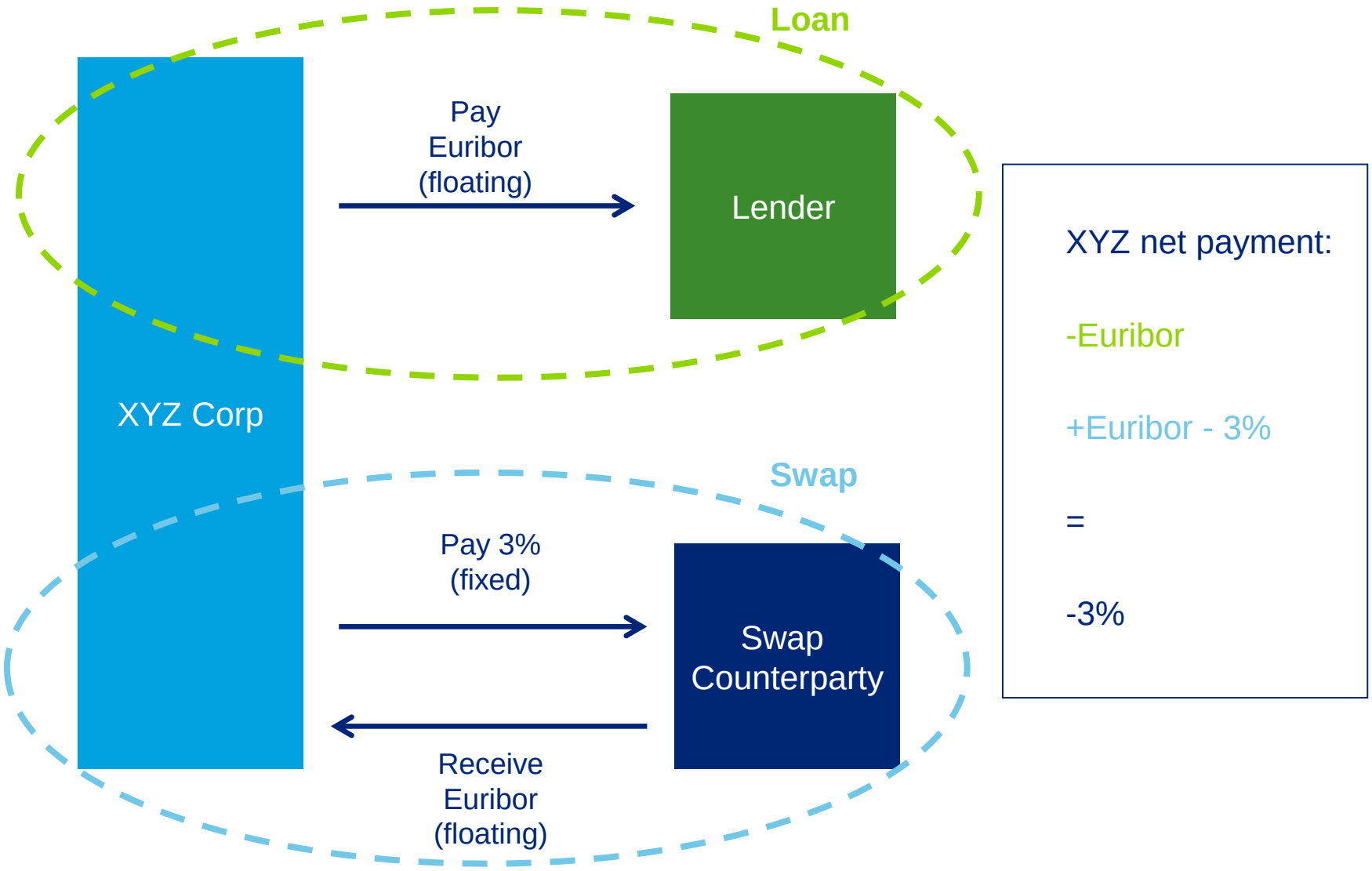
Example:

XYZ Corp. has €100M of floating-rate debt at Euribor, i.e. every year it pays that year's current Euribor rate.

XYZ would prefer to have fixed-rate debt.

XYZ could enter a swap, in which they receive a floating rate and pay the fixed rate, which in the following example, is 3%.

Example:



Conclusions on Interest Rate Swaps

If a firm thought that rates would rise it would enter into a swap agreement to pay fixed and receive floating in order to protect it from rising debt-service payments.

If a firm thought that rates would fall it would enter into a swap agreement to pay floating and receive fixed in order to take advantage of lower debt-service payments.

The cash flows of an interest rate swap are interest rates applied to a set amount of capital; no principal is swapped, only the coupon payments.

The swap itself is not a source of capital but an alteration of the cash flows associated with payment.

Interest Rate Swap Fair Valuation

The fair value of an interest rate swap is calculated by determining the future cash flows on both legs (i.e. the receiving leg and the paying leg), and discounting these cash flows using an appropriate discount factor curve.

