Equity and Equity Index Derivatives
Trading Strategies

eurex

Please Note

The definitions of "basis" and "cost of carry" have been changed in this version of the brochure.

In previous versions, the following definitions were used:

Basis = Futures Price – Price of Cash Instrument
Cost of Carry = Basis

In this version, the following definitions are used:

Basis = Price of Cash Instrument – Futures Price
Cost of Carry = Basis

These changes have been made in order to ensure that definitions of both items are consistent throughout Eurex materials, including the Trader Examination and corresponding preparatory material.

Equity and Equity Index Derivatives

Trading Strategies

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Futures Pricing

Equity Index Futures Strategies

Introduction to Stock Options and Equity Index Options

Options Pricing

Important Risk Parameters – "Greeks"

Strategies for Stock Options and Equity Index Options

Appendix

Brochure Structure and Objectives

This brochure presents the equity and equity index derivatives traded at Eurex and illustrates their most significant applications. The Eurex product range comprises options on European and US equities, as well as futures and options on various international indexes. For a better understanding of the strategies, you will be introduced to some of the fundamental terms used in securities management that are significant to the trading strategies described in the brochure.

Fundamental Terms of Securities Management

Portfolio Theory

Portfolio theory – the basis of modern securities management. Its objective is to derive rules on a portfolio's optimum structure from the statistical analysis of the yields (or returns) on securities. While traditional equity valuation is based on the assessment of individual shares, portfolio theory concerns itself with the interaction of different issues.

In addition to observing the return of securities, portfolio theory establishes a new risk parameter. Using return as the only basis for decision would result in a distinct order of preference. Every investor would invest his assets completely in the highest-yielding shares. The concept of a diversified investment covering a multitude of different securities – and how it works in practice – cannot be explained until the risk involved in choosing different financial investments is taken into consideration.

One of the most important studies on portfolio theory is the "Portfolio Selection Model" developed by H. M. Markowitz.

Return

The aggregate return of an equity investment comprises potential dividends, subscription rights and price performance, based on the price at the beginning of the investment period. Hence, the exact return can be determined at the end of a specific period. However, the estimated future return – rather than the historical return – is decisive for the investment. A portfolio return in absolute terms is the weighted mean of the return of the securities held in the portfolio.

Risk: Volatility and Correlation

Portfolio theory calculates the risk of an investment according to the extent by which the return fluctuates – positively and negatively – from its mean. The statistical measure used here is standard deviation, or volatility. The crucial factor is that, in contrast to the return, the volatility of a portfolio cannot be calculated from the weighted mean of the volatilities of securities contained in that portfolio. Rather, portfolio volatility depends on the extent to which the returns of individual portfolio components perform in line (but not necessarily in parallel) with each other.

The statistical measure here is the correlation coefficient (or simply "correlation"), which can assume a theoretical value of between minus one and plus one. A coefficient of minus one means that the returns in question are totally divergent. Return fluctuations can be eliminated through investing in a suitable securities mix. With a coefficient of one, returns are completely uniform. Only in this case does the portfolio risk correspond to the weighted average of the volatility of the individual shares. Where yields do not correlate, the risk associated with individual shares is reduced but not eliminated entirely.

Diversification and Efficient Portfolios

Where correlation is not totally positive, risk can be reduced by diversifying the investment among several shares. According to the assumptions of portfolio theory, portfolios are only suitable where a maximum return is anticipated for a specific level of risk, or where a minimum risk is undertaken for a specified anticipated return. These portfolios are referred to as "efficient portfolios" (function marked in blue on the diagram on page 9).

Capital Market Theory

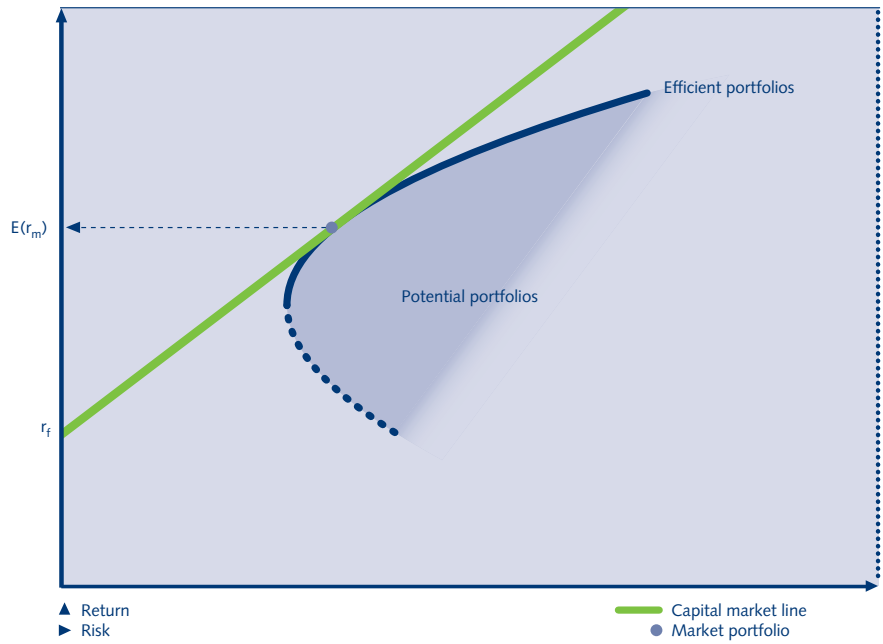
Capital market theory develops approaches for the valuation of securities assuming market equilibrium. The best-known model is the "Capital Asset Pricing Model"[1] (CAPM), which implemented the beta factor (see below) as an indicator for systematic risk (overall market risk).

Capital Asset Pricing Model

The CAPM builds on the rules of portfolio theory, adding a perspective that is based on the entire market. Unlike the portfolio theory, the anticipated returns are no longer determined exogenously, but are explained within the model (endogenously).

In accordance with the observations of portfolio theory, the portfolio chosen by investors among the various efficient portfolios available depends on their individual appetite for risk. Assuming the concurrent existence of a risk-free investment, this results in a unique market portfolio that is chosen by every investor and which can then be combined with the risk-free investment. The aggregate of these combinations is referred to as capital market line (CML).

[1] The CAPM was developed by Sharpe, Lintner and Mossin.



r_f = interest rate of a risk-free investment
$E(r_m)$ = anticipated return of the market portfolio m

A fully-diversified portfolio is only subject to overall market risk, in line with the capital market line. This risk component is known as "systematic", while risk that can be eliminated is referred to as "unsystematic".

Market equilibrium assumes that all shares that are subject to risk are held in the portfolio in line with their market capitalization. Where the return on a particular security is not risk-adjusted at any particular point in time, the market mechanism will regulate its present value so as to restore the equilibrium.

The return of individual issues can be determined, given market equilibrium, from the return of the market portfolio and the interest rate of the risk-free investment using the following equation:

$$E(r_i) = r_f + [E(r_m) - r_f]\,\beta_i$$

$E(r_i)$ = anticipated return of individual security i
r_f = interest rate of a risk-free investment
$E(r_m)$ = anticipated return of market portfolio m
β_i = beta factor of security i

The beta factor reflects the sensitivity of the share relative to the market. The following fundamental interpretations for various beta factor values can be derived directly from the definition:

Beta factor	Interpretation
< 1	The share price moves to a lesser degree than the market.
= 1	The share price movement is equal to that of the market.
> 1	The share price moves to a larger degree than the market.

It should be noted that the beta factor of a share covers only systematic risk. Unsystematic risk is not valued, since in market equilibrium, no premium is paid for risk components that can be eliminated.

Given that the assumptions on which the CAPM is based, which are beyond the scope of this brochure, the model cannot be tested in the form presented above.

Determining the Beta Factor from Historical Data

The empirical estimate of the beta factor is of special significance when using the Capital Asset Pricing Model. On the basis of historical data, the so-called market model equation is generally used here.

$$r_i = a_i + b_i r_m + u_i$$

r_i = return of individual security i
a_i = return component that is independent of the market (Y-axis intercept)
b_i = slope (sensitivity)
r_m = return of market portfolio (all available issues, weighted by capitalization, or equity index)
u_i = random error

The estimated beta factor in this equation corresponds to the regression parameter bi.[2] In this scenario, however, the point where the line crosses the Y-axis (in other words: the return given a market return of zero) does not represent a risk-free rate, but a return that is independent of the overall market. At the same time, the estimate reflects the systematic and unsystematic risk.

2 This parameter is calculated on the basis of returns r_i and r_m, rather than using the respective difference to the risk-free return: $(r_i - r_f)$ or $(r_m - r_f)$. In terms of the sensitivity of individual shares relative to the total market, both methods of calculation result in the same outcome, insofar as the risk-free return r_f is constant.

Using Portfolio Theory and Capital Market Theory in Securities Management

As a consequence of the portfolio theory, volatility as a measure of risk and the practice of diversification to reduce portfolio risk have become important factors in securities management. Broad diversification is required when using index-based derivatives to hedge the portfolios that are described in the brochure.

Using the Beta Factor

The beta factor of the CAPM is used as an indicator for the sensitivity of a share or portfolio relative to the overall market. It is useful to remember here that the beta factor of a portfolio corresponds to the weighted mean of the beta factors of all shares held in the portfolio. This relationship simplifies the management of the portfolio beta, by selecting shares with varying degrees of sensitivity. The objective of an adjustment can be, for example, to increase sensitivity in the event of an anticipated market rally, or to reduce it if a downturn is anticipated. It is also conceivable that the portfolio's performance could be fully neutralized against market movements (a sensitivity of zero). The use of derivatives, which will be presented below, is appropriate for such a total hedge.

Correlation and Diversification

It only makes sense to use the beta factor as an indicator of sensitivity when the security shows a high degree of correlation to the overall market. The correlation is a measure of the proportion of return fluctuation that can be explained by reference to the overall market. If the correlation is high, i.e. close to one, the volatility of the portfolio can be explained to a large degree by market movements. A lot can be explained by the beta factor. While share-specific risk in this case is low, market risk on the other hand is high. Where the correlation is low (close to zero), market developments have little influence on the portfolio's volatility. Share-specific risk becomes particularly important here.

In summary, unsystematic risk is eliminated by portfolio diversification, while systematic risk is managed through the beta factor.

Characteristics of Derivative Financial Instruments

Financial futures and options are so-called derivative financial instruments. In other words, their prices are derived from the underlying assets. The worldwide success of derivative instruments is attributable to the high volatility and associated risks experienced on currency, equity and bond markets. Managing these risks correctly is extremely important to every investor's success. The use of futures and options allows for efficient and cost-effective risk management.

Risk Transfer

The main benefit of using futures and options is that it allows the transfer of risks. Market participants often have different perceptions of risk. One investor for example wants to avoid incurring losses on his portfolio, while a less risk-averse market participant wants to deliberately undertake greater risk, in order to exploit profit potential by forecasting market development correctly. With the help of futures and options, investors can transfer undesired risks to other market participants.

Leverage Effect

One of the major features of derivative trading is the fact that the invested capital is small relative to the sums involved in a comparable cash market transaction. This means that larger sums can be controlled by investing (or pledging) a small capital amount. In percentage terms, the price fluctuations of futures and options, relative to the invested capital or to the pledged collateral, are therefore considerably greater than those of the underlying instrument. This is referred to as the leverage effect. Trading derivative instruments therefore offers great profit potential, but also carries major exposure to risk.

Transparency and Liquidity

Trading standardized contracts results in a concentration of order flows, thus ensuring market liquidity. High liquidity means that major buy or sell orders can be placed and executed at any time, without overly impacting upon prices.

Electronic trading on Eurex guarantees extensive transparency of prices, volumes and executed transactions. This also contributes to an attractive market.

Flexibility

Standardized futures and options contracts can be traded on a central exchange such as Eurex. This guarantees investors a high degree of flexibility: they can establish long or short positions at any time, in line with their market assessment and appetite for risk. They can react quickly and flexibly to changes in the market outlook, for example, by closing out their position.[3]

Time Difference between Conclusion and Settlement of Transactions

One of the main differences between futures and options transactions compared with those of the cash market lies in the timing between concluding the agreement (i.e. the time a trade takes place) and its settlement. Cash market transactions are distinguished by the short time period between trading and settlement (usually two business days). In contrast, futures and options are not settled until a contractually-agreed settlement date often far in the future. This allows investors to sell instruments they do not actually hold in their portfolio.

Differentiating between Unconditional and Conditional Forward Transactions

Unconditional forward transactions (Futures)	**Conditional forward transactions** (Options)
The **obligation** to buy or to sell a specific underlying instrument, at a price agreed upon today, at a specific date in the future.	The **right** to buy (call) or to sell (put) a specific amount of an underlying instrument, at a price agreed upon today (exercise price), on or up to the Last Trading Day (American-style option).
• Unlimited risk exposure • Unlimited profit potential • Neutralizing risks • No premium payment	• Limited risk exposure for the buyer • Very high profit potential • Protection against risks • Premium payment

The characteristics of unconditional (futures) or conditional (options) forward transactions are explained in detail below.

3 Cf. section "Settlement or Close-Out".

Introduction to Equity Index Futures

Definition – What are Futures?

Futures are standardized forward transactions between two parties. They comprise the obligation,

...to take delivery of	Buyer	Long position	Long position
...or to deliver	Seller	Short position	Short position
...a specific (financial) instrument	Underlying instrument	e.g. the SMI® Index	e.g. the DAX® Index
...at a determined price	Futures price	6,355	4,810
...at a set point in time	Delivery date	15 March 2002	15 March 2002
...in a set amount	Contract size	CHF 10 per index point	EUR 25 per index point

Conclusion of the agreement (purchase/sale) and settlement (delivery/payment) take place at different points in time. The price is already determined at the conclusion of the agreement. Contrary to off-exchange (OTC) forward transactions (often simply referred to as "forwards"), the contractual terms (contract specifications) of a futures contract are standardized.

Futures Positions – Rights and Obligations

A futures position can either be "long" or "short":

Long position Buying a futures contract	**Short position** Selling a futures contract
At the maturity date, the buyer is obliged to take delivery of the underlying instrument of the futures contract (or settle in cash).	At the maturity date, the seller is obliged to deliver the underlying instrument of the futures contract (or settle in cash).[4]

[4] At maturity, the futures position is valued at the respective prevailing final settlement price. On the basis of this valuation, the corresponding cash amounts are either credited or debited.

Settlement or Close-Out

Futures contracts are settled through physical delivery or cash settlement. Given that an index is an abstract underlying instrument, and physical delivery of all underlying securities of an index is not realizable in practice, Eurex index futures are settled in cash at maturity.

Very few futures positions are held until maturity: the majority of contracts are closed out before. Where the price of a futures contract rises (falls), the original buyer (seller) of the contract can realize profit simply by selling (buying) the contract. Closing out by entering into a counter-transaction releases both parties from the obligation entered into.

Overview of Eurex Equity Index Futures

The following index futures are traded at Eurex:

Underlying instrument	Product code	Index multiplier
DAX®	FDAX	EUR 25
TecDAX®	FTDX	EUR 1
SMI®	FSMI	CHF 10
HEX25®	FFOX	EUR 10
Dow Jones EURO STOXX 50	FESX	EUR 10
Dow Jones EURO STOXX Market Sector Indexes		EUR 50
Automobiles	FESA	
Banks	FESB	
Energy	FESE	
Financial Services	FESF	
Healthcare	FESH	
Insurance	FESI	
Media	FESM	
Technology	FESY	
Telecommunication	FEST	
Utilities	FESU	
Dow Jones STOXX 50	FSTX	EUR 10
Dow Jones STOXX 600 Market Sector Indexes		EUR 50
Banks	FSTB	
Technology	FSTY	
Telecommunication	FSTT	
Healthcare	FSTH	
Dow Jones Global Titans 50	FGTI	EUR 100

Status as of 1 October 2002

Please refer to the "Eurex Products" brochure or to the Eurex website www.eurexchange.com for exact specifications of individual products. The most important components are explained here, using the example of an SMI® Future.

An investor buys:

… 5	Number of contracts and contract value	The value of one contract is CHF 10, multiplied by the futures price. In our example, the value of the SMI® Futures contract is CHF 317,750 (5 × CHF 10 × 6,355).
SMI®	Underlying instrument	The Swiss Market Index® is the underlying instrument of the futures contract.
… March	Maturity month	The three maturity months following the current date, within the cycle March / June / September / December are available as maturity months. SMI® Futures therefore have a maximum remaining lifetime of nine months. The Last Trading Day is the third Friday of the maturity month. The contracts are settled in cash.
… at 6,355	Futures price	It corresponds to the forward price of the SMI® at the time at which the agreement is concluded. The minimum price change (tick) of the SMI® Future is one index point, or CHF 10.

Margin

Futures Spread Margin and Additional Margin

Eurex Clearing AG, Eurex's integrated clearing house, is the central counterparty for each transaction. Clearing members are thus protected against the potential default of another market participant. To protect itself against a clearing member's insolvency, Eurex Clearing AG requires that margin collateral is pledged for each open long and short futures position. This serves to cover the maximum expected losses of the following exchange-trading day.

When calculating the margin collateral for futures, different margin rates are applied for spread positions and positions that do not form part of a spread (outright or "non-spread" positions).

Holding opposite long and short positions in different maturity months of the same futures contract is referred to holding a spread position. The high correlation between the individual components of these positions means that the Futures Spread Margin rates are lower than those for Additional Margin, which is charged for all non-spread positions. This margin collateral must be pledged in the form of cash or securities. Eurex Clearing AG's process of calculating margin collateral is described in detail in the brochure "Risk-Based Margining".

Leverage Effect

In the event of price fluctuations in the underlying instrument, the lower margin collateral relative to the equivalent futures position can result in a strong leverage effect.

Example:
An investor sells 10 SMI® Futures contracts at a price of 6,295. As a result, he has to pledge an Additional Margin of CHF 42,000 (margin rates as at 1 October 2002).

10 contracts × 10 CHF/index point × 420 index points (Additional Margin parameter)

The value of the position (market risk) however amounts to CHF 629,500.

10 contracts × 10 CHF/index point × 6,295 index points

Assuming the SMI® rises by 5 percent to 6,610 points, the value of these contracts is then CHF 661,000.

10 contracts × 10 CHF/index point × 6,610 index points

This represents a loss of CHF 31,500 for the investor.

CHF 629,500 – CHF 661,000 = CHF – 31,500

The loss of CHF 31,000 corresponds to a 75 percent impairment in value, based on the original CHF 42,000 of "invested" capital. Even the losses incurred on relatively small movements in the underlying instrument can account for a high percentage of the capital pledged as collateral.

Variation Margin

Equity index futures are not settled in full against cash at the final delivery date. Too much time would elapse before uncovering heavy losses potentially incurred by a market participant.

For Eurex Clearing AG to avoid this increased risk, all open futures positions are revalued at the end of each trading day. This process is referred to as mark-to-market, determining the effective profit and loss of the futures positions resulting from the daily market fluctuations. These amounts are subsequently settled through payment of the Variation Margin.

Calculating the Variation Margin for a new long futures position:	
	Daily futures settlement price
–	Futures purchase or selling price
=	Variation Margin

The daily settlement price of the SMI® Futures in the following example is 6,375 points. Five contracts were purchased at a price of 6,295 points.

Example of Variation Margin – SMI®:		
	CHF 318,750	(6,375 × CHF 10 × 5)
	CHF – 314,750	(6,295 × CHF 10 × 5)
=	CHF 4,000	

The buyer of the SMI® Future makes a profit of CHF 4,000 (80 points × CHF 10 per point × 5 contracts). He is thus credited with the Variation Margin.