Example: Swap fair value as of 31 December 2012 (value date):

Notional:	€100m
Pay leg:	Fixed 3%
Receive leg:	3m Euribor
Floating rate spread:	0%
Trade date:	30 June 2012
Effective date:	30 June 2012
Maturity:	31 December 2014

Cash flows

Receive EUR Float									
Num	Notional	AccSt	AccEnd	PayDt	Reset Dt	Rate	Days	SettleAmt	DiscAmt
1	100,000,000	30/06/2012	28/09/2012	28/09/2012	28/06/2012	0.653	90	163,250.00	0
2	100,000,000	28/09/2012	31/12/2012	31/12/2012	26/09/2012	0.222	94	57,966.67	0
3	100,000,000	31/12/2012	28/03/2013	28/03/2013	27/12/2012	0.185	87	44,708.33	44,690
4	100,000,000	28/03/2013	28/06/2013	28/06/2013	26/03/2013	0.1835763	92	46,913.95	46,857
5	100,000,000	28/06/2013	30/09/2013	30/09/2013	26/06/2013	0.1719225	94	44,890.88	44,800
6	100,000,000	30/09/2013	31/12/2013	31/12/2013	26/09/2013	0.1991208	92	50,886.42	50,740
7	100,000,000	31/12/2013	31/03/2014	31/03/2014	27/12/2013	0.2336158	90	58,403.94	58,182
8	100,000,000	31/03/2014	30/06/2014	30/06/2014	27/03/2014	0.2638339	91	66,691.34	66,370
9	100,000,000	30/06/2014	30/09/2014	30/09/2014	26/06/2014	0.3039353	92	77,672.35	77,211
10	100,000,000	30/09/2014	31/12/2014	31/12/2014	26/09/2014	0.3509121	92	89,677.54	89,034
								Total floating cash flows	**477,884**

Pay EUR Fixed								
Num	Notional	AccSt	AccEnd	PayDt	Rate	Days	SettleAmt	DiscAmt
1	100,000,000	30/06/2012	28/09/2012	28/09/2012	3.0	88	-733,333.33	0
2	100,000,000	28/09/2012	31/12/2012	31/12/2012	3.0	93	-775,000.00	0
3	100,000,000	31/12/2012	28/03/2013	28/03/2013	3.0	88	-733,333.33	-733,029
4	100,000,000	28/03/2013	28/06/2013	28/06/2013	3.0	90	-750,000.00	-749,091
5	100,000,000	28/06/2013	30/09/2013	30/09/2013	3.0	92	-766,666.67	-765,118
6	100,000,000	30/09/2013	31/12/2013	31/12/2013	3.0	90	-750,000.00	-747,841
7	100,000,000	31/12/2013	31/03/2014	31/03/2014	3.0	90	-750,000.00	-747,146
8	100,000,000	31/03/2014	30/06/2014	30/06/2014	3.0	90	-750,000.00	-746,388
9	100,000,000	30/06/2014	30/09/2014	30/09/2014	3.0	90	-750,000.00	-745,546
10	100,000,000	30/09/2014	31/12/2014	31/12/2014	3.0	90	-750,000.00	-744,615
							Total fixed cash flows	**-5,978,776**

Swap fair value: +477,884 - 5,978,776 = -5,500,892

Final conclusions on Interest Rate Swaps

- The fair value of a swap at inception is zero.
- Once the swap is struck, its market value will generally no longer be zero because:
  - the interest rates will change over time
  - even if interest rates do not change, the market value of swaps will change over time due to the changes in the implicit forward rates.
- A buyer wishing to exit the swap could enter into an offsetting swap with the original counterparty or whomever offers the best price.
- In the event that a swap counterparty defaults, the payments would cease and the losses associated with the failed swap would be mitigated
- The real exposure in a swap is not the total notional principal but the mark-to-market value of the differentials.

Variations on Interest Rate Swaps - beyond the plain vanilla

The characteristics of the notional principal or the payments derived from the previous examples are altered to go beyond the plain vanilla swaps.

- Amortizing Swap (notional principal decreases over time)
- Accreting Swap (notional principal increases over time)
- Seasonal Swap (notional principal varies over time by schedule)
- Roller Coaster Swap (mix of accreting and amortizing swaps or also switches in payer and receiver swaps)
- Basis Swap (floating to floating based on different indexes)

3. Cross Currency Swap

Definition:

A cross currency swap is an exchange of interest payments in one currency for interest payments in another currency. The interest rates can both be fixed, both floating or one of each. As well as the exchange of interest payments there is also an exchange of the principals (in two different currencies) at the beginning of the contract and at the end.

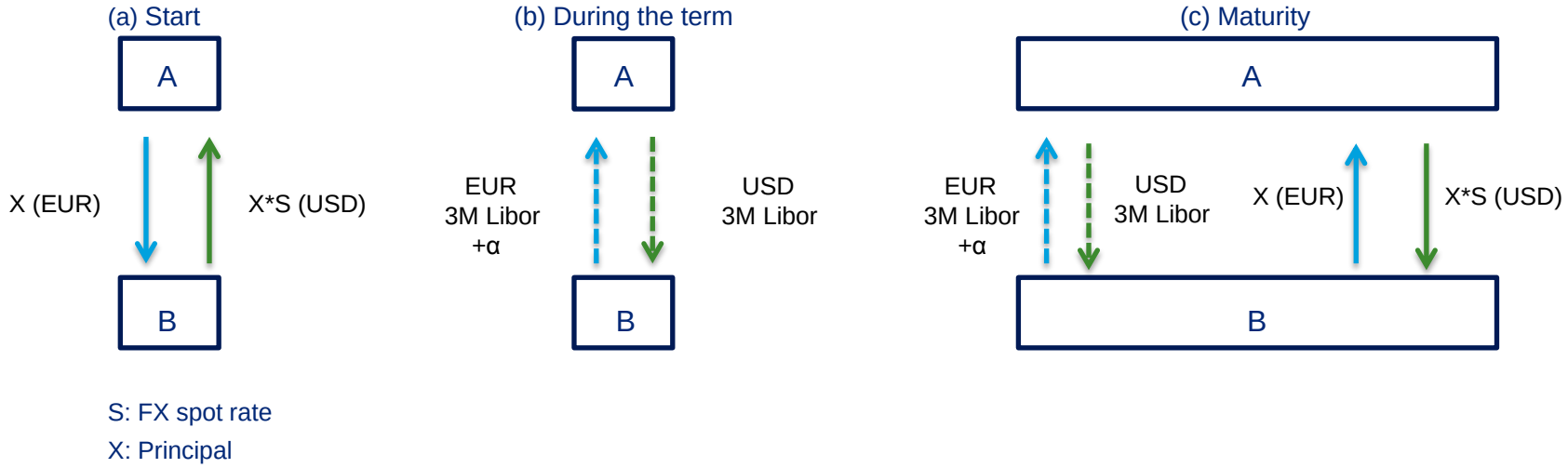
Cross-currency swaps have been employed to fund foreign currency investments, both by financial institutions and their customers, including multinational corporations engaged in foreign direct investment. They have also been used as a tool for converting currencies of liabilities, particularly by issuers of bonds denominated in foreign currencies. Mirroring the tenor of the transactions they are meant to fund, most cross-currency swaps are long-term, generally ranging between one and 30 years in maturity.

Example:

Let's take the example of a Euro / US dollar cross currency swap set up between two companies, A and B. The swap can be broken down into three elements:

- **The initial exchange of principal**
- **Interest payments**
- **The final exchange of principal**

Also let S denote the spot rate between Euro and US dollars at the start of the swap and X denote the principal.



S: FX spot rate

X: Principal

At the start of the contract, A borrows X*S USD from, and lends X EUR to B. During the contract term, A receives EUR 3M Libor + α from, and pays USD 3M Libor to B every three months. When the contract expires, A returns X·S USD to B and B returns X EUR to A, where S is the same FX spot rate as of the start of the contract.

The swap above is an example of a **floating for floating cross currency basis swap**. In a floating-for-floating cross currency swap, the interest rate on both legs are floating rates. Such swaps are also called cross currency basis swaps. Floating-for-floating swaps are commonly used for major currency pairs, such as EUR/USD and USD/JPY. Other examples of cross currency swaps include a **floating for fixed** cross currency swap where the interest rate on one leg is floating, and the interest rate on the other leg is fixed and **fixed for fixed** cross currency swap where both legs have fixed interest rates.

In our example on the previous slide, we note that B receives US Libor flat but must pay A Euribor + α. α represents **the currency basis,** that is the cost of funding in one currency versus investing in another currency. In other words, the currency basis reflects counterparty risk, namely the credit quality of the banks quoting LIBOR. In our example, A requires α as an additional compensation over the quoted Euribor rate to receive what is seen to be the worst currency i.e. Euros.

Cross Currency Swap Fair Valuation

To value a cross currency swap we need to calculate the present values of the cash-flows in each currency for both legs of the swap. This is easily done, requiring the discount factors for the two currencies. Once this is complete, we can then convert one leg's present value into the other currency using the current spot exchange rate.

So let's take our previous example (from A's perspective) and construct a swap fair valued as of 31 December 2012 where the EUR/USD exchange rate was 1.3197:

USD Notional:	$100m
EUR Notional:	€125.8m
A pays:	3m US Libor (ACT/360)
A receives:	3m Euribor + 30bps (ACT/360)
Trade date:	30 June 2012
Effective date:	30 June 2012
Maturity:	31 December 2014

Spot on trade date was 1.258

Cash Flows

Pay USD Float											
Num	Notional	AccSt	AccEnd	PayDt	Reset Dt	Rate	Days	Interest	Principal	SettleAmt	DiscAmt
1	100,000,000	30/06/2012	28/09/2012	28/09/2012	28/06/2012	0.4606	90	-115,150	0	-115,150	0
2	100,000,000	28/09/2012	31/12/2012	31/12/2012	26/09/2012	0.36225	94	-94,588	0	-94,588	0
3	100,000,000	31/12/2012	28/03/2013	28/03/2013	27/12/2012	0.311	87	-75,158	0	-75,158	-75,108
4	100,000,000	28/03/2013	28/06/2013	28/06/2013	26/03/2013	0.3021203	92	-77,209	0	-77,209	-77,097
5	100,000,000	28/06/2013	30/09/2013	30/09/2013	26/06/2013	0.3271988	94	-85,435	0	-85,435	-85,239
6	100,000,000	30/09/2013	31/12/2013	31/12/2013	26/09/2013	0.3485061	92	-89,063	0	-89,063	-88,779
7	100,000,000	31/12/2013	31/03/2014	31/03/2014	27/12/2013	0.3785137	90	-94,628	0	-94,628	-94,238
8	100,000,000	31/03/2014	30/06/2014	30/06/2014	27/03/2014	0.4094123	91	-103,490	0	-103,490	-102,957
9	100,000,000	30/06/2014	30/09/2014	30/09/2014	26/06/2014	0.4549413	92	-116,263	0	-116,263	-115,529
10	100,000,000	30/09/2014	31/12/2014	31/12/2014	26/09/2014	0.5060078	92	-129,313	-100,000,000	-100,129,313	-99,368,559