The daily settlement price of the DAX® Future is 4,780 points. Ten contracts were bought at 4,910 points. This results in the following:

Example of Variation Margin – DAX®:		
	EUR 1,195,000	(4,780 × EUR 25 × 10)
	EUR – 1,227,500	(4,910 × EUR 25 × 10)
=	EUR – 32,500	

The buyer of the DAX® Future incurs a loss of EUR 32,500 (130 points × EUR 25 per point × 10 contracts). He is debited with the Variation Margin.

Calculating the Variation Margin whilst positions are open:	
	Futures daily settlement price on each exchange trading day
–	Futures daily settlement price on the previous exchange trading day
=	Variation Margin

Calculating the Variation Margin when closing out the contract:	
	Futures price of the closing transaction
–	Futures daily settlement price on the previous exchange trading day
=	Variation Margin

Calculating the Variation Margin at the contract's maturity date:	
	Final settlement price
–	Futures daily settlement price on the previous exchange trading day
=	Cash settlement

The daily settlement price and final settlement price are determined by Eurex according to the rules described in the contract specifications.

Futures Pricing

Price versus Performance Indexes

We have to initially determine what type of index the underlying instrument of the futures contract is. The underlying instrument of the DAX® and TecDAX® Futures are performance (or total return) indexes. The calculation of these indexes assumes that the dividend and subscription rights incurred on the respective shares are reinvested. The underlying instruments of the SMI® and the Dow Jones (EURO) STOXX Futures family are price indexes. These are not adjusted for dividend payments or capital adjustments.

Theoretical (Fair) Value

In theory, there are two possibilities available to investors wishing to enter into a long position to take on the market risk of the Dow Jones EURO STOXX 50 Index. They can either buy the various component shares, in line with the weighting of the Dow Jones EURO STOXX 50 Index on the cash market and hold these positions for the desired period of time, or buy a Dow Jones EURO STOXX 50 Futures contract (FESX) against provision of Additional Margin. Investors incur funding costs for the cash purchase, which may be offset by potential dividend income. No funding costs are incurred on the purchase of the Dow Jones EURO STOXX 50 Futures contract (FESX) – however, neither are dividends received.[5]

Assuming market efficiency where risk-free arbitrage is impossible, the outcome of both investment alternatives should be equal.

Time	Buying a future	Buying the shares
Today	Buying a futures contract	Buying the individual shares
During the futures' lifetime	Investing unused liquidity on the money market	Receipt of dividend payments (if any) and their investment on the money market
Futures maturity	**Portfolio value** Underlying instrument (Dow Jones EURO STOXX 50 Index) + Money market interest resulting from investment of unused liquidity	**Portfolio value** Value of the shares + Dividend payments

On the basis of the assumptions outlined above and the values of both portfolios, the following fundamental relationship between the index level and the futures price is derived:

Theoretical futures price = Underlying instrument + Funding costs – Dividend payments

5 For the purpose of simplification, the commitment of capital in the form of the Additional Margin is ignored. Tax effects on dividend payments are also not taken into consideration.

Or in mathematical terms:[6]

$$\text{Futures price} = C_t + C_t \times r_c \times \frac{T-t}{360} - d_{t,T}$$

Whereby:

C_t = *Underlying instrument, for example the index level*
r_c = *Money market interest rate (percent; actual/360)*
t = *Value date of the cash market transaction*
T = *Settlement value date of futures contract*
$T-t$ = *Remaining lifetime of futures contract*
$d_{t,T}$ = *Expected* dividend payments for period t to T

Basis

The difference between the cash index and the futures price is referred to as the basis. The basis (expressed in index points) is calculated as follows:

$$\text{Basis} = \text{Cash index} - \text{Futures price}$$

6 For the purpose of simplification, we have ignored potential profit from reinvesting dividends.

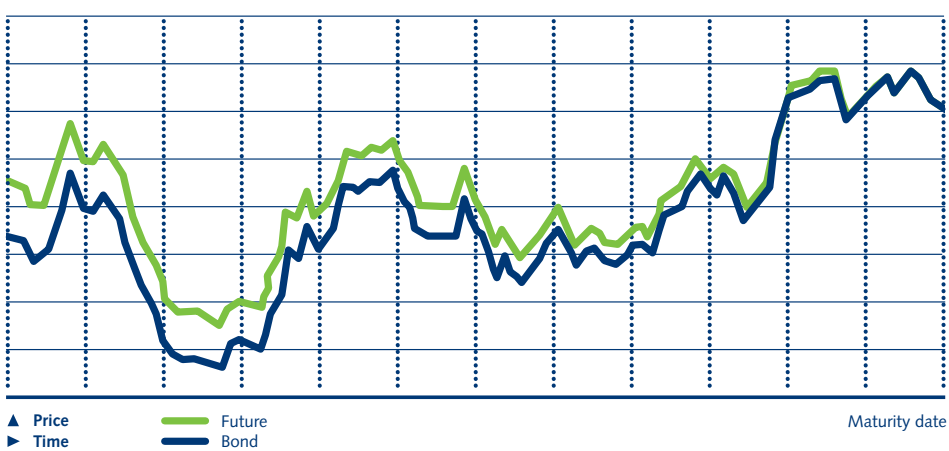
Cost of Carry = Basis

The futures price can be lower or higher than the underlying instrument, depending on whether the cost of carry is positive or negative.

Positive cost of carry	Negative cost of carry
The return exceeds the financing costs of the underlying instrument. When entering into a futures position, the investor must take into consideration the foregone income on the cash market investment. The futures price is therefore below the price of the underlying instrument or the index (discount).	If the funding costs are higher than the income from the cash position (i.e. dividends), the futures position is more attractive than the cash market investment. The futures price therefore exceeds the price of the underlying instrument or the index (premium).
The futures price is lower • the lower the price of the underlying instrument • the lower the interest rate and • the higher the dividend.	The futures price is higher • the higher the price of the underlying instrument • the higher the interest rate and • the lower the dividend.

The closer it moves towards maturity, the smaller the theoretical basis becomes (a process known as basis convergence). The basis is zero at the maturity date, and the futures price is equivalent to the price of the underlying instrument. This is explained by the decreasing funding costs and dividends.

Basis Convergence



Equity Index Futures Strategies

There are several motives for using derivatives: Trading, hedging and arbitrage.

Trading means entering into risk positions, to make profits when forecasts are met. Hedging is to secure an existing or planned portfolio against market fluctuations. Arbitrage trades exploit market imbalances to make risk-free profits.

The transactions carried out by traders and hedgers secure the equilibrium and liquidity on futures and options markets. Trades between individual traders and hedgers are entered into, for example, when a trader deliberately wants to assume the very risk that a hedger wants to eliminate. Trades can also be concluded between two hedgers, if one trading participant wants to hedge an existing portfolio against price setbacks and a second trading participant wants to hedge an investment against price increases.

The most important function of futures and options markets is the transfer of risk between these trading participants. Arbitrageurs ensure the prices of forward transactions deviate minimally, if at all, and for a short period of time only, from their theoretical values.

Fundamental Strategies

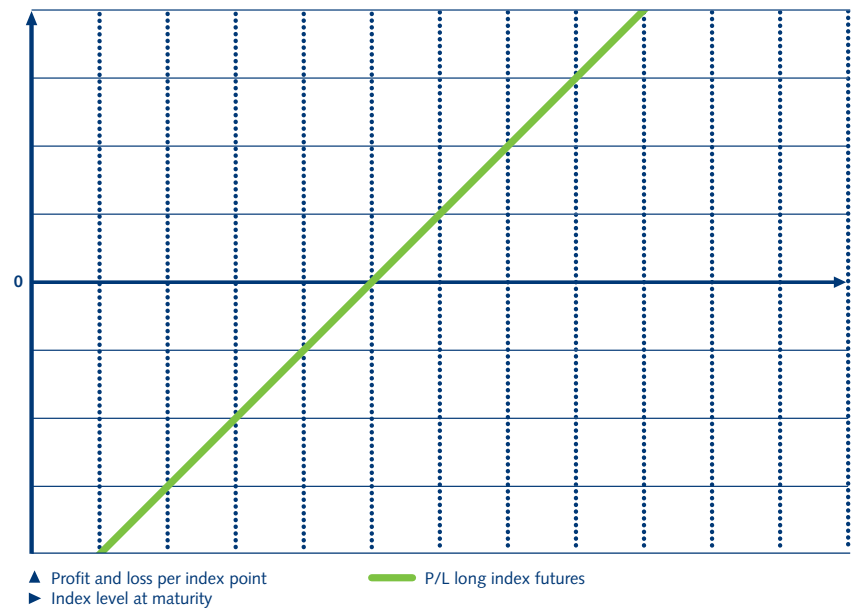
Long Positions ("Bullish" Strategies)

An investor anticipates rising prices and enters into a long index futures position, which is closed out after a certain period of time. When the futures price rises, profits are made on the difference between the lower purchase price and the higher selling price. At the same time, the investor is exposed to the risk of incurring a loss on falling prices.

Rising prices	Profit made on equity index futures
Falling prices	Loss incurred on equity index futures

The risk profile of a long futures position is therefore almost identical to that of the underlying instrument. Risk exposure and profit potential of such a long futures position are equivalent.

Profit/Loss Profile at the End of the Futures Lifetime, Long Index Futures – P/L per Underlying Instrument



Motivation

The investor wants to benefit from a market assessment, without tying up capital.

Starting scenario

Having analyzed the market thoroughly, the investor comes to the conclusion that Eurozone share prices will rise in the next two months. On 23 January 2002, the Dow Jones EURO STOXX 50 Index is trading at 3,645.5 points.

Strategy

Purchase	**10 Dow Jones EURO STOXX 50 March Futures**	**3,647 points**

The investor plans to close out the position before the maturity date. If the price of the Dow Jones EURO STOXX 50 rises, the investor makes a profit on the difference between the purchase price and the higher selling price.

To control the risk, the investor must analyze the market continuously, and if necessary, close out the position immediately.

The following table describes the calculation of the Additional and Variation Margins. Additional Margin is calculated by multiplying the number of contracts by the margin parameters specified by Eurex Clearing AG.

Date	Type of transaction	Purchase/ selling price	Daily settlement price	Variation Margin credit (EUR)	Variation Margin debit (EUR)	Additional Margin (EUR)
01/23	Purchase of 10 Dow Jones EURO STOXX 50 Futures	3,647	3,652	500		–31,000
01/24			3,720	6,800		
01/25			3,768	4,800		
01/28			3,695		–7,300	
.....						
03/12			3,902	20,700		
03/13	Sale of 10 Dow Jones EURO STOXX 50 Futures	3,915		1,300		
03/14						+31,000
	Result	**268**		**34,100**	**–7,300**	**0**

Status as of 1 October 2002

Changed market situation
On 13 March, the investor decides to close out the position at a price of 3,915 points. Additional Margin pledged of EUR 31,000
(10 contracts × EUR 10 index multiplier × 310 points[7]) is returned.

Outcome
By correctly forecasting the Dow Jones EURO STOXX performance, the investor made a profit of EUR 26,800 within a short period of time on an investment of 10 contracts – or 86.45 percent, based on the margin collateral pledged. This equates to the balance of the Variation Margin amounts that are credited or debited on a daily basis.

Alternatively, the Dow Jones EURO STOXX Futures index multiplier (EUR 10) can be used to calculate the profit:

10 contracts × EUR 10 index multiplier × 268 index points profit = EUR 26,800

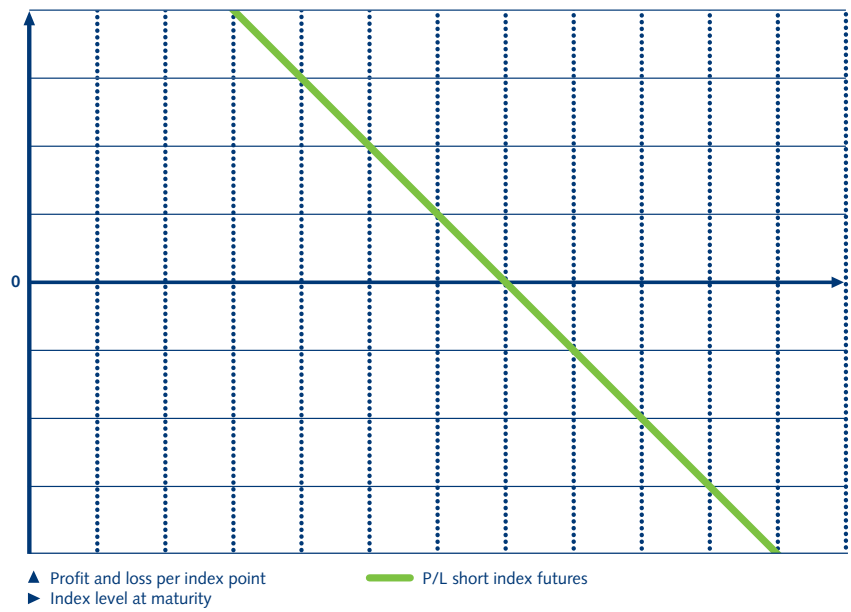
7 Additional Margin per Dow Jones EURO STOXX 50 Futures contract as per 1 October 2002: 310 points or EUR 3,100.

Short Positions ("Bearish" Strategies)

The investor expects falling equity indexes.

Rising prices	Loss incurred on equity index futures
Falling prices	Profit made on equity index futures

Profit/Loss Profile at the End of the Futures Lifetime, Short Index Futures – P/L per Underlying Instrument



Motivation

The investor wants to benefit from falling equity indexes, without having to sell shares (for example, because the investor is neither long of equities nor has access to a securities lending facility).

Starting scenario

An investor expects negative news on the Swiss economic situation in the next one to two weeks. A corresponding fall in share prices is expected. The SMI® Index is trading at 6,348 points on 8 July 2002.

Strategy

Sale	**50 SMI® September Futures**	**6,353 points**

The following table describes the calculation of the Additional and Variation Margin. Additional Margin is calculated by multiplying the number of contracts by the margin parameters specified by Eurex Clearing AG.

Date	Type of transaction	Purchase/ selling price	Daily settlement price	Variation Margin credit (CHF)	Variation Margin debit (CHF)	Additional Margin (CHF)
07/08	Sale of 50 SMI® Futures	6,353	6,351	1,000		–210,000
07/09			6,354		–1,500	
07/10			6,348	3,000		
07/11			6,345	1,500		
07/12			6,358		–6,500	
...		...				
09/11			6,230	64,000		
09/12	Closing purchase of 50 SMI® Futures	6,228		1,000		
09/13						+210,000
	Result	**–125**		**70,500**	**–8,000**	**0**

Status as of 1 October 2002

Changed market situation

On 12 September 2002, the investor decides to close out his position at a price of 6,228 points. Additional Margin pledged of CHF 210,000 (50 contracts × CHF 10 index multiplier × 420 points[8]) is repaid.

Outcome

By selling at a higher price and closing out at a lower price, the investor was able to realize a profit of CHF 1,250 per contract. The total profit of CHF 62,500 (CHF 70,500 – CHF 8,000) is the result of the Variation Margin flows calculated daily that were credited to or debited from the investor during the duration of the open position.

Alternatively, the profit can also be calculated as follows:
50 contracts × CHF 10 index multiplier × 125 index points profit = CHF 62,500

When entering into trading strategies, investors should set a loss limit for every trade from the outset. The positions should be closed out once this limit is reached, so as to avoid untenable losses.

8 Additional Margin per SMI® Futures contract as per 1 October 2002: 420 points or CHF 4,200.

Trading Spreads

What is a Spread?

As outlined in the section "Futures Pricing", the theoretical price of an index future corresponds to the index level plus net financing costs (financing costs – dividend payments) over the remaining lifetime of the futures contract. The price difference between two futures contracts with different lifetimes is referred to as a time spread. The theoretical spread results from the difference between the net financing costs for the two remaining lifetimes at a specific point in time, and not from the expectations as to how the index will perform during this time.

As long as the futures prices do not deviate from their theoretical values, the index level can only impact on the spread through the financing costs.

Buying a spread...	Selling a spread...
... corresponds to the simultaneous purchase of an index futures contract with a shorter maturity, and the sale of an index futures contract with a longer maturity.	... corresponds to the simultaneous sale of an index futures contract with a shorter maturity, and the purchase of an index futures contract with a longer maturity.

Deriving the correct strategy from the given price expectation depends both on the net financing costs and on whether the index is a price or performance index. The various scenarios are displayed in the following table. It is assumed that the return on the basket of shares and refinancing interest rates are constant.

Index/ Market development		Market rises	Market falls
Performance indexes	DAX® or TecDAX®	Sell a spread	Buy a spread
Price indexes SMI®, HEX25®, Dow Jones Global Titans, Dow Jones (EURO) STOXX indexes and sector indexes	Scenario a) Net financing costs > 0	Sell a spread	Buy a spread
Price indexes SMI®, HEX25®, Dow Jones Global Titans, Dow Jones (EURO) STOXX indexes and sector indexes	Scenario b) Net financing costs < 0	Buy a spread	Sell a spread

Strategies based exclusively on price development can be derived for DAX® or TecDAX® Futures. The longer the remaining lifetime of the futures, the more negative the basis, which means the higher the futures price is trading over the index. When the index rises, the proportionate increase in the basis of both contracts is equal. In other words, the spread widens in absolute terms. Hence, profit can be made on the sale of a spread, that is, by selling the futures contract with the shorter remaining lifetime and buying the futures contract with the longer remaining lifetime. The opposite applies to falling prices.

One must differentiate between two scenarios in the case of price indexes (please refer to the table as well: scenario a) and b)):
If net financing costs are positive, the development of the futures price (relative to the index) is the same as with the performance index DAX®: the basis is negative and changes proportionately to the index.

If, however, the income from the cash position exceeds the financing costs, the futures price is lower than the cash price of the price index (positive basis). An increase in the index value is matched by an increase in the positive basis, so that compared with the first scenario mentioned, the contrary position would be profitable.

Buying a Spread

Motivation

An investor anticipates a significant decline in prices on the German equity market. How will this scenario impact upon an existing long spread position? When prices fall, the prices of both futures fall as well. The basis at the new price level is determined by the index level plus the financing costs of the index portfolio until the respective maturity date. Since the value of the portfolio falls in this case, the difference between the financing costs falls: the loss of value of the "more expensive" September contract exceeds that of the "cheaper" June contract.

Starting scenario

Date	**20 March**
10 DAX® June Futures	4,742 points
10 DAX® September Futures	4,806.5 points
Spread	– 64.5 points

Strategy

20 March		
Purchase	10 DAX® June Futures	4,742 points
Sale	10 DAX® September Futures	4,806.5 points
Spread		– 64.5 points

Changed market situation

The anticipated price decline occurred on 22 March: the DAX® has fallen from 4,711 to 4,435 points. The investor decides to close out the spread position:

22 March		
Sale	10 DAX® June Futures	4,464.5 points
Purchase	10 DAX® September Futures	4,526 points
Spread		– 61.5 points

Outcome

The negative spread has narrowed by three points. The investor thus makes the following profit:

10 DAX® June Futures	Purchase 4,742 Sale 4,464.5 Loss 277.5	or 277.5 × EUR 25 × 10	EUR – 69,375
10 DAX® September Futures	Sale 4,806.5 Purchase 4,526 Profit 280.5	or 280.5 × EUR 25 × 10	EUR 70,125
	Total profit:		**EUR 750**
Spread on 20 March		– 64.5 points	
Spread on 22 March		– 61.5 points	
Spread has narrowed by...		3 points	
Profit on the long spread		EUR 750 (3 points × 25 EUR/point × 10 contracts)	

Selling a Spread

Motivation

On 20 March, an investor examines the theoretical price of the HEX25® Futures and determines that the June futures contract is overvalued in relative terms compared with the September contract. It is expected that the price difference between both futures contracts will increase if prices rise, since the relative overvaluation of the June contract will be corrected.

Starting scenario

Date	**20 March**
10 HEX25® June Futures	1,544 points
10 HEX25® September Futures	1,584 points
Spread	– 40 points

Strategy

20 March		
Sale	10 HEX25® June Futures	1,544 points
Purchase	10 HEX25® September Futures	1,584 points
Spread		– 40 points

Changed market situation

The HEX25® rises from 1,515 to 1,685 points by 22 March. The investor decides to close out the position.

22 March		
Purchase	10 HEX25® June Futures	1,689 points
Sale	10 HEX25® September Futures	1,733 points
Spread		– 44 points

Outcome

The spread has widened in absolute terms. The investor makes the following profit:

22 March	
Spread on 20 March	– 40 points
Spread on 22 March	– 44 points
Spread has widened by...	– 4 points
Profit on the short spread	EUR 400 (–4 points × –10 EUR/point × 10 contracts)

In detail, the profit is calculated as follows:

10 HEX25® June Futures	Sale Purchase Loss	1,544 1,689 145	or – 145 × EUR 10 × 10	EUR – 14,500
10 HEX25® September Futures	Purchase Sale Profit	1,584 1,733 149	or 149 × EUR 10 × 10	EUR 14,900
	Total profit:			**EUR 400**

By holding long and short positions simultaneously (spread), you reduce the risk compared with an outright position in a single contract that is entered into purely on market direction. Even if the investor's expectations are not met, the loss incurred on one contract will always be reduced by the profit made on the other contract. Eurex therefore applies a margin rate for spread positions (Futures Spread Margin) which is lower than the Additional Margin required for outright positions.

In addition to the trading motivation described above, spread orders are often used in practice to roll over maturing contracts into the next contract maturity. For example, an investor holds a long position in a March contract that is maturing shortly. To extend this position into the June contract, a spread is sold (March contract sold/June contract purchased). In doing so, the long March position is closed and a new position maturing in June is entered into.

Risk Management Using Index Futures

A beta factor can be calculated for each portfolio. This describes the sensitivity of the portfolio relative to the overall equity market (cf. section "Fundamental Terms of Securities Management").

Investors can change the beta factor of their portfolio depending on individual market expectations. If the beta is not (or is no longer in line) with the desired value, they can manage the resulting market risk by buying or selling index futures.

When the market trend is bullish ...	When the market trend is bearish ...
... investors can increase the beta factor by buying index futures, to reap greater benefits from the anticipated rally.	... investors can reduce the beta factor by selling index futures, to reduce their losses.

Hedging Strategies with Index Futures

The risks of an equity portfolio comprise on the one hand company- and industry-specific risks (unsystematic) and overall market (systematic) risk on the other. Unsystematic risks can be reduced mainly by holding a broadly diversified portfolio (please refer to the section "Portfolio Theory"). On the other hand, market risk can be hedged by using the relevant index instruments, where the investor exploits the correlation between the hedged portfolio and the matching index. The SMI® and DAX® are used as reference indexes in the following examples (cf. sections "Capital Market Theory" and "Hedging with Index Options").

Hedging when Equity Prices Fall – the Short Hedge

Motivation

On the basis of market analysis, an investor fears a significant price decline in the Swiss equity market within the coming months.

Starting scenario

The investor manages a broadly-diversified portfolio of Swiss equities valued at CHF 1,225,000 (as per April 2002). The beta factor of this portfolio, measured relative to the SMI®, is 1.20.

Strategy

The SMI® is trading at 6,352.5 points. A decision is taken to hedge most of the equity position against the impending loss in value. SMI® Futures contracts need to be sold to fulfill this purpose.

The number of contracts is calculated according to the following formula:

$$\text{Number of futures contracts} = -1 \times \frac{\text{Portfolio value}}{\text{Index level} \times \text{Contract size}} \times \text{Portfolio beta}$$

$$= -1 \times \frac{\text{CHF } 1{,}225{,}000}{6{,}352.5 \times \text{CHF } 10} \times 1.20 = -23.14$$

23 contracts have to be sold to hedge the equity portfolio against price fluctuations.

Sale	**23 SMI® September Futures**	**6,366 points**

Changed market situation

Share prices have actually fallen, and the SMI® is trading at only 6,187.5 points in September. The value of the equity position has fallen to CHF 1,192,170. The investor closes out the SMI® Futures position shortly before maturity, by buying back the SMI® September Futures at a price of 6,221.

Outcome

Equity position			
	Value in April		CHF 1,225,000
	Value in September		CHF 1,192,170
	Loss		CHF – 32,830

SMI® Futures position			
	Sale in April	23 × 6,366 × CHF 10	CHF 1,464,180
	Closing purchase in September	23 × 6,221 × CHF 10	CHF 1,430,830
	Profit		CHF + 33,350

The investor achieves the following overall outcome:

Portfolio			
	Profit on the SMI® Futures position		CHF + 33,350
	Loss on the equity position		CHF – 32,830
	Change in the portfolio		CHF + 520

The overall outcome of the investor's hedging strategy is a profit of CHF 520. If the portfolio had not been hedged with SMI® Futures, it would have incurred an uncompensated book loss of CHF 32,830.[9]

Long Hedge

A short equity position can be hedged through a long equity index futures position.

Motivation

The investor expects prices on the German equity market to rise.

Starting scenario

The DAX® Index is trading at 4,798 points in March. An investor plans to build up a diversified equity position amounting to EUR 1,600,000. The beta factor of the planned portfolio is 1.06. The funds required for the investment are tied up in a time deposit that does not mature for three months. The investor therefore decides to buy June DAX® Futures to hedge against rising prices. The contract is traded at a price of 4,816 points.

9 The fact that only round-lot futures contracts can be traded leads to a certain inaccuracy in the hedge.

Strategy

The investor secures the current price level by entering into an equivalent long position on the futures market. The sensitivity is adjusted through the beta factor.

$$\text{Number of futures contracts} = \frac{\text{Portfolio value}}{\text{Index level} \times \text{Contract size}} \times \text{Portfolio beta}$$

$$= \frac{\text{EUR } 1{,}600{,}000}{4{,}798 \times \text{EUR } 25} \times 1.06 = 14.14$$

Purchase	**14 DAX® June Futures**	**4,816 points**

Changed market situation

Share prices actually rise and the DAX® reaches 4,883 points in June. The June DAX® Futures position is sold shortly before maturity at a price of 4,898 points.

Outcome

Equity position			
	Value in March		EUR 1,600,000
	Value in June		EUR 1,627,810
	Additional investment		EUR 27,810

DAX® Futures position			
	Purchase in March	14 × 4,816 × EUR 25	EUR 1,685,600
	Sale in June	14 × 4,898 × EUR 25	EUR 1,714,300
	Profit		EUR + 28,700

The investor realizes the following result related to the overall position:

Portfolio			
	Profit on the DAX® Futures position		EUR + 28,700
	Additional investment required for the portfolio		EUR – 27,810
	Difference between profit on the futures position and additional investment		EUR + 890

The added investment required of EUR 27,810 (resulting from delayed availability of the funds) is more than offset by the profit from the futures position. The investor was able to profit from his forecasts, despite the fact that the liquidity was not available until March.

Both examples described hedging strategies that frequently use index futures. They enable investors to hedge an existing or future equity portfolio against upside or down-side price movements, by "locking in" the current price level. Futures are an extremely flexible and cost-effective instrument that can be used to adjust the risks and anticipated returns of a portfolio in line with one's own market assessment.

With these futures hedging strategies, the investor acquires protection against exposure to risks, by surrendering the opportunity of making profits on the portfolio. If the prices for the short hedge develop contrary to expectations, the investor makes a profit on the equity portfolio. However, this is negated by the loss incurred on the short futures position. Depending on their appetite for risk and assessment of the market situation, investors may decide to partially hedge a position. In this case, they only buy or sell a portion of the required number of futures contracts calculated. The residual, unhedged part of the portfolio then holds the full profit potential, but is also subject to the full risk. It is also conceivable to convert an equity position into a net short position, if the futures position exceeds the value of the equity portfolio.

Managing the Hedge Position

Strategies involving hedging with futures require constant monitoring of the hedge positions. Investors must constantly harmonize their market outlook on which their hedging strategies are based with actual market developments, and must adjust their futures positions immediately in the the event of changed circumstances, or a different market projection.

Introduction to Stock Options and Equity Index Options

Definition – What are Options?

An option is a contract entered into between two parties. By paying the option price (the premium) the buyer of an option acquires the right, for example,

		Example
... to buy	= > Call option	= Call
... to sell	= > Put option	= Put
... a specific (financial) instrument	= > Underlying instrument	Nestlé shares
... in a set amount	= > Contract size	10 shares
... on or up to a fixed point in time	= > Last Trading Day	12/20/2002
... at a price set in advance	= > Exercise price	CHF 360

The seller (sometimes also called the "writer") is obliged to sell (in the case of a call option) or to buy (in the case of a put option) the underlying instrument at a fixed exercise price, if the buyer claims his right to exercise the option. The option buyer pays the option price, or premium, in exchange for this right. Depending on whether it is an American- or European-style option, the option buyer can exercise his right on any exchange trading day before expiration (American-style option) or only on its Last Trading Day (European-style option).

European-style option	= can only be exercised on the Last Trading Day	Eurex equity index options
American-style option	= can be exercised on any exchange trading day before expiration	Eurex stock options

Options Positions – Rights and Obligations

An investor may enter into a position on the option market by buying or selling options. A position is either long or short.

Call option		Put option	
Call buyer	Call seller	Put buyer	Put seller
Long call	Short call	Long put	Short put
has the right, but not the obligation, to buy the underlying instrument at the exercise price agreed in advance.	is obliged to sell the underlying instrument at the exercise price agreed in advance, if the call is exercised.	has the right, but not the obligation, to sell the underlying instrument at the exercise price agreed in advance.	is obliged to buy the underlying instrument at the exercise price agreed in advance, if the put is exercised.

Position Close-Out

Option positions can be neutralized by close-out. This means that a short position of five Dow Jones EURO STOXX 50 June 3,900 calls can be closed out by buying five Dow Jones EURO STOXX 50 June 3,900 calls. Hence, the obligations arising from the original short position are fully offset. In the same way, a long position of five Dow Jones STOXX 50 March 3,800 puts can be closed out by selling five Dow Jones STOXX 50 March 3,800 puts.

Exercising Stock Options and Equity Index Options

When a Eurex stock option is exercised, the option position expires. Both the buyer and seller enter into an equity cash position through physical delivery.

Exercising a ...		Assignment of a ...	
Long call	Long put	Short call	Short put
results in a ...			
long equity position	short equity position	short equity position	long equity position

Assignment is on the day of the exercise: delivery normally takes place between two and four CSD business days later, depending on the contract specification. The holder of a long position informs Eurex Clearing AG of his intention to exercise, which then selects a holder of a short position according to the principle of random selection, to fulfill the obligation to buy or sell.

Eurex equity index options are European-style options. They can only be exercised on their Last Trading Day, and are settled in cash.

Contract Specifications – Eurex Stock Options and Equity Index Options

Eurex options are exchange-traded contracts with standardized specifications. The specifications for Eurex products can be found on the Eurex website www.eurexchange.com, and in the "Eurex Products" brochure. The most important terms are described in the following example.

An investor buys

… 2	Contracts	The number of shares in each Eurex options contract varies according to market segment and underlying instrument. A BMW Option contract, for example, comprises 100 shares.
… Calls	Call option	
… BMW	Underlying instrument	BMW shares are the underlying instrument for this option contract.
… June	Expiration date	Every option has a limited lifetime and a set expiration date.
… EUR 40	Exercise price (strike price)	This is the price at which the option buyer can buy or sell the underlying instrument.
… EUR 2.80	Option price (premium)	The buyer of stock options or equity index options pays the option price per share for his option right to the seller one day after entering into the contract. The option premium per contract is 100 × EUR 2.80 = EUR 280 Since he buys two contracts, he pays a total of 2 × EUR 280 = EUR 560 (excluding fees).

The buyer in our example acquires the right to buy 200 BMW registered shares at an exercise price of EUR 40 each until the third Friday in June. The buyer pays EUR 560 to the seller for this right. The seller on the other hand is obliged to sell (deliver) 200 BMW registered shares at a price of EUR 40 each, if the buyer uses the right to exercise: and the seller is selected via the assignment process.

Premium Payment and Risk-Based Margining

Premium Payment

The premium for Eurex stock and equity index options is paid one exchange trading day after the trade date.

Margin

The purchase of the option represents no further risk to the buyer after paying the premium. The buyer has acquired the right to exercise, but has no obligation. Hence, there is no requirement to pledge margin collateral for long options positions.

On the other hand, the option seller enters into an obligation to deliver (in the case of a short call) or take delivery of (in the case of a short put) the underlying instrument upon exercise. That is why margin must be pledged for two risk components:

Premium Margin
Should the option seller be forced to close out the position, the value of the sold option is covered by the Premium Margin. The Premium Margin is adjusted to prevailing option prices on a daily basis.

Additional Margin
Additional Margin is collateral that serves to hedge against the maximum anticipated loss that might be incurred on the following exchange trading day.

Covered positions, where the seller of a call pledges the underlying instrument as collateral, represent the only exception in the case of stock options. Please refer to the "Risk-Based-Margining" brochure for more detailed information on margining for options.

Options Pricing

Components

The option price is comprised of two components – intrinsic value and time value.

Option price = Intrinsic value + Time value

Intrinsic Value

An option that allows the purchase or sale of the underlying instrument at more attractive terms than at the market price at the time of valuation is said to have an intrinsic value. The intrinsic value can only be positive or zero.

Call	Intrinsic value = Price of the underlying – Exercise price, if this is > 0; otherwise it is zero.
Put	Intrinsic value = Exercise price – Price of the underlying, if this is > 0; otherwise it is zero.

An option with an intrinsic value is also referred to as "in-the-money". Options with no intrinsic value are referred to as "at-the-money" or "out-of-the-money". "At-the-money" means the exercise price equals the market price of the underlying instrument.

	Call	**Put**
Exercise price < price of the underlying instrument	In-the-money (intrinsic value > 0)	Out-of-the-money (intrinsic value = 0)
Exercise price = price of the underlying instrument	At-the-money (intrinsic value = 0)	At-the-money (intrinsic value = 0)
Exercise price > price of the underlying instrument	Out-of-the-money (intrinsic value = 0)	In-the-money (intrinsic value > 0)

Time Value

The time value reflects the buyer's potential chances of his forecasts being met on the development of the underlying instrument during the remaining lifetime. The buyer is prepared to pay a certain sum – the time value – for this opportunity. Conversely, the time value represents the compensation the seller receives for the exposure to risk. The closer an option moves towards expiration, the lower the time value becomes until it eventually reaches zero on that date. The time value decay accelerates as the expiration date comes closer.

Time value = Option price – Intrinsic value

Determining Factors

The theoretical option price can be calculated independently of the current supply and demand situation on the basis of various parameters. One important component is the intrinsic value which we have already introduced. The following section illustrates the determining factors of time value.

Volatility of the Underlying Instrument

Volatility measures the magnitude of price fluctuations of the returns on the underlying instrument.[10] The greater the volatility, the higher the option price. An underlying instrument whose returns fluctuate strongly provides the option buyer with a greater opportunity of meeting his price forecast during the lifetime of the option. The buyer is therefore prepared to pay a higher price for the option. The seller, in turn, demands a higher price to cover his increasing risks.

There are two types of volatility:

Historical volatility	Expected (implied) volatility
This is based on historical data and corresponds to the standard deviation of the daily returns of the underlying instrument.	It corresponds to the volatility of the underlying instrument, as reflected in a traded option price. In a liquid market it indicates the fluctuations in return anticipated by market participants.

Given that the other features of an option that are used to determine the option price – current price of the underlying, exercise price, short-term interest rate, remaining lifetime and dividend payments (if any) – are fixed or external factors that cannot be changed independently by market participants, volatility is the decisive factor in determining the bid or offer prices of the option.

Remaining Lifetime of the Option

The longer the remaining lifetime, the greater the chance that the forecasts of option buyers on the price of the underlying instrument will be met at some point during the remaining period of time. Conversely, the longer lifetime increases risks from a seller's point of view, which is why a higher option price is required. The closer the option moves towards expiration, the lower the time value and hence the lower the option price.[11] As the time value equals zero on the expiration date, time acts against the option buyer and in favor of the option seller.

10 Cf. section "Portfolio Theory".

11 Deep in-the-money European-style puts can be subject to some exceptions to the rule.

Dividends

The option buyer is not entitled to dividend payments on an option's underlying instrument that are paid during the lifetime of the option. A high dividend will therefore tend to reduce the price of a call option. The opposite applies to a put option. The dividend payment announced by the respective company is taken into account when calculating the option price. However, the terms or the exercise price of the option remain unchanged.

Short-Term Interest Rate

Similar to calculating futures prices, investing in an underlying instrument involves capital costs, which are greater, the higher the interest rate. This investment can be avoided by buying a call. As a result, rising interest rates are accompanied by an increase in the value of a call option with traditional premium payment. The price of put options generally behaves in a totally opposite fashion, with the exception of certain extreme circumstances. Compared with other determining factors, the interest rate is relatively unimportant.

Summary of Determining Factors

The price of the call is higher,	**The price of the call is lower,**
the higher the price of the underlying instrument;	the lower the price of the underlying instrument;
the lower the exercise price;	the higher the exercise price;
the longer the remaining lifetime;	the shorter the remaining lifetime;
the higher the volatility;	the lower the volatility;
the higher the interest rate;	the lower the interest rate;
the lower the dividend.	the higher the dividend.

The price of the put is higher,	**The price of the put is lower,**
the lower the price of the underlying instrument;	the higher the price of the underlying instrument;
the higher the exercise price;	the lower the exercise price;
the longer the remaining lifetime;	the shorter the remaining lifetime;[12]
the higher the volatility;	the lower the volatility;
the lower the interest rate;	the higher the interest rate;
the higher the dividend.	the lower the dividend.

12 Deep in-the-money European-style puts can be subject to some exceptions to the rule.

Important Risk Parameters – "Greeks"

Risk parameters are used to describe the sensitivity of the option price relative to the determining factors set out above. These are characterized according to prevailing convention by Greek letters (also called "Greeks").

Delta

The option's delta factor describes the effect of a one unit change in the share price or index level on the option price. The delta changes according to fluctuations in the underlying instrument. The delta of long calls lies between zero and one. It lies between minus one and zero for long puts:

Call option delta	0.00 < delta < 1.00
Put option delta	–1.00 < delta < 0.00

The value of the delta depends on whether a position is in-, at- or out-of-the-money:

		Out-of-the-money	At-the-money	In-the-money
Long-	Call	0.00 < delta < 0.50	0.50	0.50 < delta < 1.00
	Put	–0.50 < delta < 0.00	–0.50	–1.00 < delta < –0.50
Short-	Call	–0.50 < delta < 0.00	–0.50	–1.00 < delta < –0.50
	Put	0.00 < delta < 0.50	0.50	0.50 < delta < 1.00

Starting scenario
Call option on the UBS share (UBSN) June, exercise price CHF 90
Current call price: CHF 3.80
Delta = +0.60
Current UBSN share price: CHF 92

The approximate effect of the change in the price of the underlying instrument on the option price can be calculated using the delta.