Total USD cash flows -100,007,506

Receive EUR Float												
Num	Notional	AccSt	AccEnd	PayDt	Reset Dt	Rate	Spread	Days	Interest	Principal	SettleAmt	DiscAmt
1	125,800,000	30/06/2012	28/09/2012	28/09/2012	28/06/2012	0.653	30	90	299,719	0	299,719	0
2	125,800,000	28/09/2012	31/12/2012	31/12/2012	26/09/2012	0.222	30	94	171,465	0	171,465	0
3	125,800,000	31/12/2012	28/03/2013	28/03/2013	27/12/2012	0.185	30	87	147,448	0	147,448	147,476
4	125,800,000	28/03/2013	28/06/2013	28/06/2013	26/03/2013	0.1835763	30	92	155,464	0	155,464	155,522
5	125,800,000	28/06/2013	30/09/2013	30/09/2013	26/06/2013	0.1719225	30	94	155,016	0	155,016	155,102
6	125,800,000	30/09/2013	31/12/2013	31/12/2013	26/09/2013	0.1991208	30	92	160,462	0	160,462	160,569
7	125,800,000	31/12/2013	31/03/2014	31/03/2014	27/12/2013	0.2336158	30	90	167,822	0	167,822	167,937
8	125,800,000	31/03/2014	30/06/2014	30/06/2014	27/03/2014	0.2638339	30	91	179,296	0	179,296	179,409
9	125,800,000	30/06/2014	30/09/2014	30/09/2014	26/06/2014	0.3039353	30	92	194,158	0	194,158	194,249
10	125,800,000	30/09/2014	31/12/2014	31/12/2014	26/09/2014	0.3509121	30	92	209,261	125,800,000	126,009,261	126,032,558

Total EUR cash flows 127,192,823

Swap Fair Value + €127,192,823 - $100,007,506 / 1.3197 = + 27,185,317

4. Contracts for Difference

Definition:

A **contract for difference** (or CFD) is a contract between two parties, typically described as "buyer" and "seller", stipulating that the seller will pay to the buyer the difference between the current value of an asset and its value at contract time. (If the difference is negative, then the buyer pays instead to the seller.)

In effect CFDs are financial derivatives that allow traders to take advantage of prices moving up (**long positions**) or prices moving down (**short positions**) on underlying financial instruments and are often used to speculate on those markets. For example, when applied to equities, such a contract is an equity derivative that allows traders to speculate on share price movements, without the need for ownership of the underlying shares.

CFD Key Features:

- **Leverage:** One of the benefits (and risks) of trading CFDs is that they are traded on margin meaning that they provide the trader with leverage. Leverage involves taking a small deposit and using it as a lever to borrow and gain access to a larger equivalent quantity of assets. The margin requirements on CFDs are low meaning that only small amount of money is required to take large positions.

- **Commission:** Commission is charged on CFDs just like on an ordinary share trade, the commission is calculated on the total position value not the margin paid.

Since CFDs are traded on margin if you hold a position open overnight it will be subject to a finance charge. Long CFD positions are charged interest if they are held overnight, Short CFD positions will be paid interest. The rate of interest charged or paid will vary between different brokers and is usually set at a % above or below the current LIBOR (London Inter Bank Offered Rate). The interest on position is calculated daily, by applying the applicable interest rate to the daily closing value of the position. The daily closing value is the number of shares multiplied by the closing price. Each day's interest calculation will be different unless there is no change at all in the share price.

Example

Suppose Vodafone shares are currently trading at a bid – ask price of 140p – 140.5p. An investor believes that Vodafone is going to rise and places a trade to buy 10,000 shares as a CFD at 140.5p. The total value of the contract would be £14,050 but they would only need to make an initial 10% deposit (initial margin) £1,405.

Assume the commission on the trade is 20% meaning that there is a charge of £28.10 (£14,050 * 20%). As this is a CFD, the investor has no stamp duty to pay.

A week later the investor’s prediction was correct and Vodafone has risen to 145p – 145.5p and they decide to close their position by selling 10,000 Vodafone CFDs at 145p. The commission on this trade is £29 (£14500 * .20%).

The profit on the trade is calculated as follows:

Opening Level	140.50p
Closing Level	145.00p
Difference	4.50p
Profit on trade, (4.5p x 10,000)	**£450.00**

To calculate the overall profit you must take into account the commission and financing charges on the deal (assume a financing charge of £12.50 for the week):

Profit On Trade	£450.00
Commission	-£57.10
Financing Charge	-£12.50
Overall Profit On the Trade	**£380.40**

5. Forward Contracts & Futures

Forwards and Futures

Definition

A forward contract is an agreement where one party promises to buy an asset from another party at a specified price at a specified time in the future. No money changes hands until the delivery date or maturity of the contract. The terms of the contract make it an obligation to buy the asset at the delivery date, there is no choice in the matter. The asset could be a stock, a commodity or a currency.

A futures contract is very similar to a forward contract. Futures contracts are usually traded through an exchange, which standardizes the terms of the contracts. The profit or loss from the futures position is calculated every day and the change in this value is paid from one party to the other. Thus with futures contracts there is a gradual payment of funds from initiation until maturity.

Uses

- Hedging (forward/future)
- Speculation (future)

Example

For the purpose of this session, we will focus primarily on FX forward contracts

FX Forward

Suppose an Irish firm expects to pay GBP 10m in UK purchases over the next month.