	UBS share	Value of the call per underlying instrument
Starting scenario	CHF 92	CHF 3.80
in CHF	CHF + 1	+CHF 0.60 (CHF 1 × 0.60 delta)

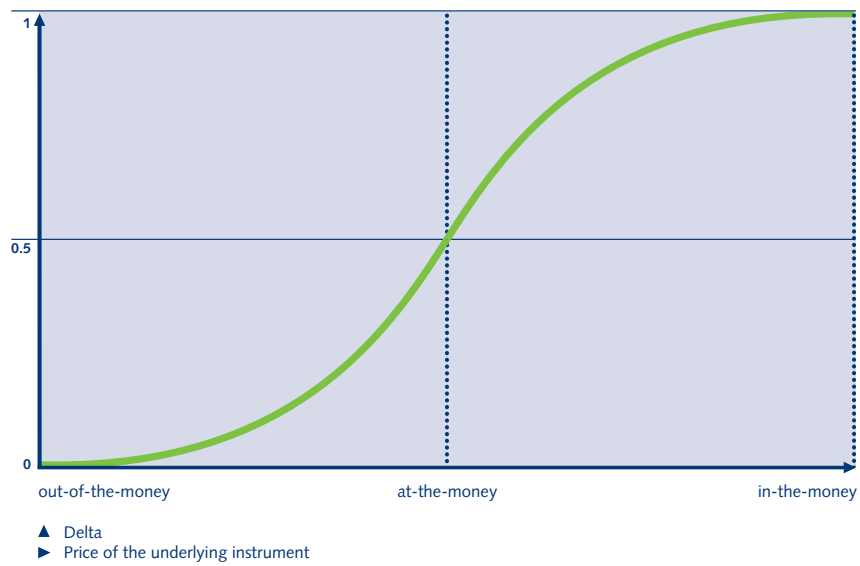
Short-term price change	**CHF 93**	**4.40**
in %	1.09	15.79

Outcome

A delta of 0.6 means that the option price rises (falls) by 0.60 points/monetary units, when the index or share price rises (falls) by one point/monetary unit. The correlation applies approximately for short periods of time and for minor changes.

The following graph depicts the delta factor of call options that are in-, at- or out-of-the-money.

Correlation between the Call Option Deltas and the Change in the Price of the Underlying Instrument



Gamma

The gamma factor reflects the change in the delta given a one unit change in the underlying share price or index level. The gamma factor is always positive for long positions. The gamma is at its highest level for at-the-money options immediately before expiration.

Vega (Kappa)

Vega is a measure of the impact of volatility on the option price. The vega indicates by how many units the option price will change given a one percentage point change in the volatility of the underlying instrument. The longer the remaining lifetime of the option, the higher the vega. It is at its highest level for at-the-money options.

Theta

Theta describes the influence of the time value decay on the option price. Theta indicates by how many units the option price will change given a one period reduction in the remaining lifetime. From a mathematical point of view, theta is the derivative of the option price by the remaining lifetime (multiplied by minus one), and is normally negative for long stock option and equity index option positions. The time value decay rises the closer the expiration date, and is highest for in-the-money options immediately before expiration.

Rho

The rho indicates by how many units the option price will change given a one percentage point change in the interest rate. The rho of a call option on equities or indexes is higher than or equals zero, since an increase in the interest rate increases the costs of an alternative investment on the cash market. Rising interest rates therefore result in an increase in the value of the call. The rho of a put option on shares is normally negative, since the return on an alternative short sale increases.

Omega (Leverage Effect)

Although a comparison between outright equity positions and option positions at the option's expiration shows that the buyer of shares makes a profit sooner, the investor has to pledge significantly more capital than for the option position. In terms of invested capital – the option price – the option buyer achieves higher profit in percentage terms than the buyer of shares.

The elasticity (omega) of an option quantifies the leverage effect and is calculated as follows:

$$\text{Omega} = \frac{\frac{\text{Change in the option price}}{\text{Option price}}}{\frac{\text{Change in the share price}}{\text{Share price}}} = \frac{\text{Share price}}{\text{Option price}} \times \text{Delta factor}$$

Strategies for Stock Options and Equity Index Options

Trading Strategies for Stock Options and Equity Index Options

Investors can use options to adjust their risk/return profile according to their individual requirements. The applications of options will be shown below using the four fundamental strategies. Examples of some option combinations will also be outlined.

Long Call

Motivation

In May an investor expects a short-term rally in Novartis shares (NOVN). However, he does not want to be exposed in the event of a price decline.

Starting scenario

Novartis shares (NOVN) are trading at CHF 67 on 24 May.
The price of the NOVN June 65 Call is CHF 3.10.

Strategy

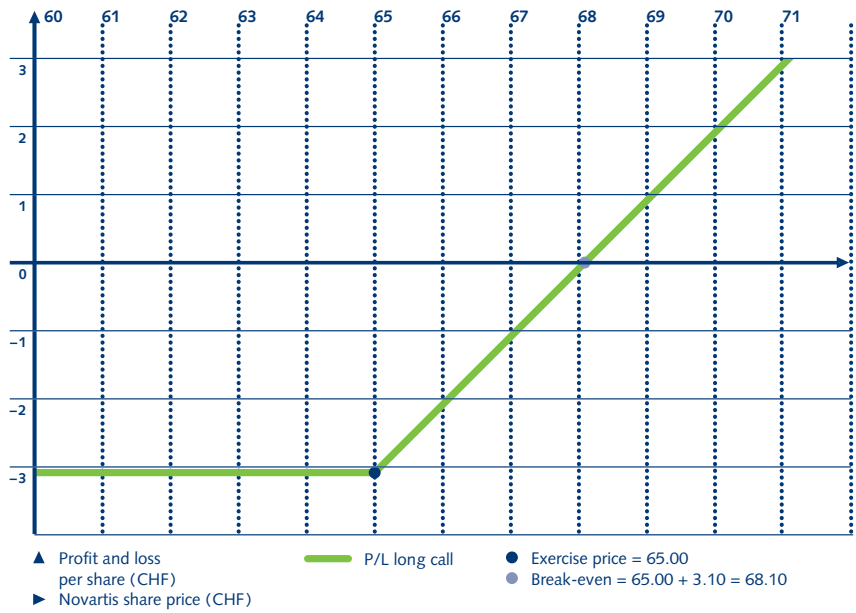
Long	1 Novartis N June 65 Call	CHF 3.10

Profit and Loss at the End of the Option Lifetime in CHF, long Novartis N June 65 Call

Novartis share price (CHF) at the end of the option lifetime	Value of the June 65 Call (CHF)	Profit/loss per contract unit (CHF)
59	0	–3.10
61	0	–3.10
63	0	–3.10
65	0	–3.10
67	2	–1.10
68.1	3.10	0
69	4	+0.90
71	6	+2.90
73	8	+4.90
75	10	+6.90

In this case, one contract unit is equivalent to one share.

Profit/Loss Profile at the End of the Option Lifetime, Long Novartis N June 65 Calls – P/L in CHF per Underlying Instrument



Outcome

The call buyer breaks even at the end of the option lifetime on exercise, if the share price corresponds exactly to the sum of the exercise price and the option price (65 + 3.10 = 68.10). Every further increase in price increases the profit at a ratio of 1:1. If the price is below CHF 68.10 on expiration the investor incurs a loss of up to CHF 3.10 (= the option premium paid) per share or per contract unit. Had he bought the share, he would have been exposed to a maximum potential loss of CHF 67 per share.

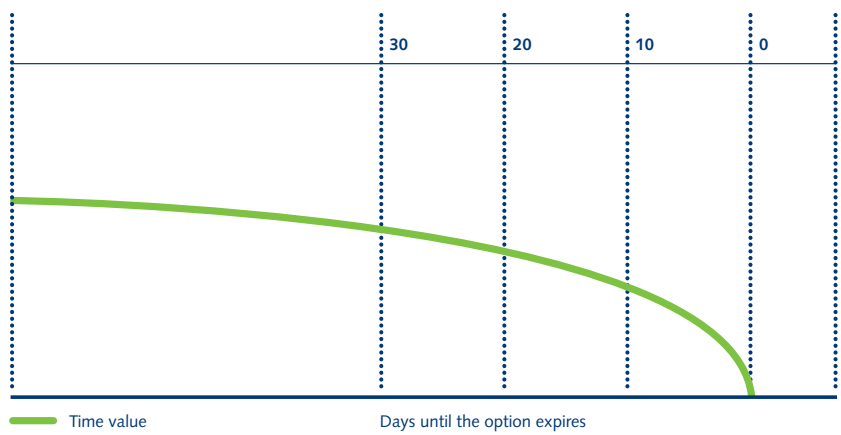
Selecting the Options Series

The starting scenario of the trading strategy outlined above was that the investor expected rising prices. In addition, the appropriate option contract series had to be determined. These considerations are based on the explanations given in the section on the determining factors of the option. The investor cannot influence volatility or short-term interest rates. However, the intrinsic value and time value depend on the choice of exercise price and remaining lifetime respectively at the time of the transaction.

In the example of the Novartis long call, at the time of buying the option at a share price of CHF 67, every series with an exercise price of over CHF 67 would have no intrinsic value (it would have been out-of-the-money). The contract selected with an exercise price of CHF 65 has an intrinsic value of CHF 2 per contract unit (it is slightly in-the-money). Options with different exercise prices react differently to fluctuations in the price of the underlying instrument. The price of an in-the-money option, in absolute terms, is more closely correlated to the actual share price movement than an out-of-the-money option (cf. section "Delta"). The leverage effect (cf. section "Omega") is greater for an out-of-the-money option, which is why it should be regarded as more of a speculative investment.

The remaining lifetime of the option contract influences the time value, at the time of entering into the position as well as during the period for which it is held. As explained in the section "Theta", the time value declines progressively until expiration. The time decay per period is smaller for options with long maturities than for those shortly before expiration. All other factors constant, an option with a longer remaining lifetime has a higher time value, and is therefore more expensive.

Time Value for a Long Option Position (At-the-Money)



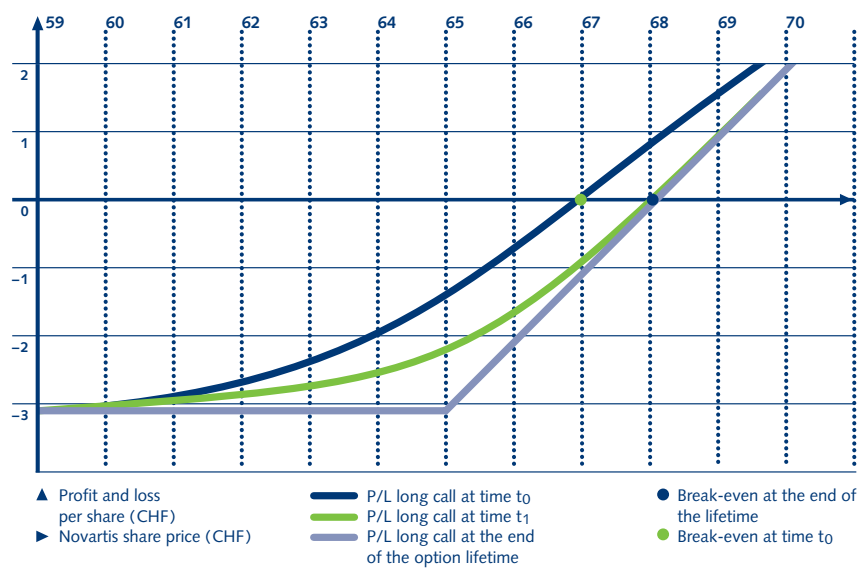
Exercise, Close-Out or Hold

Observation of profit and loss in the previous example was based on the investor holding the option until the end of the lifetime. However, the investor is also entitled to close out the position during the lifetime or, since this is an American-style option, to exercise the option.

Sale of the option (close-out)	Exercising the option
The profit is derived from the difference between the current selling price (intrinsic value + time value) and the original purchase price.	The profit is derived from the difference between the intrinsic value and original purchase price.

With the exception of taking dividend dates into consideration, it does not make sense to exercise the option during the lifetime, since the buyer loses time value. After purchasing the long call position, the investor has to decide whether or not to close out the option before the end of the lifetime. The following example, outlining the performance of a long call during the lifetime, serves to explain this situation.

Profit/Loss Profile upon Conclusion of the Transaction, during and at the End of the Option Lifetime, Long Novartis June 65 Calls – P/L in CHF per Underlying Instrument



The profit and loss profile immediately after the transaction (at time t_0) is marked in dark blue. When the underlying instrument is trading at a price of CHF 67, the value of the option is CHF 3.10. For any changes in the share price, the option price changes

accordingly by the delta factor. The option is subject to the effect of time value decay, so that the option price for each given share price falls over time. The value between the transaction and the end of the option's lifetime (time t_1) is marked in green. As a result of the time value decay, the break-even point moves further towards the right. In other words, the share price must rise over the time of purchase for the investor to make a profit. At the end of the lifetime, the intrinsic value of the option alone must amortize the purchase price of CHF 3.10, so that break-even rises to CHF 68.10.

The investor should constantly check the option during its lifetime, to determine whether further price performance will compensate over and above the time value decay. In the previous example of a long call, the position should have been closed out as soon as no further price performance was expected. This rule is based on the assumption that other parameters, especially volatility, remain constant.

Short Call

Motivation

At the end of February, an investor expects Deutsche Bank shares (DBK) to fall slightly, or to remain around current price levels in the near future.

Starting scenario

The investor currently holds no Deutsche Bank shares in the portfolio.
The price of Deutsche Bank shares (DBK) on 22 February is EUR 73.70.
The price of the DBK March 75 Call is EUR 1.90.

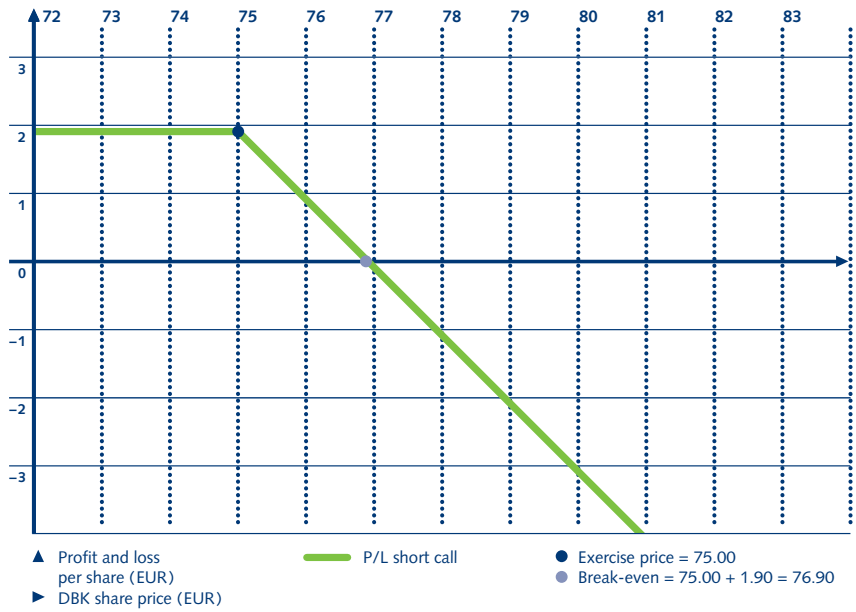
Strategy

Sale	10 DBK March 75 Calls	EUR 1.90

Profit and Loss at the End of the Option Lifetime in EUR, short DBK March 75 Call

DBK share price (EUR) at the end of the option lifetime	Obligation of the call seller per contract unit (EUR)	Profit/loss per contract unit (EUR)
72	0	+1.90
73	0	+1.90
74	0	+1.90
75	0	+1.90
76	–1	+0.90
76.90	–1.90	0
77	–2	–0.10
78	–3	–1.10
79	–4	–2.10
80	–5	–3.10

Profit/Loss Profile at the End of the Option Lifetime, Short Deutsche Bank March 75 Call – P/L in EUR per Underlying Instrument



Outcome

The investor makes a profit when the share is trading below EUR 76.90 (exercise price + option price) on the Last Trading Day. The maximum profit is EUR 1.90 (the option premium received) per contract unit, if the share price is trading below EUR 75. In this case, the call holder (buyer) will not exercise the option.

However, if the share price rises over EUR 75, the investor must expect the option to be exercised. The shares must then be delivered at an exercise price of EUR 75. This can result in a loss which increases the more the share price rises. The risk exposure is theoretically unlimited. Furthermore, this position is an uncovered short call for which margin collateral must be pledged.

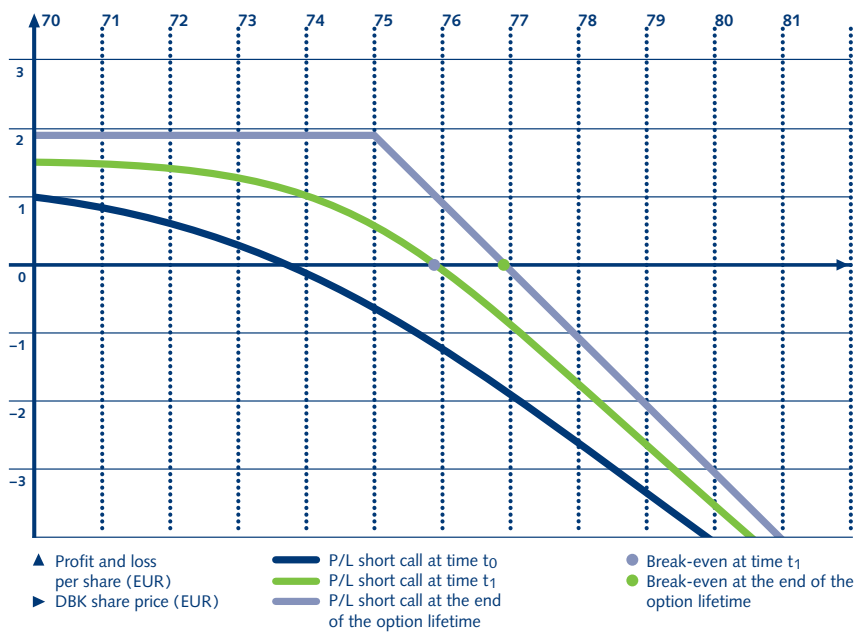
Selecting the Options Series

The premises that apply to a long call also apply to a short call position, only in reverse. The development of an in-the-money option largely follows the trend of the underlying instrument. If the price rises, the price of an out-of-the-money option, for which a relatively small premium is paid when it is sold, can easily multiply, which represents a high risk to the seller. The profit from the time value decay, on which the short option strategy is based, is highest for at-the-money options.

Close-Out or Hold

This example was again based on the assumption that the short position would be held until the end of the lifetime. It is of course also possible to close out the position during the lifetime, or for the seller to have to deliver the underlying instrument if a corresponding long position is exercised. However, as was explained in the previous section, the holder of the long position would lose the time value by exercising the option during the lifetime. Once again, time value plays an important part in the decision whether to hold or close out the short position during the lifetime.

Profit/Loss Profile upon Conclusion of the Transaction, during and at the End of the Option Lifetime, Short Deutsche Bank March 75 Call – P/L in EUR per Underlying Instrument



The profit/loss profile at the time of the transaction is highlighted in dark blue. Assuming constant volatility, the value of the option increases when the share price rises, so that the investor incurs a loss on a repurchase. However, if the share price falls, the option price decreases, allowing the investor to make a profit when closing out the position. Over the lifetime of the contract, the profit/loss profile approaches its characteristics on the Last Trading Day as a result of the time value decay. Unlike the long position, the short call for each given share price becomes more profitable over time. The course of time therefore acts in favor of the option seller and against the option buyer. Accordingly, the holder of the short call would hold this position as long as no price increase in the underlying is anticipated, which would significantly increase the option value. As outlined in the table, the seller realizes maximum profit when the option expires worthless.