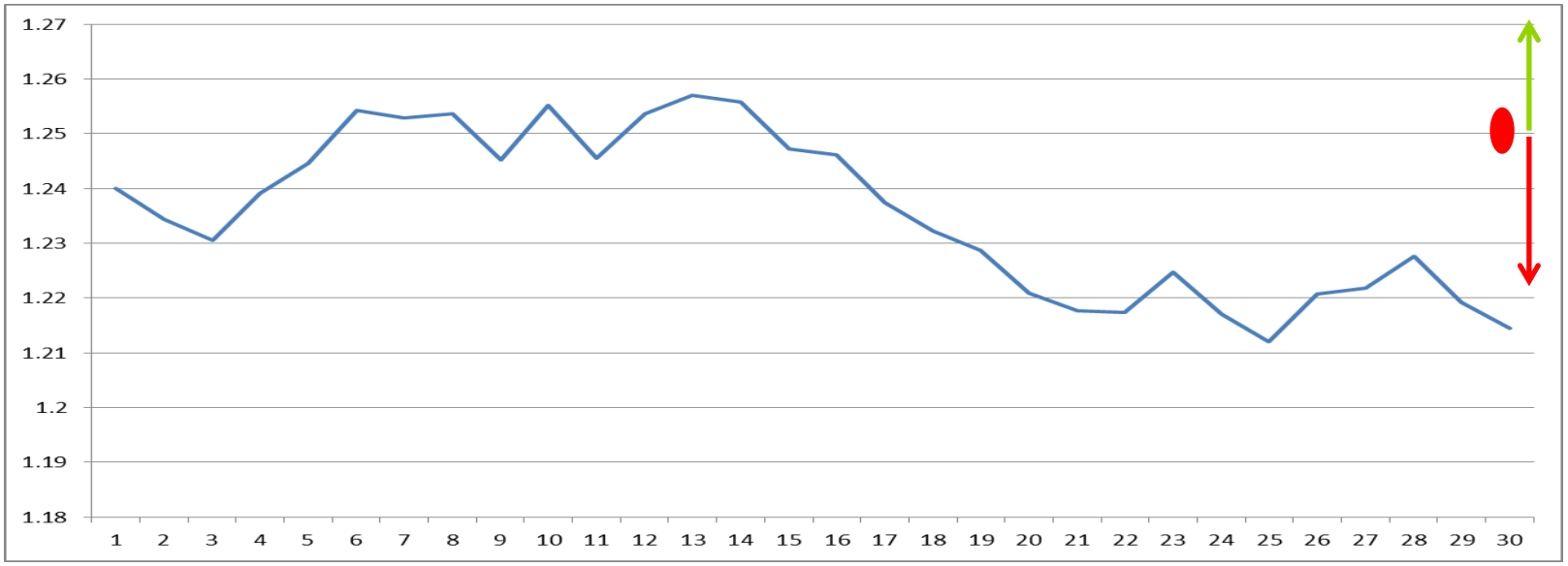
- The Irish firm is clearly exposed to a foreign exchange risk.
- The firm is worried that the GBP might appreciate over the next month.

The Irish firm could avoid their potential currency risk by entering into a forward contract.

The Irish firm negotiates a price of 1.25 GBP/EUR, where in 30 days it will sell EUR 12.5m in exchange for GBP 10m.

Example continued…

The evolution of the GBP/EUR spot rate is shown below:



On the settlement date, had it instead sold EUR in the spot market, it would have sold EUR 12.15m in exchange for GBP 10m. Therefore, the settlement of the FX forward would generate a loss of EUR 350,000.

Fair Valuation

Foreign Exchange forward rates, Foreign Exchange spot rates, and interest rates are interrelated by the interest rate parity (IRP) principle.

This principle is based on the notion that there should be no arbitrage opportunity between the Foreign Exchange spot market, Foreign Exchange forward market, and the term structure of interest rates in the two countries.

$$\text{FX forward} = FXSpot * \frac{\left(1 + i_f * \frac{t_f}{base_f}\right)}{\left(1 + i_d * \frac{t_f}{base_f}\right)} \quad \text{, also} \quad \text{FX forward} = FXSpot \pm \text{basis points}$$

When ascertaining the fair value of a FX forward, the question to answer is:

What would it cost to close out the trade based on the current FX forward rate? Then, discount back the locked in cash-flows to present value using the appropriate discount factors.

Fair Valuation continued…

In our example:

1	Discount EUR 12.5m using a EUR discount factor for the month end
2	Discount GBP 10m using a GBP discount factor for the month end
3	Convert the discounted GBP amount to EUR at today's spot rate
4	Net the positive and negative EUR amounts to determine fair value
5	Note that on day 1, the agreed rate would have been the month end forward rate (neglecting fees), and the fair value would be zero.

6. Options

Options

Definition:

A contract in which the *writer (seller)* of the option grants the *holder (buyer)* the right, but not the obligation, to buy from or to sell to the writer an *underlying asset* at a fixed *strike (exercise) price* at or before an *exercise date*.

		CALL Option to buy	PUT Option to sell
Holder	**Pays premium**	**Right to buy** *Grants its holder the right to buy the underlying asset*	**Right to sell** *Grants its holder the right to sell the underlying asset*
Writer	**Receives premium**	**Obligation to sell** *Should the holder exercise the option*	**Obligation to buy** Should the holder exercise the option

Preliminary notes on Options

- ***European*** options can be exercised only at the exercise date.