Long Put

Motivation

On 22 February, an investor expects a strong short-term decline in the price of Nokia shares (NOA3). Should the price of the Nokia share rise, the investor is not prepared to risk a loss over and above the option premium.

Starting scenario

The investor currently holds no Nokia shares in the portfolio.
The Nokia share price (NOA3) on 22 February is EUR 25.
The price of the NOA3 March 24 Put is EUR 0.30.

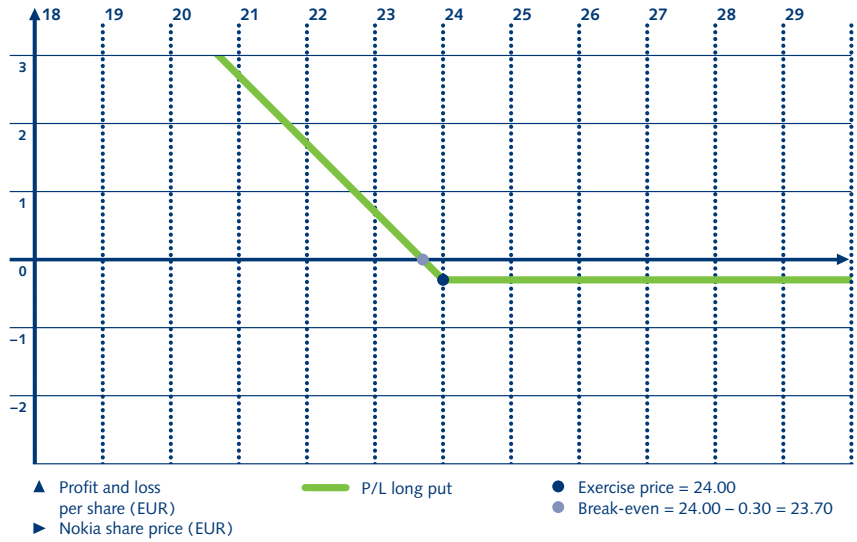
Strategy

Purchase	1 Nokia March 24 Put	EUR 0.30

Profit and Loss at the End of the Option Lifetime in EUR, Long Nokia March 24 Put

NOA3 share price (EUR) at the end of the option lifetime	Value of the March Put per contract unit (EUR)	Profit/loss per contract unit (EUR)
18	+6	+5.70
19	+5	+4.70
20	+4	+3.70
21	+3	+2.70
22	+2	+1.70
23	+1	+0.70
23.70	+0.30	0
24	0	−0.30
25	0	−0.30
26	0	−0.30

Profit/Loss Profile at the End of the Option Lifetime, Long Nokia March 24 Puts – P/L in EUR per Underlying Instrument



Outcome

The investor makes a profit if the share price falls below EUR 23.70 (exercise price minus option price). The further the share price falls, the higher the profit. If the share price exceeds EUR 23.70, the investor incurs a loss. The loss however is limited to the option price paid (EUR 0.30 per contract unit). Since the long put represents an option purchase, no margin must be pledged. Similar to a long call, the investor must observe the time value decay for a long put – measured by the theta – and hence the time horizon of the personal price forecast for the underlying instrument.

Short Put

Motivation

On 22 February, an investor expects the price of Unilever shares (UNI) to rise slightly or stagnate in the short-term. Furthermore, he does not want to reduce the liquidity position in his portfolio.

Starting scenario

The price of Unilever shares (UNI) on 22 February is EUR 60.
The price of the Unilever March 60 Put is EUR 1.40.

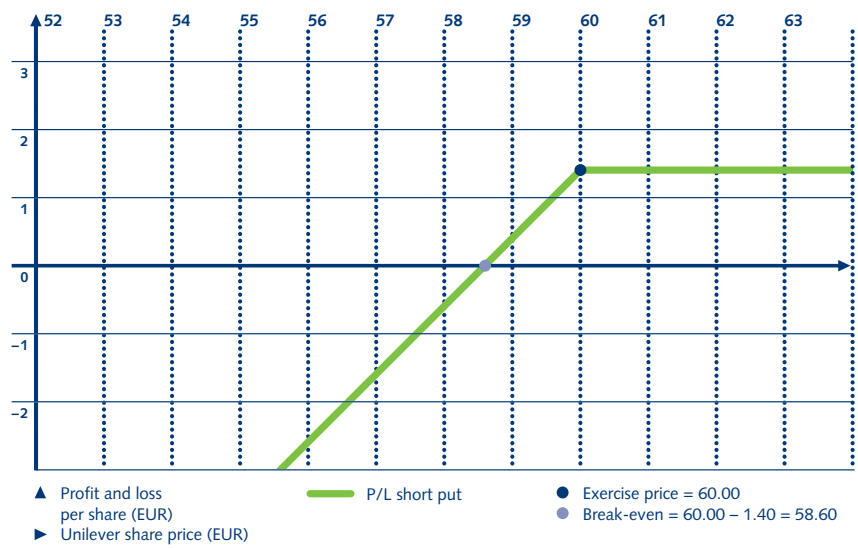
Strategy

Sale	1 Unilever March 60 Put	EUR 1.40

Profit and Loss Profile at the End of the Option Lifetime in EUR, Short Unilever March 60 Put

UNI share price (EUR) at the end of the option lifetime	Obligation of the put seller per contract unit (EUR)	Profit/loss per contract unit (EUR)
55	–5	–3.60
56	–4	–2.60
57	–3	–1.60
58	–2	–0.60
58.60	–1.40	0
59	–1	+0.40
60	0	+1.40
61	0	+1.40
62	0	+1.40
63	0	+1.40

Profit/Loss Profile at the End of the Option Lifetime, Short Unilever March 60 Put – P/L in EUR per Underlying Instrument



Outcome

The investor makes a profit when the Unilever share price exceeds EUR 58.60 on the Last Trading Day (exercise price minus option premium received: 60 – 1.40 = 58.60). The profit is limited to the option price received of EUR 1.40 per contract unit. This profit is achieved if the share price is at least EUR 60. However, if the share price falls below EUR 60, the investor must expect the put buyer to exercise the option. The investor is then obliged to take delivery of the share at the exercise price of EUR 60, although the current price is lower. The further the share price falls, the greater the loss. The maximum loss is EUR 58.60 per contract unit (exercise price minus option premium received). This extreme situation would occur had the investor been obliged to take delivery of shares that were worthless on the cash market, at a price of EUR 60. Due to the risk incurred on this position, or the obligation to take delivery in the event of exercise, margin must be pledged for a short put.

Combined Trading Strategies

Strategies in Anticipation of Rising Prices

A "bull" market means rising prices. Most simple bullish strategies were already covered in the section "Fundamental strategies". The examples for long call and short put show how investors can use option positions to benefit from rising share prices.

Bull Call Spread

The bull spread is another typical bull strategy. A bull call spread comprises the purchase of a call with a lower exercise price and simultaneous sale of a call with a higher exercise price.

Long	**call with a low exercise price, at a higher option price**
Short	**call with a higher exercise price, at a lower option price**

Motivation

In February, an investor expects a moderate increase in the DaimlerChrysler share price (DCX) over the coming six weeks. The long call component benefits from rising share prices. Furthermore, the maximum potential loss is lower, since the price received for the short call partly offsets the price paid for the long call.

Starting scenario

The price of DaimlerChrysler (DCX) on 22 February is EUR 43.85.
The price of the DaimlerChrysler March 44 Call is EUR 1.80 and the DaimlerChrysler March 46 Call (thus with the same lifetime) is EUR 1.00.

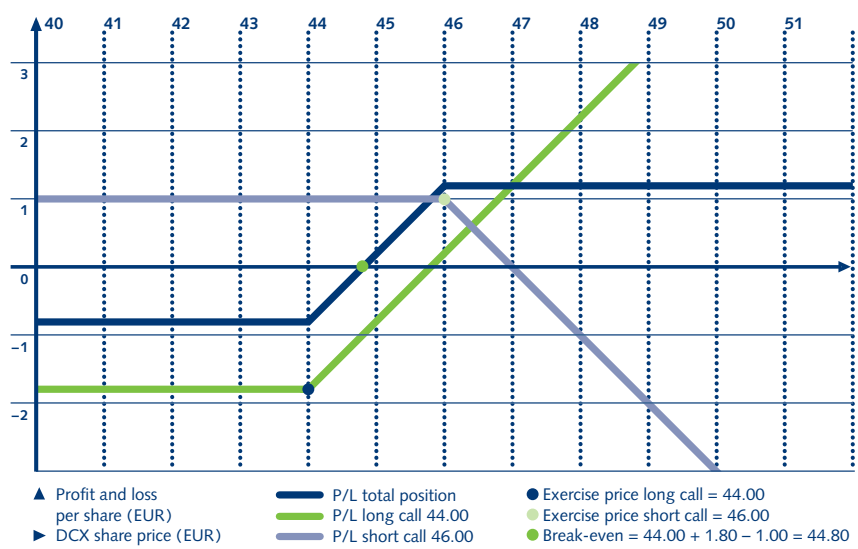
Strategy

Long	**1 DaimlerChrysler March 44 Call**	**EUR 1.80**
Short	**1 DaimlerChrysler March 46 Call**	**EUR 1.00**

Profit and Loss at the End of the Option Lifetime in EUR, DaimlerChrysler March 44/46 Bull Call Spread

DCX share price at the end of the option lifetime (EUR)	Value of the long call 44 (EUR)	Profit/ loss on the long call 44 (EUR)	Value of the obligation from the short call 46 (EUR)	Profit/ loss on the short call 46 (EUR)	Total profit/ total loss (EUR)
40	0	−1.80	0	+1	−0.80
41	0	−1.80	0	+1	−0.80
42	0	−1.80	0	+1	−0.80
43	0	−1.80	0	+1	−0.80
44	0	−1.80	0	+1	−0.80
44.80	0.80	−1	0	+1	0
45	1	−0.80	0	+1	+0.20
46	+2	+0.20	0	+1	+1.20
47	+3	+1.20	−1	0	+1.20
48	+4	+2.20	−2	−1	+1.20
49	+5	+3.20	−3	−2	+1.20
50	+6	+4.20	−4	−3	+1.20

Profit/Loss Profile at the End of the Option Lifetime, DaimlerChrysler Bull Call Spread – P/L in EUR per Underlying Instrument



Outcome

The maximum profit of EUR 1.20 per contract unit is achieved when the share price rises up to or exceeds the higher exercise price. Above this point, the additional profit made on the purchased call with the lower exercise price (March 44) is completely compensated by the loss incurred on the sold call with the higher exercise price (March 46). The maximum loss of EUR 0.80 per contract unit is incurred when the price falls to or below the lower exercise price. It is calculated from the difference between both option prices. Break-even is at EUR 44.80 (= 44 + 1.80 – 1.00).

If the share price rises above EUR 47 (higher exercise price + short call premium), the profit/loss profile of a long call position at the end of the lifetime is more favorable than the spread. Compared with the long call position, the spread has a lower time value decay and is less sensitive to volatility (vega) and share price performance (delta). This reduces both risk exposure and profit potential.

No margin needs to be pledged for a bull spread with calls, since the strike price for the short position is higher. Hence, the risk of rising prices is fully covered by the long position which is already in-the-money, should the market rally.

Bull Put Spread

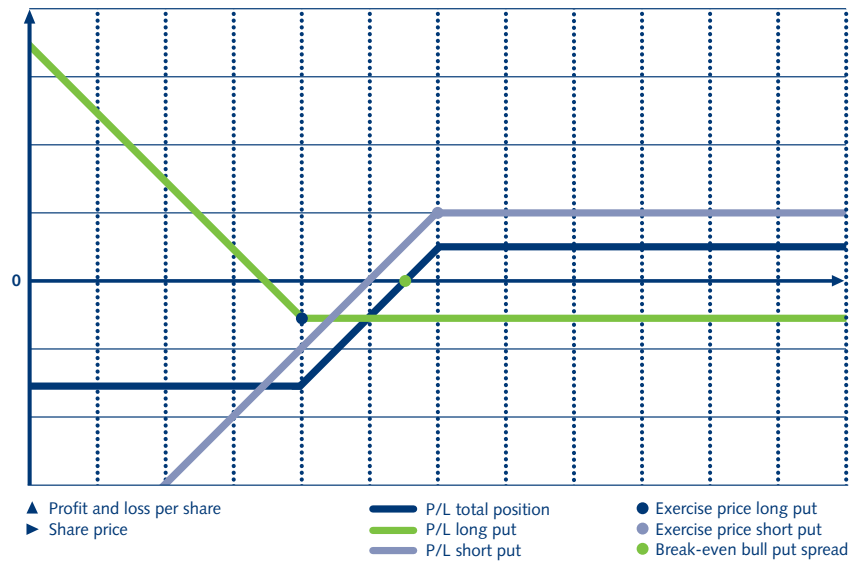
The investor can also speculate on a limited price rise, with a bull put spread.

Long	**put with a lower exercise price, at a lower option price**
Short	**put with a higher exercise price, at a higher option price**

Since the contract with the higher exercise price is more expensive, the investor receives a net premium, which represents the maximum profit when the share price rises above the exercise price of the sold put. With this strategy, the investor receives this maximum profit immediately. Similar to the bull call spread, the potential loss is limited.

However, the bull put spread is exposed to the risk of early exercise of the sold option, when the share price is trading between break-even of the short put and the exercise price of the long put – whilst the investor is unable to exercise, since the long put is out-of-the-money. Margin must therefore be pledged on bull spreads comprising two put positions.

Profit/Loss Profile at the End of the Option Lifetime, Bull Put Spread – P/L per Underlying Instrument



Bear Put Spread

Contrary to the bull spread, with the bear spread the put option with the lower exercise price is sold and the put option with the higher exercise price (but same expiration date) is bought.

Short	**put with a lower exercise price, at a lower option price**
Long	**put with a higher exercise price, at a higher option price**

Motivation

In October, the investor expects the IBM share price to fall slightly. The time horizon is two months. Similar to the bull call spread, the investor wants to limit both the risk and the investment.

Starting scenario

IBM shares are trading at EUR 128 at the end of October.
The prices of the IBM December 130 Put and December 110 Put are EUR 9.35 and EUR 2.10 respectively.

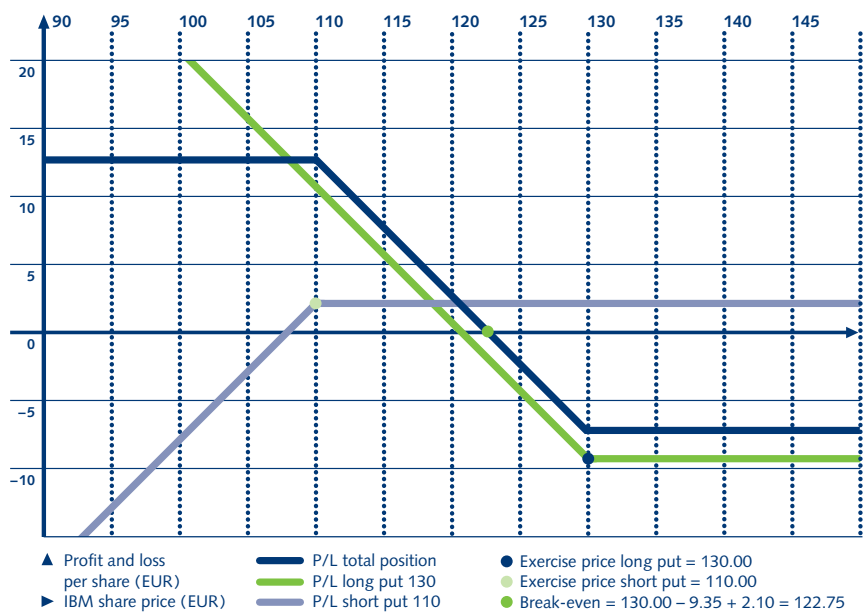
Strategy

Long	**1 IBM December 130 Put**	**EUR 9.35**
Short	**1 IBM December 110 Put**	**EUR 2.10**

Profit and Loss at the End of the Option Lifetime in EUR, IBM March 130/110 Bear Put Spread

IBM share price at expiration (EUR)	Value of the long put 130 (EUR)	Profit/ loss on the long put 130 (EUR)	Value of the obligation from the short put 110 (EUR)	Profit/ loss on the short put 110 (EUR)	Total profit/ total loss
100	+30	+20.65	–10	– 7.90	+12.75
105	+25	+15.65	– 5	– 2.90	+12.75
110	+20	+10.65	0	+2.10	+12.75
115	+15	+ 5.65	0	+2.10	+ 7.75
120	+10	+ 0.65	0	+2.10	+ 2.75
122.75	+ 7.25	– 2.10	0	+2.10	0
125	+ 5	– 4.35	0	+2.10	– 2.25
130	0	– 9.35	0	+2.10	– 7.25
135	0	– 9.35	0	+2.10	– 7.25
140	0	– 9.35	0	+2.10	– 7.25

Profit/Loss Profile at the End of the Option Lifetime, IBM Bear Put Spread – P/L in EUR per Underlying Instrument



Outcome

Whilst the long put lets the investor benefit from the falling share price, the risk is lowered by the amount achieved from the sale of the short put. The time value decay, delta and vega of this spread are also lower than for an outright long put.

Since the long put is already in-the-money in the event of falling share prices, the short put does not represent an additional risk to the investor. Therefore, no margin is required for the bear put spread.

The maximum profit of EUR 12.75 per contract unit is achieved if the share price reaches/falls below the lower exercise price. Below that price, the additional profit gained on the purchased put with the higher exercise price is completely compensated by the loss incurred on the sold put with the lower exercise price. The maximum loss of EUR 7.25 per contract unit occurs if the share rises to or above the higher exercise price. It is calculated from the difference between both option prices. Break-even is at EUR 122.75 (130 + 2.10 – 9.35).

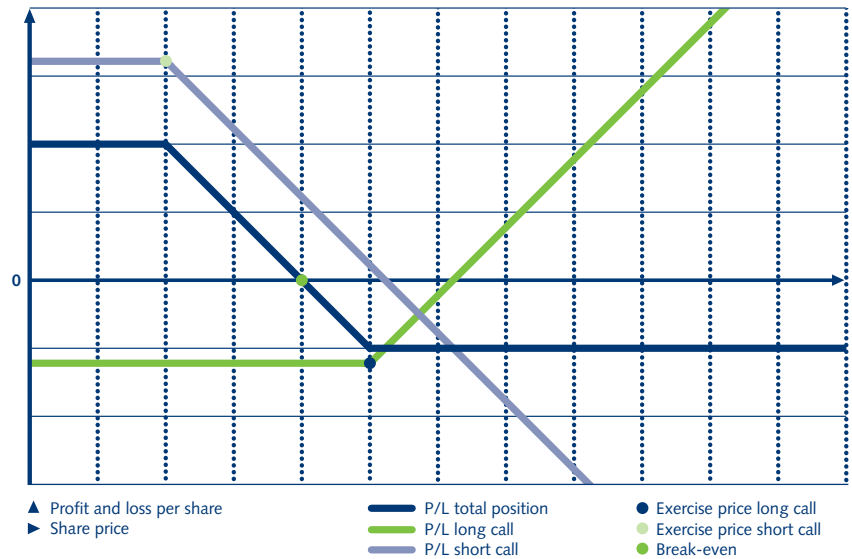
Bear Call Spread

Just as the bear put spread, a bear call spread comprises two opposite trades:

Long	**call with a higher exercise price, at a lower option price**
Short	**call with a lower exercise price, at a higher option price**

The investor in a bear spread benefits from falling prices. If the price falls below the exercise price of the short call, neither of the two options are exercised. The maximum profit in this case is the net premium received. Since the sale of the call with the lower exercise price represents a risk to the seller, margin must be pledged for a bear call spread.

Profit/Loss Profile at the End of the Option Lifetime, Bear Call Spread – P/L per Underlying Instrument



Strategies that Anticipate Changes in Volatility

Long Straddle

The previous examples showed trading and hedging strategies where the starting scenario was the expectation of a specific development in the price of the underlying instrument. We explained that the time value decay (portfolio theta) is very important to the success of these strategies. Volatility was assumed to be almost constant.

The advantage of options is that they allow the investor to use trading strategies that benefit from a change in the volatility of a trend, irrespective of the direction of the price performance.

The long straddle represents a typical strategy for when increasing volatility is expected.

Long straddle	Simultaneous purchase of a call and a put with the same exercise price and expiration date

Motivation

Since the end of October, the share price of Credit Suisse Group (CSGN) has been fluctuating between CHF 60 and 70. It is trading at CHF 65 in January. The Credit Suisse Group quarterly figures are due to be published shortly. An investor is convinced that the volatility of this share will increase significantly, without being able to forecast a clear price development.

Starting scenario

Credit Suisse Group shares (CSGN) are trading at CHF 65.
The CSGN March 65 Call trades at CHF 3.00.
The CSGN March 65 Put trades at CHF 2.60.

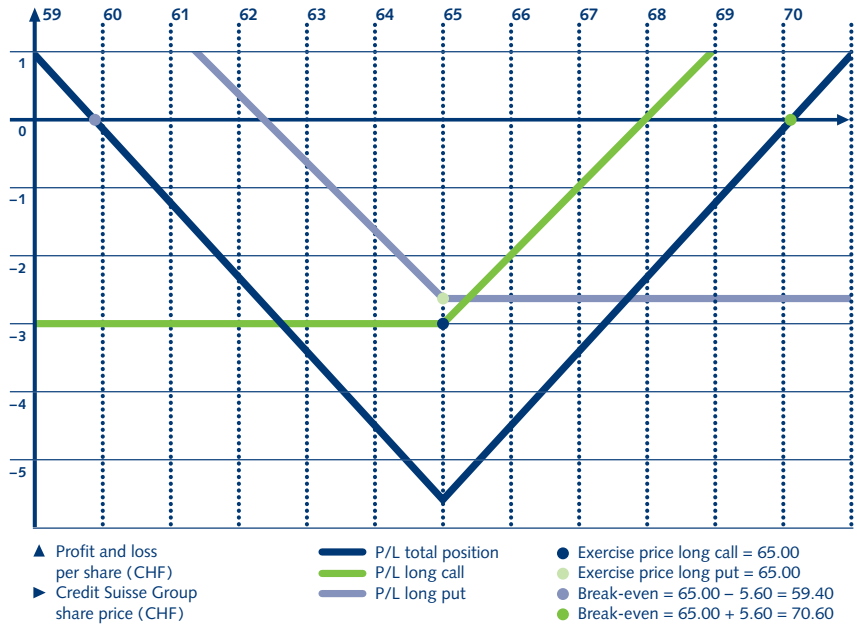
Strategy

Long	**1 Credit Suisse March 65 Call**	**CHF 3.00**
Long	**1 Credit Suisse March 65 Put**	**CHF 2.60**

Both the long call and the long put position benefit from an increase in the implied volatility. At the same time, this strategy realizes a profit on an increase in the actual volatility – a short-term, major price movement. However, each of these positions carry the threat that an increase in value through increased volatility (vega) is lost on account of the disadvantageous performance of the underlying instrument. The combination of a long call and long put position allows the investor to build up a position that is almost delta neutral. Similar to previous examples, the profit/loss profile at the end of the option lifetime is derived from the sum of both components.

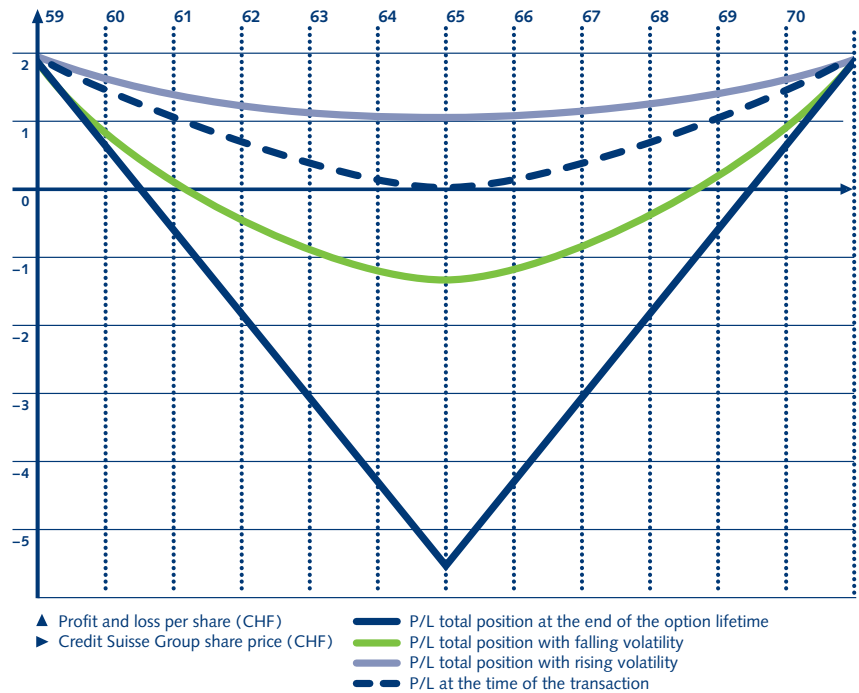
Since this is a combination of two long positions, no margin is required.

Profit/Loss Profile at the End of the Option Lifetime in CHF, Credit Suisse March 65 Long Straddle – P/L in CHF per Underlying Instrument



When the long straddle expires, profit is only made if the share price deviates from the exercise price by more than the sum of both option prices. However, this is highly unlikely due to the double time value decay. Rather, the objective of this strategy is to close out the position immediately after an increase in the implied or actual volatility. The profit/loss profile for various volatility levels is shown in the following graph.

Profit/Loss Profile in CHF, Credit Suisse March 65 Long Straddle – P/L per Underlying Instrument



The value of the position immediately after the transaction is shown by the blue dotted line. The profile at the end of the lifetime is already known. An increase in the volatility results in an increase in the value of both positions, resulting in a profit (light blue line) irrespective of the price of the underlying. The position should be closed out as soon as no further short-term increase in volatility is expected. If the volatility falls, the profit/loss function approaches the profile at the end of the option lifetime, since falling volatility and the passage of time reduce the time value (shown in green).

Long Strangle

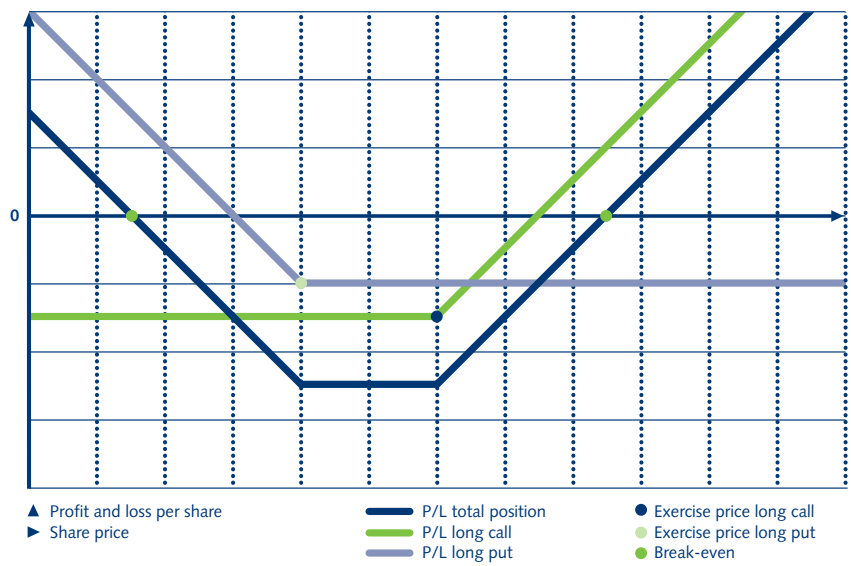
Similar to the straddle described above, a long strangle also serves to benefit from increasing volatility. Unlike the long straddle, the investor buys calls and puts with different exercise prices (but with the same expiration). With this strategy, the investor usually buys a put with a lower exercise price and a call with a higher exercise price. In this case, at least one option is out-of-the-money. The sum of the option prices is lower than for the straddle, as is the profit potential should the implied volatility rise, on account of the lower vega. This is the case even if the market is subject to a major short-term move. Making a profit on the share price movement is even more unlikely if the position is held until expiration.

Long strangle	Simultaneous purchase of a call and a put with the same expiration date, but different exercise prices

Like the long straddle, no margin is required for a long strangle, since it comprises only long positions.

The development of this combination for different volatility levels is similar to the straddle. The following graph assumes the underlying price lies equidistant between the exercise prices at the time of the transaction. The profit and loss function between the exercise prices is relatively flat.

Profit/Loss Profile, Long Strangle Position – P/L per Underlying Instrument



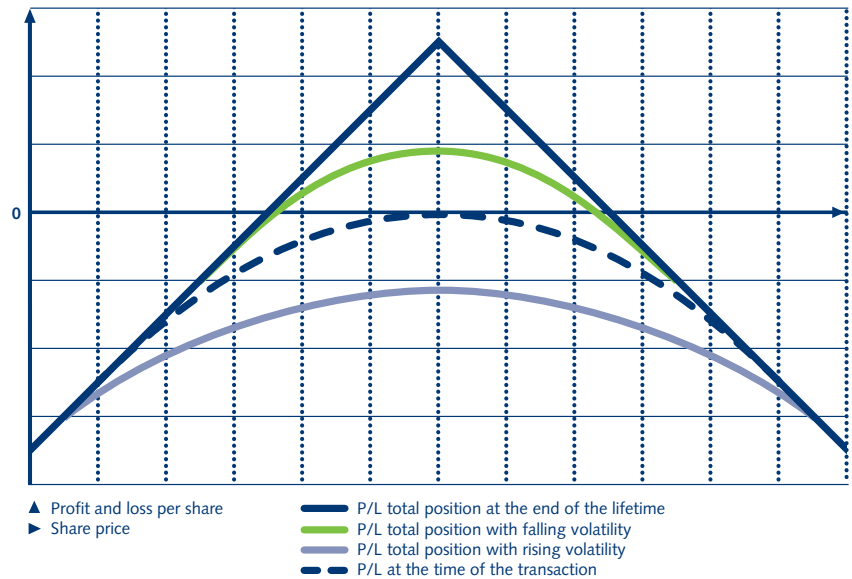
Short Straddle

The short straddle is the exact opposite of a long straddle. The investor sells a put and a call with the same exercise price and expiration date. This is based on the assumption that the underlying instrument will remain within a certain price range and that the implied volatility will fall. Because the investor sells both a call and a put, he stands to benefit twice from the time value decay of the options. The maximum profit corresponds to the sum of the option premiums received in the event that they expire worthless. The risk exposure of this strategy is very high, should volatility increase or should the price of the underlying instrument break out on the up- or downside.

Short straddle	Simultaneous sale of a call and a put with the same exercise price and expiration date

Margin must be pledged for a short straddle.

Profit/Loss Profile at the End of the Option Lifetime, Short Straddle – P/L per Underlying Instrument

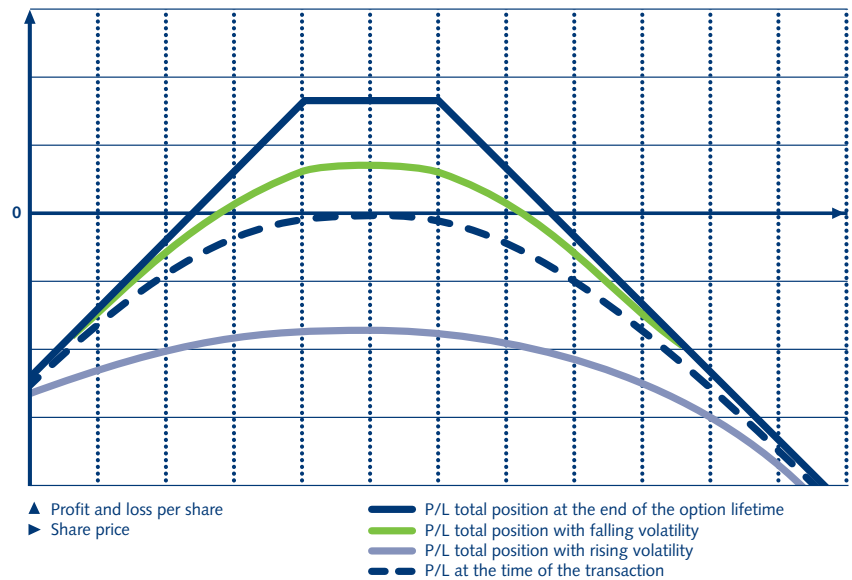


Short Strangle

The short strangle differs from the short straddle by the different exercise prices of the sold options. With this strategy, the investor expects the share to remain trading within a range around the current share price and for volatility to fall. Similar to the short straddle, the holder of the short strangle benefits twice from the time value decay. On the other hand, the short strangle carries the threat of high risk exposure should volatility rise. Hence, margin must also be pledged.

Short strangle	Simultaneous sale of a call and a put with the same expiration date, but different exercise prices

Profit/Loss Profile, Short Strangle – P/L per Underlying Instrument



Hedging Strategies Using Stock Options and Equity Index Options

A hedging strategy using options aims to balance potential losses from the equity portfolio with profits from the options position.

As was already explained in the section "Portfolio theory", an equity portfolio is subject to unsystematic (company-specific) risk on the one hand and to systematic (overall market) risk on the other. The company-specific risk can be reduced by using options on individual shares, while index options serve to reduce market risk.

Hedging with Stock Options – Buying Puts

Long put positions can be used to hedge positions in individual shares, since the value of a long put rises when prices fall, thus compensating the loss incurred on the shares. The put purchase also gives the investor the right to sell the shares at the exercise price, even when the share price falls below this level.

In the event that the investor wants to hold the shares in spite of falling prices, the put position can be closed out. Since the put price rises when share prices fall, the option can be sold at a higher price, providing for a partial compensation of the loss sustained on the equity position.

Motivation

An investor holds BMW shares in the portfolio. Notwithstanding the very positive long-term outlook for BMW, quarterly figures are expected shortly and the investor wants to hedge against unpleasant surprises.

Starting scenario

The investor holds 1,000 BMW shares bought at a price of EUR 34.50.
The BMW share price is EUR 38.
The price of the BMW June 38 Put is EUR 1.30.

Strategy

Number of option contracts = Number of shares in the portfolio / Contract size = 1,000 / 100 = 10

Purchase	10 BMW June 38 Puts	EUR 1.30

Profit and Loss at the End of the Option Lifetime in EUR, Long BMW June 38 Puts, BMW Share

BMW share price at the end of the option lifetime (EUR)	Value of the BMW June 38 Put (EUR)	Profit/loss per contract unit (EUR)	Profit/loss per share (EUR)	Total profit/ total loss
34	+4	+2.70	−4	−1.30
35	+3	+1.70	−3	−1.30
36	+2	+0.70	−2	−1.30
37	+1	−0.30	−1	−1.30
38	0	−1.30	0	−1.30
39	0	−1.30	+1	−0.30
39.30	0	−1.30	+1.30	0
40	0	−1.30	+2	+0.70
41	0	−1.30	+3	+1.70
42	0	−1.30	+4	+2.70

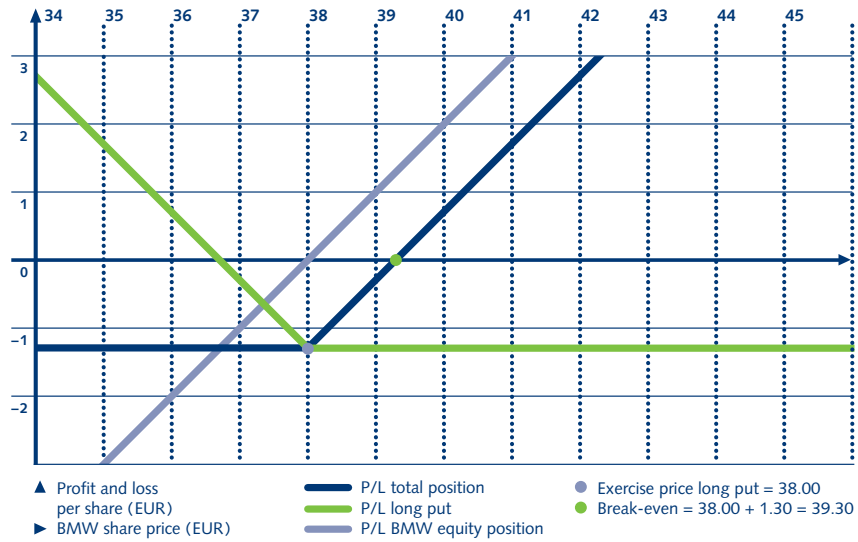
The following applies to the total position:

P/L of the option position = P/L per contract × Number of contracts (10) × Contract size (100)

P/L of the equity position = P/L per share × Number of shares (1,000)

P/L of the total position = P/L of the option position + P/L of the equity position

Profit/Loss Profile at the End of the Option Lifetime, Long Share, Long BMW June 38 Put – P/L in EUR per Underlying Instrument



Outcome

This example clearly reflects the concept of hedging: the maximum total loss per unit is limited to EUR 1.30 (total position: EUR – 1,300), the profit potential however remains intact. The shares are hedged at EUR 36.70, whereby the option price (premium) paid for this hedge must be deducted from the exercise price of the option. If the price of the share is above EUR 36.70 on the expiration date, the unhedged position is more advantageous than the hedged one. If the price is below EUR 39.30 on the Last Trading Day, the investor incurs a maximum loss on the hedged position of EUR 1.30 per unit. Even if the share price falls further, the loss on the share position is compensated by the profit on the option position, with a residual disadvantage of EUR 1.30 per contract unit. Similar to a speculative long put which is not used specifically to hedge an equity portfolio, no margin is required for this position.

Hedging with Stock Options – Covered Call Writing

The sale of a covered call presents an interesting strategy to an investor with an equity portfolio who anticipates stable prices.

The investor can increase the return on the portfolio by the option price received, without having to pledge margin: in other words, without having to incur additional costs. When equity prices fall, the risk exposure of the shares will be reduced by the option price received. The enhanced return is paid for by limiting the potential profit on rising prices.

Motivation

At the beginning of February, an investor holds 1,000 Deutsche Telekom shares (DTE) and expects no strong price fluctuations over the coming days. The requirement is to achieve a small additional return.

Starting scenario

Deutsche Telekom shares (DTE) are currently trading at EUR 18.20.
The price of the DTE February 19 Call is EUR 0.43.