- ***American*** options can be exercised anytime between the date they are written and the exercise date.

- ***Bermudan*** options can only be exercised at pre-defined dates between the effective date and the maturity date.

Preliminary notes on Options continued…

In the Money; an option whose exercise today would generate a profit, given the current market price of the underlying asset.

Calls (puts) with exercise prices lower (higher) than the current price of the underlying

Out of the Money; an option whose exercise today would generate a loss.

Calls (puts) with exercise prices higher (lower) than the current price of the underlying

At the Money; the exercise price is roughly equal to the current price of the underlying.

Financial options can be found in a vast number of underlying: equities, interest rates, currencies, commodities, indexes, credit spreads,…

For the purpose of this session, we will focus primarily on equity options.

Example:

A European call option on 100 Apple shares at a strike price of USD 700 that expires on 31 December 2013 gives the call option holder the right to buy 100 Apple shares for USD 700 a share prior to 31 December 2013. The writer of this option is obligated to sell the share at this price if and when the holder decides to exercise the option.

Suppose, on 31 December 2013, the Apple stock is trading at USD 750 per share, the option holder could exercise his/her right to buy the shares at a discount of USD 50 per share. If the price of the asset is lower than the strike price, the option is not exercised.

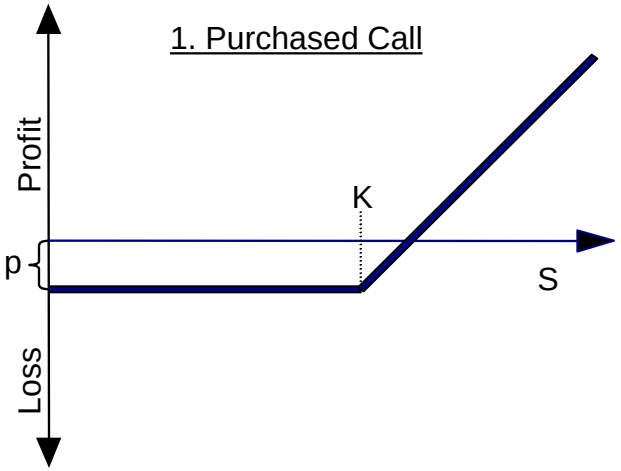
The gross profit on a financial option investment is the difference between the current asset price and the exercise price. The net profit is the difference between the gross profit and the price paid for the option initially. (Remember the holder must pay to acquire the right to buy the asset).

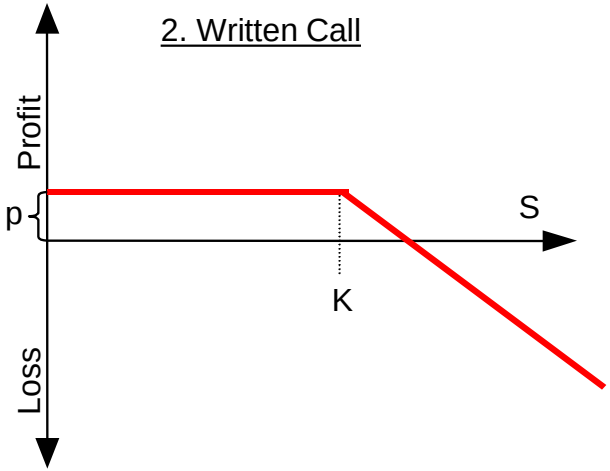
Call:	Put:
Gross Profit = max (0, S – K) Net Profit = [max (0, S – K)] – p	Gross Profit = max (0, K – S) Net Profit = [max (0, K – S)] – p

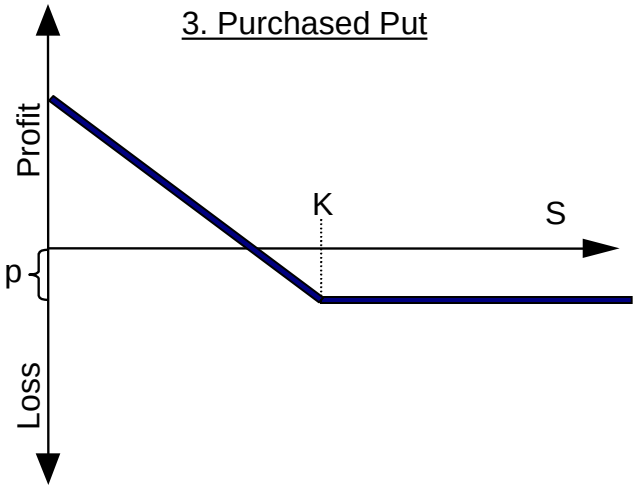
Where:

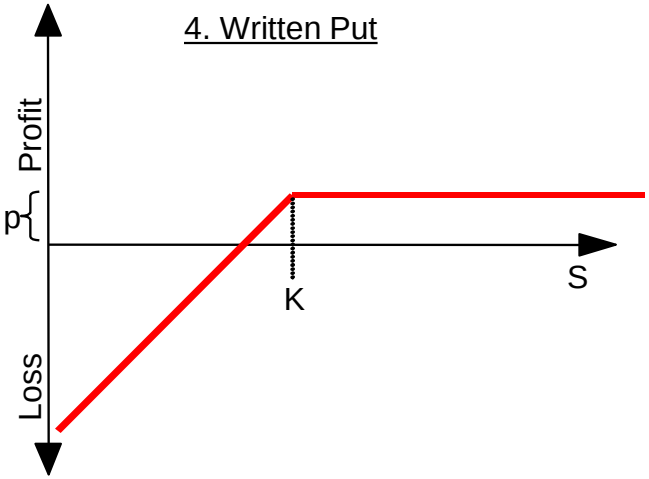
S = the price of the underlying asset.
K = the strike/exercise price.
p = the premium paid for the option.