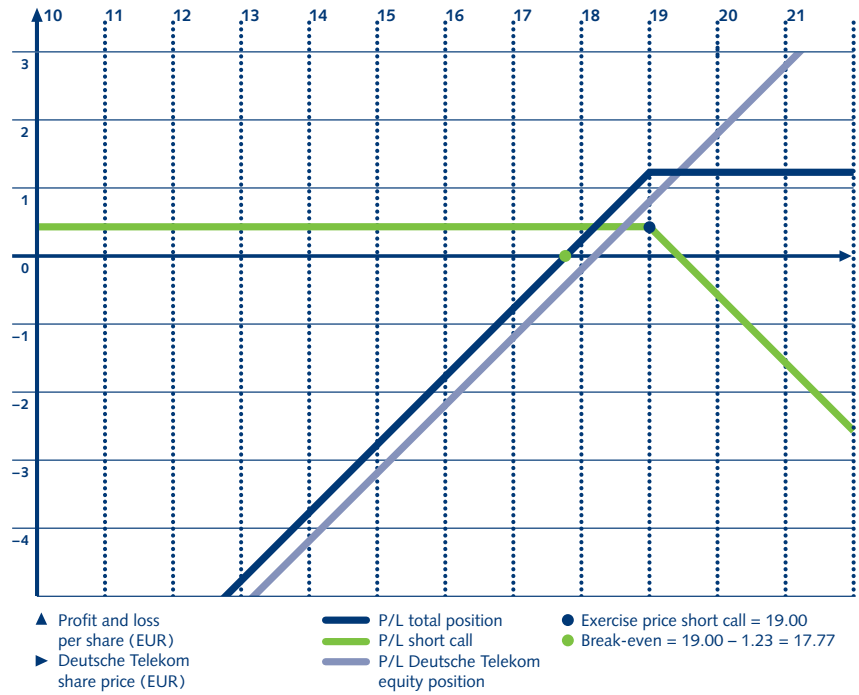
Strategy

Sale	10 Deutsche Telekom February 19 calls	EUR 0.43

Profit and Loss at the End of the Option Lifetime in EUR,
Short Deutsche Telekom February 19 Calls / Long Deutsche Telekom Shares

DTE share price at the end of the option lifetime (EUR)	Value of the obligation from the sale of the DTE 19 call (EUR)	Profit/loss per contract unit (EUR)	Profit/loss on the equity position 18.20 (EUR)	Total profit/ total loss
14	0	+0.43	−4.20	−3.77
15	0	+0.43	−3.20	−2.77
16	0	+0.43	−2.20	−1.77
17	0	+0.43	−1.20	−0.77
17.77	0	+0.43	−0.43	0
18	0	+0.43	−0.20	+0.23
18.20	0	+0.43	0	+0.43
19	0	+0.43	+0.80	+1.23
20	+1	−0.57	+1.80	+1.23
21	+2	−1.57	+2.80	+1.23

Profit/Loss Profile at the End of the Option Lifetime, Long Shares, Short Deutsche Telekom February 19 Calls – P/L in EUR per Underlying Instrument



Outcome

The profit potential of the total position (shares + options) is limited. The maximum profit of EUR 1.23 per contract unit is achieved if the share price trades up to the exercise price of EUR 19. If, contrary to expectations, the share price rises further, the investor will either close out the call position or will expect to have to deliver the shares at the exercise price.

Both the latter cases are unfavorable for the investor, since either the call has to be bought back at a higher price, or the shares must be delivered below the market price. If the share price lies between EUR 17.77 and the exercise price of EUR 19 on the Last Trading Day, the investor can still make a profit. A loss is incurred on a share price below EUR 17.77. This corresponds to the loss on the equity position reduced by the option price received. A pure equity position would be more advantageous (since the short call imposes a ceiling on profit) if the share price were above EUR 19.43 (19 + 0.43) on the Last Trading Day. Similar to an outright short call, time acts in favor of the holder of this position. The option position should be closed as soon as a price increase is expected.

Hedging with Equity Index Options

A prerequisite for the use of index options for hedging an equity portfolio – as explained in the introductory chapter – is a broadly-diversified equity portfolio with a strong correlation to the underlying index of the option contract.

Motivation

An investor holds a diversified portfolio of Swiss shares. There are fears that the overall market will decline in the short-term.

Starting scenario

The SMI® is trading at 6,341.50 points in May. The investor wants to hedge the value of the portfolio until mid-June and therefore buys SMI® June 6,300 Puts. The beta factor of the portfolio must be taken into consideration when calculating the necessary number of puts.[13]

Quantity	Issue	Entry price (CHF)	Current price (CHF)	Beta factor	Market value (CHF)
1,800	ABB N	12.50	16.20	1.35	29,160
900	Roche GS	101.80	115.00	1.14	103,500
2,000	CS Group N	62.35	67.50	1.28	135,000
Total value	**Portfolio**				**267,660**

Similar to purchasing puts to hedge individual shares, the hedge is based on the investor acquiring a right to sell at a set minimum price. Index options on the other hand do not constitute a physical share sale, but a "sale" of an index portfolio of the most possible equivalent value at a given point in time. The option position must be adjusted relative to the value and sensitivity of the equity portfolio. This is achieved by multiplying the option position by the beta factor of the equity portfolio. In other words, the more sensitively the shares react to the overall market development, the more option contracts will be required for the hedge. By definition, the sensitivity of the index underlying the option contract is one.

The beta factor of the equity portfolio is a weighted mean of the beta factors of the individual shares.

$$1.35 \times \frac{29{,}160}{267{,}660} + 1.14 \times \frac{103{,}500}{267{,}660} + 1.28 \times \frac{135{,}000}{267{,}660} = 1.2335$$

The number of option contracts required is determined as follows:

$$\text{Number of contracts} = \frac{\text{Portfolio value}}{\text{Index level} \times \text{Option contract size}} \times \text{Portfolio beta}$$

[13] Cf. section "Capital Market Theory".

One index option contract comprises a set value per index point, the so-called multiplier. The multiplier of the SMI® Option is CHF 10. Index contracts are traded in points rather than currency units, so an option contract price must be adjusted by this multiplier to calculate its value.

$$= \frac{267{,}660}{6{,}341.50 \times 10} \times 1.2335 = 5.2063$$

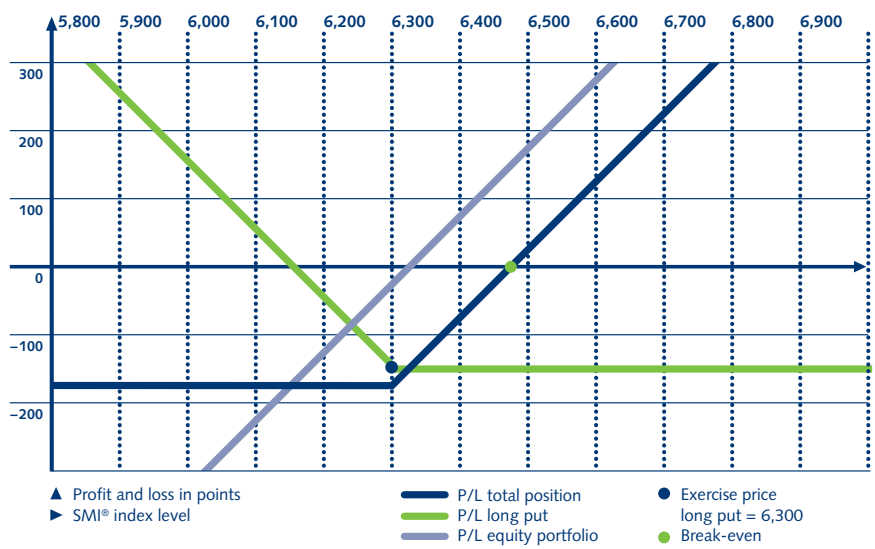
(based on a rounded beta)

Strategy

Purchase	**5 SMI® June 6,300 Puts**	**152 points**

The option price is 152 points × CHF 10 per point = CHF 1,520.

Profit/Loss Profile at the End of the Option Lifetime, Long Equity Portfolio, Long SMI® June 6,300 Put – P/L in Points



Distinction between Fixed and Dynamic Hedging Strategies

The previous strategy outlined above was a fixed hedge, by virtue of the fact that it is only suitable for hedging the value at the end of the option's lifetime. The value of the total position can also vary during the lifetime of the option. The delta factor of the option determines the extent to which the option price varies from the portfolio: for an at-the-money option, for example, it would be 0.5. To exclude this fluctuation, the option position would need to be weighted against the equity position by a factor of 1/delta (on the basis of a sensitivity adjustment, as demonstrated above). Since the delta factor is not constant over time, the option position would have to be adjusted constantly.

$$\text{Number of contracts} = \frac{\text{Portfolio value}}{\text{Index level} \times \text{Option contract size}} \times \frac{\text{Portfolio beta factor}}{\text{Index option delta}}$$

Relationship between Options and Futures

In the previous sections of this brochure, the characteristics and possible applications of stock options and equity index futures and options were presented. This section concentrates on combinations of index options and futures. One of the important characteristics of derivatives is that every contract can be reproduced by combining other derivatives and/or cash market instruments. The purpose of presenting such "synthetic" positions within the scope of this brochure is to facilitate the understanding of relationships between futures and options. Price differences between a derivative contract and its synthetic equivalent are an indication of market imbalances. In practice, however, exploiting such mispricing (by way of arbitrage) can seldom be realized by private investors, since the market imbalances are usually very minor and exist for a very short while only.

There are certain similarities between the contract features of index options traded on Eurex, and index futures. However, they are not identical: for example, options have more expiration months than futures have contract months. The similarities between both instruments allow synthetic positions to be created. A synthetic option position is created by combining futures and option contracts. A synthetic futures position, on the other hand, is created from options transactions alone.

Synthetic Long Index Call

A synthetic long index call is created by combining a long index futures position with a long index put option. Similar to the "real" long call, the synthetic long call contains limited risk exposure if the index falls and provides unlimited profit potential if it rises.

Motivation

An investor expects the SMI® index to rise and is looking for the optimum way of benefiting from this.

Starting scenario

At the end of February, the SMI® is trading at 6,275.5 points. The following prices are traded on Eurex:

SMI® March 6,300 Call	**136.5 points**
SMI® March 6,300 Put	**115.5 points**
SMI® March Future	**6,318 points**

Strategy

The investor decides to build up a synthetic long call and enters into the following positions:

Purchase	**10 SMI® March 6,300 Puts**	**115.5 points**
Purchase	**10 SMI® March Futures**	**6,318 points**

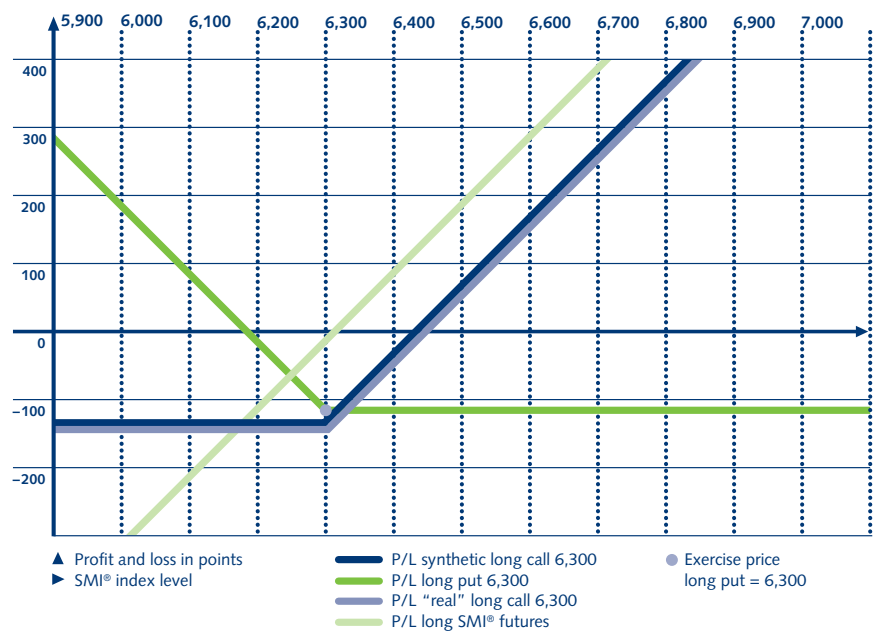
Motivation

The investor regards the option price of the call as overvalued compared with the futures price and the put premium. The synthetic long call therefore has a more favorable profit/loss profile than the "real" long call.

Profit and Loss at the End of the Option Lifetime in Points, Synthetic and "Real" Long SMI®
March 6,300 Call

SMI® index level	P/L SMI® long futures 6,318 per index point	Value of the long put 6,300	P/L long put 6,300	P/L synthetic long call 6,300	P/L "real" long call 6,300
6,100	–218	+200	+ 84.50	–133.50	–136.50
6,150	–168	+150	+ 34.50	–133.50	–136.50
6,200	–118	+100	– 15.50	–133.50	–136.50
6,250	– 68	+ 50	– 65.50	–133.50	–136.50
6,300	– 18	0	–115.50	–133.50	–136.50
6,350	+ 32	0	–115.50	– 83.50	– 86.50
6,400	+ 82	0	–115.50	– 33.50	– 36.50
6,433.5	+115.50	0	–115.50	0	– 3
6,436.5	+118.50	0	–115.50	+ 3	0
6,450	+132	0	–115.50	+ 16.50	+ 13.50
6,500	+182	0	–115.50	+ 66.50	+ 63.50
6,550	+232	0	–115.50	+116.50	+113.50

Profit/Loss Profile at the End of the Option Lifetime, Synthetic SMI® March 6,300 Call – P/L in Points



Outcome

The buyer of the synthetic call reaches break-even as soon as the SMI® exceeds 6,433.5 points (futures price + put premium). When the SMI® rises, the investor achieves a profit on the futures position, which is reduced only by the premium paid for the put. Since, theoretically, the rise in the SMI® can be unlimited, profit is also theoretically unlimited.

If the SMI® falls below 6,300 points, the maximum loss of 133.50 is reached (loss from the futures position minus profit on the put position).

Break-even for the "real" call is not reached until the SMI® rises to 6,436.5 points (exercise price + call premium). On the other hand, if the SMI® falls below 6,300 points, the maximum loss per SMI® point is 136.50 points (call premium). The synthetic call therefore outperforms the "real" long call by three index points.

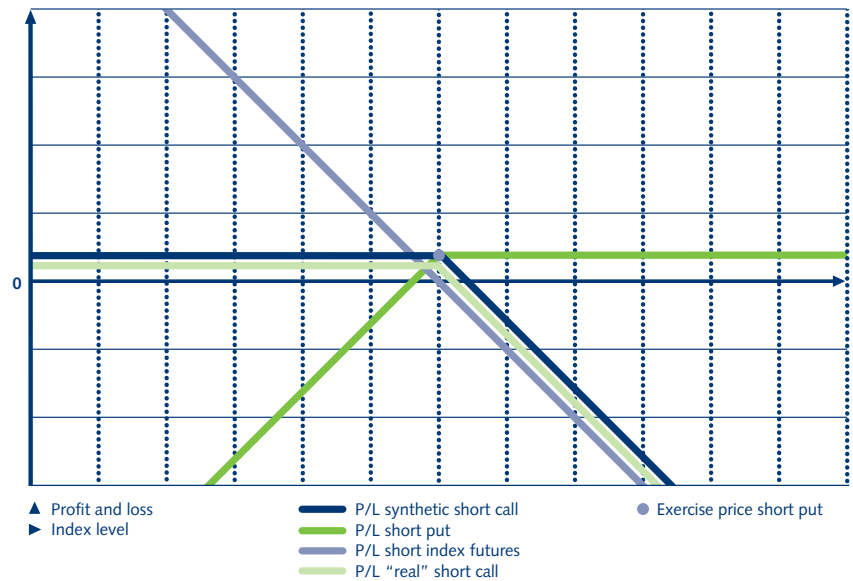
Synthetic Short Index Call

The synthetic short index call is created by combining a short index futures position with a short index put option. If the multipliers of the futures and option of the corresponding index are not the same, the relationship between the contracts must be adjusted accordingly.

Similar to the "real" option, the synthetic short call allows for limited profit when the index falls or stagnates and carries the threat of risk exposure when it rises.

A synthetic short call position is attractive when the call price is considered undervalued compared with the put and the futures price. Profits on the "real" short call would therefore be lower than on the synthetic short call; in other words, the profit/loss profile of the synthetic short call is more advantageous than that of the "real" short call.

Profit/Loss Profile at the End of the Option Lifetime, Synthetic Short Index Call



Synthetic Long Index Put

The synthetic long index put is created by combining a short index futures position with the necessary number of long index calls. Similar to the "real" long put, the risk exposure is limited if the index rises, with significant profit potential if it falls.

Motivation

An investor expects German shares to fall sharply up to March and wants to hedge the portfolio as cost-effectively as possible.

Starting scenario

At the end of February, the DAX® index is trading at 4,769 points. The following prices are traded on Eurex:

DAX® March 4,800 Call	**123 points**
DAX® March 4,800 Put	**136 points**
DAX® March Future	**4,792 points**

Strategy

Creating a synthetic long put:

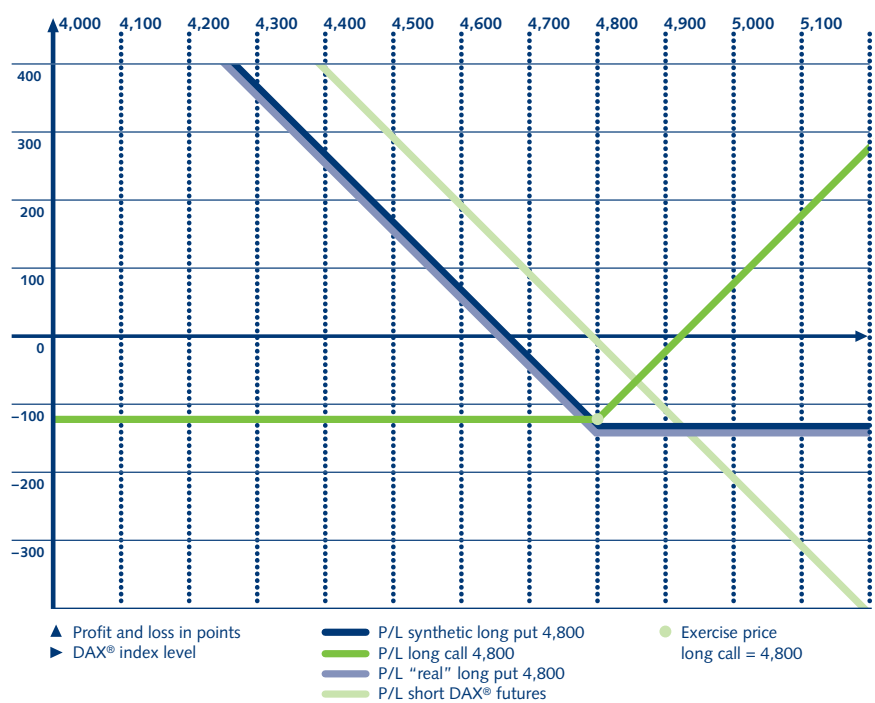
Purchase	**5 DAX® March 4,800 Calls**	**123 points**
Sale	**1 DAX® March Future**	**4,792 points**

A weighting of 5:1 is necessary due to difference in contract size (EUR 5 per index point for the option, EUR 25 for the future).

Profit and Loss at the End of the Option Lifetime in Points, Synthetic and "Real" Long March 4,800 Put

DAX® index level	P/L DAX® short futures per index point	Value of the long call 4,800	P/L of the long call 4,800	P/L of the synthetic long put 4,800	P/L of the "real" long put 4,800
4,500	+292	0	–123	+169	+164
4,550	+242	0	–123	+119	+114
4,600	+192	0	–123	+ 69	+ 64
4,650	+142	0	–123	+ 19	+ 14
4,664	+128	0	–123	+ 5	0
4,669	+123	0	–123	0	– 5
4,700	+ 92	0	–123	– 31	– 36
4,750	+ 42	0	–123	– 81	– 86
4,800	– 8	0	–123	–131	–136
4,850	– 58	+ 50	– 73	–131	–136
4,900	–108	+100	– 23	–131	–136
4,950	–158	+150	+ 27	–131	–136

Profit/Loss Profile at the End of the Option Lifetime, Synthetic Long DAX® March 4,800 Put – P/L in Points



Outcome

The synthetic long put has a more favorable profit/loss profile than the "real" long put. The buyer of the synthetic put breaks even as soon as the DAX® falls below 4,669 points (futures price minus call premium). When the DAX® falls, the investor achieves a profit on the futures position, which is reduced only by the call premium.