Option profit/loss diagrams









Fair value of options

The fair value of options is related to the present value of probability weighted payoffs in both up-move and down-move states. To value these products, financial option models are used: Black & Scholes, Black-76, Binomial, Monte Carlo, Hull & White,...

Options will generally have a value at inception. Also often see offsetting constructions, e.g. zero cost collar (cap and floor – long one option, short the other option).

Valuation for holder of option can never be negative.

Premium = Intrinsic Value + Time Value

Factors that affect values of vanilla options:

1. Spot price
2. Exercise price
3. Volatility of the underlying
4. Time to expiration
5. Interest rates
6. Dividend pay-out (options on equities)

Interest rate caps and floors

Interest rate caps and floors are effectively call and put options on the underlying interest rate.

Caplet - a series of European interest rate call options used to protect against rate moves above a set strike level

Floorlet - a series of European interest rate put options used to protect against rate moves below a set strike level

For example, the buyer of a Cap receives a cash payment from the seller. The payoff is the maximum of 0 or Euribor 3m minus 4%.

Correspondingly the buyer of a Floor receives a cash payment from the seller. The payoff is the maximum of 0 or 2% minus LIBOR 3M.

7. Total Return Swaps

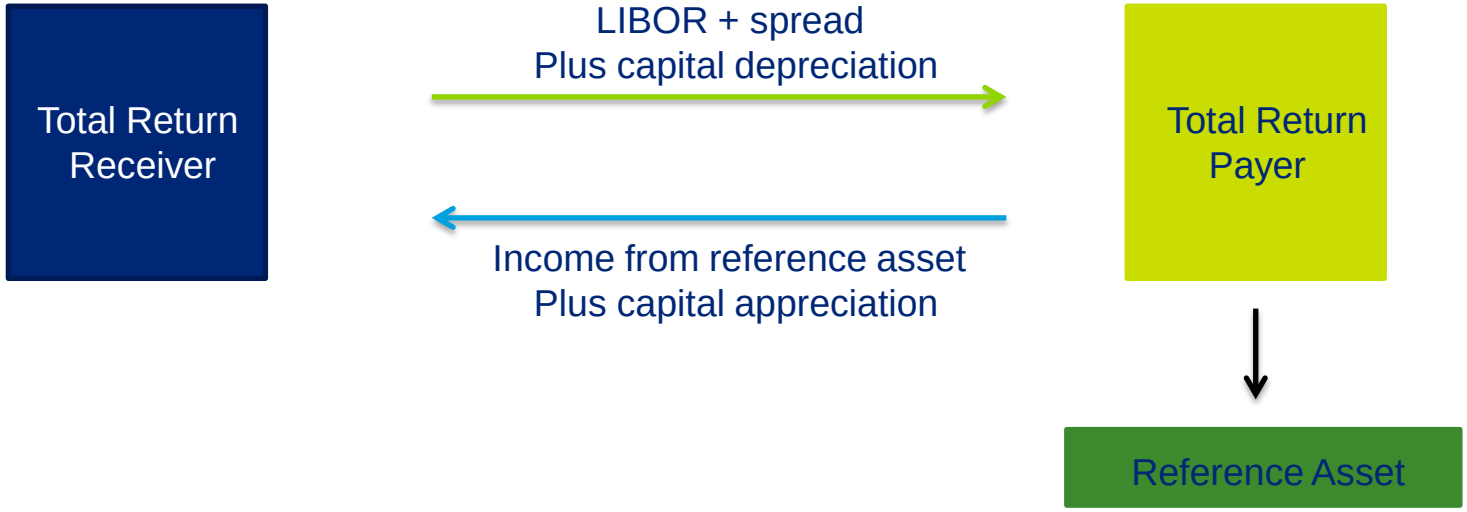
Definition

A **Total Return Swap** (TRS) is where two counterparties swap the total return of a single asset or basket of assets in exchange for periodic cash flows, typically a floating rate such as LIBOR +/- a spread and a guarantee against any capital losses. A TRS is similar to a plain vanilla swap except the deal is structured such that the total return (cash flows plus capital appreciation/depreciation) is exchanged, rather than just the cash flows.

- Total return swaps allow the party receiving the total return to gain exposure and benefit from a reference asset without actually having to own it. These swaps are popular with hedge funds because they get the benefit of a large exposure with a minimal cash outlay.

- A TRS is made up of two legs, the **Return Leg** (or Total Return Leg) and the **Funding Leg**. The reference asset or basket of assets exists on the Return Leg. The cash flow payment stream exists on the Funding Leg.

- The Return Leg is generally made up of two components: cash flows and capital appreciation of the reference asset(s). The Funding Leg also has two components: floating coupons based on LIBOR +/- a spread and payments to offset any capital depreciation of the reference asset(s).



The TRS is initially structured so the Net Present Value (NPV) to both parties is at or close to zero. As time progresses, the TRS gains or loses value on each leg so that one of the counterparties obtains a profit.