If the DAX® is trading above 4,669 on the option's Last Trading Day, the investor incurs a loss. The loss on the futures position is compensated in part by the profit made on the calls. If the DAX® exceeds 4,800 points, the investor suffers the maximum loss of 131 points (loss on futures positions minus profit on the call position).

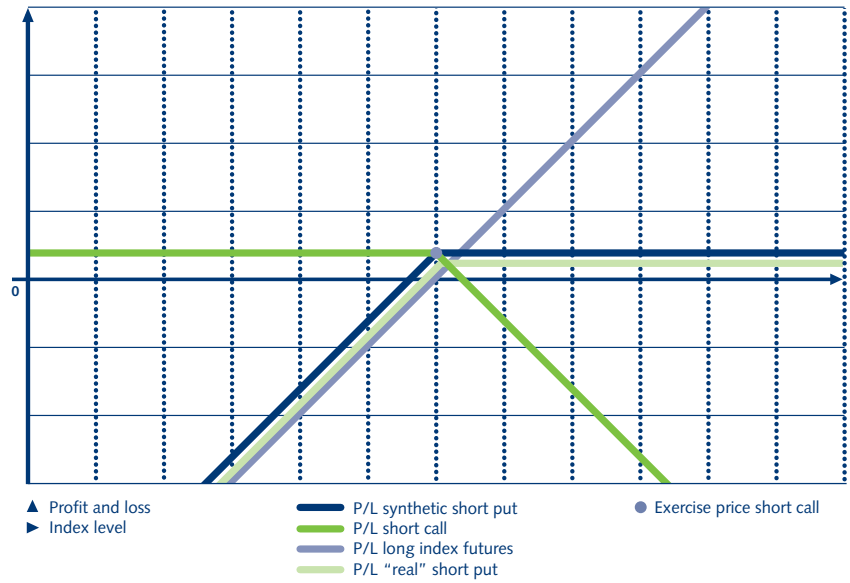
Break-even for the "real" put is not reached until the DAX® falls below 4,664 points. On the other hand, if the DAX® is at (or above) 4,800 points, the maximum loss per DAX® point is 136 points (put premium). The profit/loss profile of the synthetic long put position therefore exceeds that of the "real" long put by five points.

Synthetic Short Index Put

The synthetic short index put is created by combining a long index futures position with the necessary number of short index calls. Similar to the "real" short put, the synthetic short put offers limited profit when the index rises and carries the threat of very high risk exposure should it fall.

If the put price is undervalued compared with the call and the futures price, investors can enter into a synthetic short index put and achieve a better profit/loss profile than for the "real" put.

Profit/Loss Profile at the End of the Option Lifetime, Synthetic Short Index Put



Synthetic Short Index Future/Conversion

The key features and advantages of a synthetic short index futures position are shown here in an example of a conversion strategy.

A conversion is created by combining a synthetic short index future with a "real" long index future.

Motivation

An arbitrageur has analyzed the prices for Eurex DAX® Options, and has determined that the December 4,800 call is too expensive. The synthetic DAX® Future is more expensive than the "real" DAX® Futures contract. The intention is to benefit from exploiting the price differences.

Starting scenario

At the beginning of November, the DAX® is trading at 4,751 points. The following prices are traded on Eurex:

DAX® December 4,800 Call	**120 points**
DAX® December 4,800 Put	**143 points**
DAX® December Future	**4,767 points**

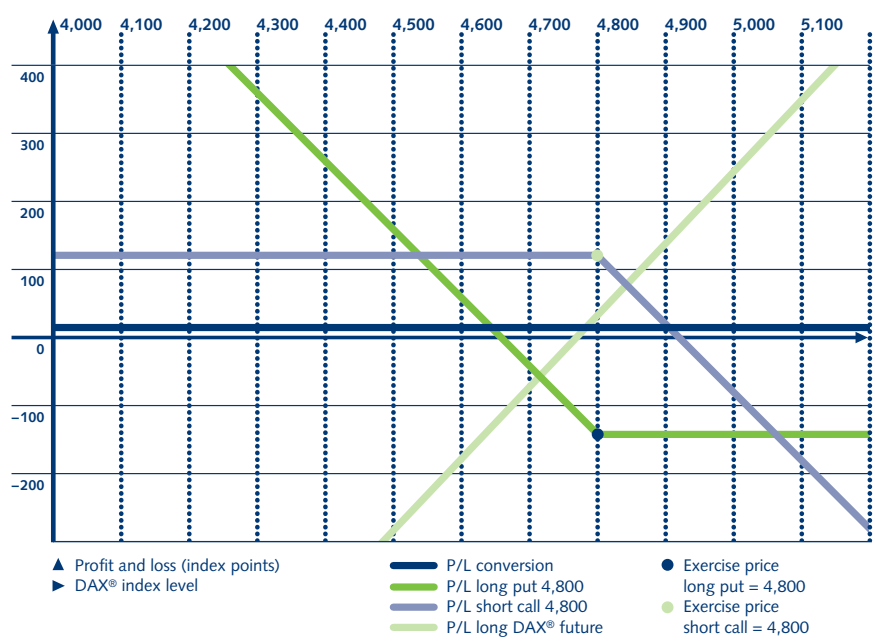
Strategy

Sale	**5 DAX® December 4,800 Calls**	**120 points**
Purchase	**5 DAX® December 4,800 Puts**	**143 points**
Purchase	**1 DAX® December Future**	**4,767 points**

Profit and Loss at the End of the Option Lifetime in Points, Conversion: Synthetic Short DAX® Future, "Real" Long DAX® Future

DAX® index level	P/L long DAX® Future 4,767	P/L short call 4,800	P/L long put 4,800	P/L synthetic short DAX® Future	Profit of the conversion
4,450	−317	+120	+207	+327	+10
4,500	−267	+120	+157	+277	+10
4,550	−217	+120	+107	+227	+10
4,600	−167	+120	+ 57	+177	+10
4,650	−117	+120	+ 7	+127	+10
4,700	− 67	+120	− 43	+ 77	+10
4,750	− 17	+120	− 93	+ 27	+10
4,800	+ 33	+120	−143	− 23	+10
4,850	+ 83	+ 70	−143	− 73	+10
4,900	+133	+ 20	−143	− 123	+10
4,950	+183	− 30	−143	− 173	+10
5,000	+233	− 80	−143	− 223	+10

Profit/Loss Profile at the End of the Option Lifetime, Conversion – P/L in Points



Outcome

The outcome of the conversion is independent of the DAX® level. The price difference between the "real" and synthetic futures contract is decisive. The price of the long DAX® Future must be lower than that of the synthetic short DAX® Futures contract.

The futures price of the synthetic position and the profit potential of the conversion can be calculated as follows:

4,800	**Exercise price**
+ 120	**Short call premium**
– 143	**Long put premium**
= 4,777	**Synthetic futures price**
– 4,767	**Actual futures price**
= 10	**Profit of the conversion strategy (per conversion unit)**

With the conversion, the investor achieves a profit of EUR 250 (10 points × EUR 25 per point) for each unit comprising one futures contract with five call and put options.

Synthetic Long Index Future/Reversal

A synthetic long index futures contract is created by buying an index call while simultaneously selling index puts. Similar to the "real" long index future, the synthetic long index future provides unlimited profit potential when the index rises, and carries the threat of risk exposure to the value of the futures contract if the index falls.

A reversal is created by combining a synthetic long index future and a "real" short index future.

Motivation

An arbitrageur has analyzed the prices for SMI® Options on Eurex and has determined that the December 6,350 Put is too expensive. The synthetic SMI® Future is cheaper than the "real" SMI® Futures contract. The intention is to benefit from exploiting the price differences.

Starting scenario

The following prices are traded at the end of November:

SMI® December 6,350 Call	**148 points**
SMI® December 6,350 Put	**146 points**
SMI® December Future	**6,360 points**

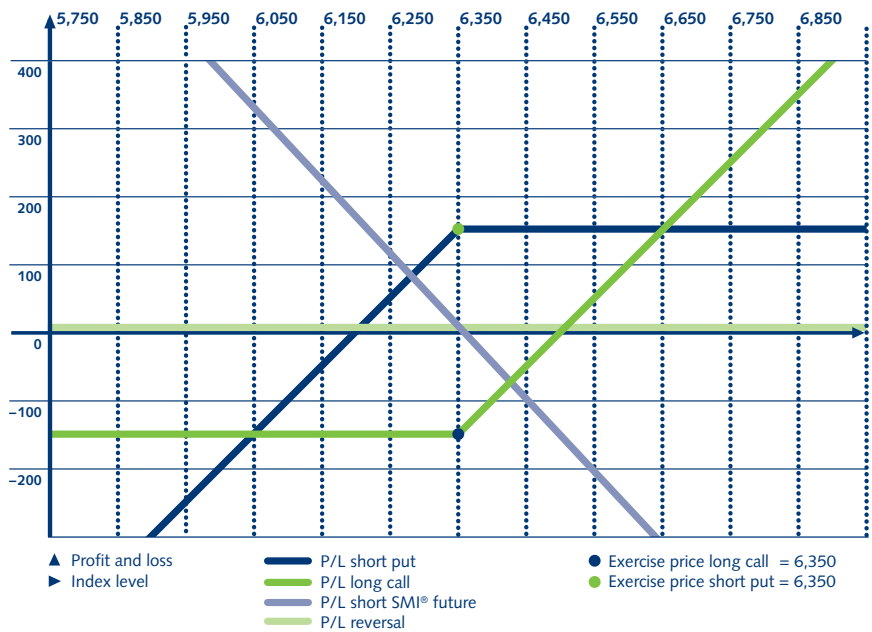
Strategy

Purchase	**1 SMI® December 6,350 Call**	**148 points**
Sale	**1 SMI® December 6,350 Put**	**146 points**
Sale	**1 SMI® December Future**	**6,360 points**

The synthetic futures price can be calculated as follows:

6,350	**Exercise price**
+ 148	**Long call premium**
– 146	**Short put premium**
= 6,352	**Synthetic futures price**

Profit/Loss Profile at the End of the Option Lifetime, Reversal - P/L in Points



Outcome

The synthetic long SMI® Future, achieved at a price of 6,352 points through the simultanous purchase of the call and sale of the put, is compared with a "real" short SMI® Future at a price of 6,360 points. The investor makes a profit of CHF 80 per contract ((6,360 – 6,352) × CHF 10) from the reversal – the strategy is worthwhile.

Price risk is eliminated by simultaneously holding a "real" futures position and the offsetting synthetic futures position.

Overview of Synthetic Options and Futures Positions

Synthetic ...	is created by		
	Call	**Put**	**Future**
Long call	–	long	long
Short call	–	short	short
Long put	long	–	short
Short put	short	–	long
Long future	long	short	–
Short future	short	long	–

Appendix

Glossary of Terms

Additional Margin

Additional margin is designed to cover the additional potential close-out costs of an open position. Such potential losses would arise if the least favorable expected price development were to materialize within the next exchange trading day (a worst-case loss), starting from the current price for futures contracts held within the respective account. It is used for short options and non-spread (outright) futures positions.

American-style option

An option that can be exercised on any exchange trading day before expiration.

At-the-money

An option whose exercise price corresponds approximately to the current price of the underlying.

Basis

The difference between the price of the underlying instrument and the futures price.

Beta

The beta factor reflects the sensitivity of a share or portfolio relative to the overall market development.

Call

An option contract that gives the buyer the right to buy a fixed number of units of the underlying instrument at a set price on or up to a set date (physical delivery). The right to physical delivery can be replaced by cash settlement (for equity index derivatives).

Cash settlement

Settling a contract whereby a cash sum is paid or received instead of physically delivering the underlying instrument. In the case of an option contract, the cash settlement is determined by the difference between the option exercise price and the final settlement price of the underlying instrument. In the case of a financial futures contract, the cash settlement is determined by the difference between the final settlement price and the daily settlement price of the contract on the previous exchange trading day.

Close-out

Closing an open options or futures position with a counter transaction is referred to as closing out (closing transaction).

Conversion

Creating a synthetic short futures position by selling calls and buying puts with the same exercise price and expiration date, while simultaneously entering into a "real" long futures position (opposite of reversal).

Correlation coefficient

The correlation coefficient measures the degree of uniformity between the returns of two financial instruments. Applied specifically, it can reduce the market risk of an instrument, either by offsetting it against a security with negative correlation, or against a counter position in an instrument with positive correlation.

Daily settlement price

The settlement price determined daily by Eurex Clearing AG for valuing open options and futures positions.

DAX®

The German Equity Index (Deutscher Aktienindex) DAX® comprises 30 German blue chips that are included in the index according to the following criteria: exchange-traded volume, market capitalization and recognition of the German Takeover Code. The DAX® is a performance index; hypothetical reinvestment of dividends is assumed when calculating the index.

Delta

The amount by which the option price changes, given a one unit change in the underlying instrument.

Derivative

Forward contracts are always based on one underlying instrument from which they are derived. Hence the expression derivatives.

Dow Jones Global Titans 50 Index

The Dow Jones Global Titans 50 Index comprises the 50 largest exchange-listed companies worldwide, in terms of free-float market capitalization.

Dow Jones STOXX Indexes

Index family that represents the price development of the European market. STOXX Ltd. calculates approximately 300 indexes. Dow Jones STOXX 50 and Dow Jones EURO STOXX 50 are the blue chip indexes of the STOXX family. They comprise the 50 largest companies in terms of capitalization from European countries or Eurozone countries, weighted by free-float market capitalization. The base date for the calculation of the index is 31 December 1991 = 1,000 points.

Aside from the blue-chip indexes, STOXX offers regional, size, style and market sector indexes. Admission to an index is – further to the index-specific criteria – subject to the free-float market capitalization of the company.

The indexes are calculated as price and performance indexes. The indexes are calculated with the stock prices converted into euros or US dollars.

European-style option

An option which cannot be exercised until their Last Trading Day.

Exercise

Declaration by the holder of an option to either buy or sell the underlying instrument at the conditions set out in the option contract.

Exercise price

The price at which the underlying is received or delivered when an option is exercised.

Expiration date

The date on which an option right can no longer be exercised.

Financial futures contract

A standardized contract comprising the delivery or receipt of a specific amount of a financial instrument at a set price on a certain date in the future.

Futures Spread Margin

This margin must be pledged to cover the maximum anticipated loss that could be incurred on a futures spread position within the next exchange trading day.

Hedging

Using a strategy to protect a portfolio or planned investments against unfavorable price changes.

HEX25®

The Finnish Stock Index is a price index weighted according to capitalization. However, the maximum weight of one company is limited to ten percent. It is continuously calculated from the 25 most frequently traded shares on the Helsinki Exchanges.

Implied volatility

The degree of volatility reflected in an option price.

In-the-money

A call option where the price of the underlying instrument is higher than the exercise price; in the case of a put option: where the price of the underlying instrument is lower than the exercise price.

Intrinsic value

The intrinsic value of an option corresponds to the difference between the current cash market price and the option's exercise price, insofar as this represents an advantage for the buyer. The intrinsic value is always greater than, or equal to, zero.

Leverage effect

The percentage change of the prices of options and futures contracts relative to the invested capital is greater than the corresponding change in the underlying. The term leverage effect is used to describe this increased profit or loss potential.

Long position

An open buyer's position in a forward contract.

Margin (Additional Margin, Premium Margin, Futures Spread Margin)

The provision of collateral which must be pledged to guarantee the fulfillment of contracts.

Mark-to-market

Daily revaluation of positions in financial futures or options on futures after the close of trading, to calculate the daily profit or loss.

Market risk

Please refer to Systematic risk.

Maturity date

The point in time at which the obligations defined in a financial futures contract must be met (delivery, cash settlement).

Non-spread futures position

Outright long or short positions that remain after netting counter positions with different remaining lifetimes, and for which Additional Margin must be pledged.

Option

The right to buy (call option) or to sell (put option) a specific number of units of a specific underlying instrument at a fixed price on, or up to a specified date.

Option price

The price paid for the option right (also referred to as "premium").

Out-of-the-money

A call option where the price of the underlying instrument is lower than the exercise price; in the case of a put option: where the price of the underlying instrument is higher than the exercise price.

Premium

Please refer to Option price.

Premium Margin

The Premium Margin must be pledged by the holder of a short options position, and must be maintained until exercise or expiration. It covers the seller's close-out costs, as measured by the settlement price. Premium Margin is continuously adjusted. Option buyers do not have to pledge any margin. By paying the option premium, they have acquired a right, but have not undertaken any obligations. Their maximum risk is that the contract can expire worthless. Hence the risk is limited to the option premium.

Put

An option contract that gives the holder the right to sell a fixed number of units of the underlying instrument at a set price on or up to a set date (physical delivery). The right to physical delivery can be replaced by cash settlement (for equity index derivatives).

Reversal

Creating a synthetic long futures position by buying calls and selling puts with the same exercise price and expiration date, while simultaneously entering into a "real" short futures position (opposite of conversion).

Short position

Open seller's position in a forward contract.

Spread position

In the case of an option transaction, the simultaneous purchase and sale of option contracts with different exercise prices and/or different expiration dates. In the case of financial futures, the simultanous purchase and sale of futures contracts with different maturity dates or underlying instruments.

Straddle

Long or short position with an equal number of calls and puts on the same underlying instrument, with the same exercise price and expiration date.

Strangle

Long or short position with an equal number of calls and puts on the same underlying instrument, with the same expiration date, but with different exercise prices.

Swiss Market Index (SMI®)

The Swiss Market Index (SMI®) is a capital-weighted price index based on a basket of continuously traded equities. It comprises up to 30 highly-capitalized Swiss blue chips.

Synthetic position

Using other derivatives to reproduce an option or futures contract.

Systematic risk

Systematic risk depends on factors which influence the entire market and which cannot be reduced or eliminated by diversifying the portfolio.

TecDAX®

TecDAX® tracks the performance of the Prime Standard´s 30 largest companies of the technology sector that, in terms of order book turnover and market capitalization, rank below those included in DAX®.

Time value

Time value comprises that part of an option's price that reflects the option's remaining lifetime. The longer the remaining lifetime, the higher the option price. This is due to the amount of time which still remains during which the price of the underlying instrument can rise or fall (the rule stated here may not apply to certain deep-in-the-money puts).

Underlying instrument

A share, index or other financial instrument on which an options or futures contract is based.

Unsystematic risk

Proportion of overall risk that cannot be explained by general market fluctuations.

Variation Margin

The profit or loss arising from the daily revaluation of futures contracts (mark-to-market). Variation Margin is settled daily, in cash.

Volatility

The extent of the actual or anticipated fluctuations in the returns of a financial instrument. The volatility of a financial instrument can vary, depending on the period of time over which it is measured. Either the historical or implied volatility can be calculated.

Worst-case loss

Estimated maximum close-out loss that can be incurred on the subsequent exchange trading day. It is covered by Additional Margin and/or Futures Spread Margin.

Writer

Counterparty of an option buyer, who is obliged to deliver (call option) or to take delivery (put option) of the underlying instrument should the option be exercised; the option premium is paid for this obligation.

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