Payments Received by Total Return Receiver:

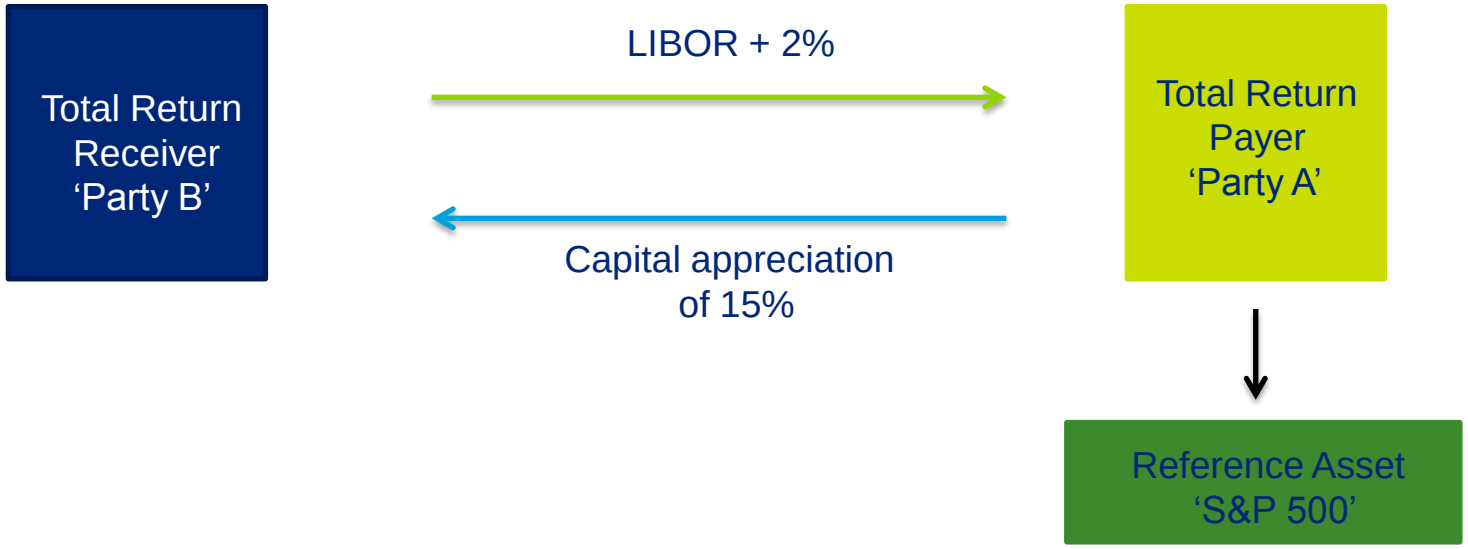
- If reference asset is a bond, the bond coupon
- The price appreciation, if any, of the reference asset since the last fixing date
- If the reference asset is a bond that defaulted since the last fixing date, the recovery value of the bond

Payments Received by the Total Return Payer:

- The periodic floating payment (usually LIBOR +/- a spread)
- The price depreciation, if any, of the reference asset since the last fixing date
- If the reference asset is a bond that defaulted since the last fixing date, the par value of the bond

Example

Two parties may enter into a one-year total return swap where Party A receives LIBOR + fixed margin (2%) and Party B receives the total return of the S&P 500 on a principal amount of $1 million. If LIBOR is 3.5% and the S&P 500 appreciates by 15%, Party A will pay Party B 15% and will receive 5.5%. The payment will be netted at the end of the swap with Party B receiving a payment of $95,000 ($1 million x 15% - 5.5%).



Advantages:

- **Leverage:** The parties do not transfer actual ownership of the assets which allows for reduced up-front capital to execute a valuable trade. This makes TRSs very popular with hedge funds.

- **Operational Efficiency:** all settlements, interest collections, payment calculations, consent requests, reporting, and tracking associated with transferring ownership of an asset can be avoided. Asset administration is left to the Total Return Payer so the Total Return Receiver never has to deal with these issues.

- **Flexible:** a TRS can be based on virtually any asset or series of assets. Furthermore, the life of a TRS contract and its payment dates are up to the parties, and need not match the payment or expiration dates of the reference asset(s).

Disadvantages:

- **Investment Return Risk:** is born by the Total Return Receiver in a TRS. While the Total Return Payer retains the reference asset(s) on its balance sheet, the Total Return Receiver assumes the risk of capital losses by making guarantee payments to the Total Return Payer that offset any drop in asset value.

- **Counterparty Risk:** many hedge funds (Total Return Receivers) take leveraged risk to generate greater returns. If a hedge fund makes multiple TRS investments in similar assets, any significant drop in the value of those assets would leave the fund in a position of making ongoing coupon payments plus capital loss payments against reduced or terminated returns from the asset(s). Since most swaps are executed on large notional amounts between $10 million and $100 million, this could put the Total Return Payer (typically a commercial or investment bank) at risk of a hedge fund's default if the fund is not sufficiently capitalized. Counterparty risk may be reduced by shortening the maturity of the TRS, increasing collateral required, or third party balance sheet auditing and verification.

Useful references

Paul Wilmott on Quantitative Finance, Paul Wilmott

Option, Future and Other Derivatives, John C. Hull

Credit Derivatives: Trading, Investing and Risk Management, Geoff Chaplin

Derivatives Markets, Robert McDonald