BASICS OF WARRANTS

Swissquote

« One of the funny things about the stock market is that every time one person buys, another sells, and both think they are astute. »

William Feather

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HISTORICAL BACKGROUND

The origins of futures transactions are closely linked to the advent of commercial business and can be traced back to earlier periods.

Producers, who for example wanted to hedge against overproduction of coffee and therefore against a likely price drop, bought the right to sell their goods to traders for a set price at a set time. They had to pay the traders a premium for this right to sell something.

On the other hand, traders who wanted to hedge against a price rise bought from producers the right to buy particular goods for a set price at a set time. They had to pay the producers a premium for this right to buy something.

As a result, the basic idea of futures is that traders or producers would like to eliminate a risk.

Alongside risk limitation, targeted use of futures can also increase returns for an investor.

Basics

Types of option
Options are part of the derivatives family. Derivatives (Latin derivare = to derive) are financial market products that are valued according to the price, price fluctuations and price expectations of an underlying instrument.

There are the following three types of options:

1. OTC options
Not all trades are carried out at stock exchanges. Over-the-counter trading represents an important alternative to exchange trading, and also now involves higher trading volumes than stock market transactions. Trades are agreed between two financial institutions or between one financial institution and one of its corporate clients. A key advantage of OTC trading is that the contractual conditions can differ from those set by the exchange. It is up to the market participants to negotiate a mutually attractive deal.

2. Traded options/standardised options (Eurex options)
A traded option certifies an option price. The contractual conditions are standardised, e.g. maturity date, contract size, etc. A key advantage over warrants is the fact that with traded options you can also «write» strategies (short positions).

3. Warrants
A warrant is a legally independent, exchange-traded security that certifies an option right. Warrants are issued by financial institutions that define the contractual conditions before issuance and are responsible for market-making. The issuer of a warrant – also known as the writer – undertakes to deliver to or accept from the option holder the underlying product at the agreed price or to pay the difference between the exercise price and the current market price (cash settlement). With this type of option, the investor should not overlook the issuer risk. It should also be noted that warrants are securities and if sold must be delivered on the same day, which means that short positions are not possible!

In principle, there is no difference in the operating principle or payment profile of warrants and options. They are identical products in terms of financial mathematics. The key differences are mainly in the legal set-up and practical applications.

Definition

The buyer of an option purchases

... the right

... to buy (call option) or sell (put option)

... a particular underlying product (e.g. equities, index, commodities, etc.)

... up to or at a specific point in time,

... at a given exercise price,

... with a defined multiplier.

IMPORTANT: The buyer of an option acquires a right, but not an obligation.

Features of an option

Type of option:	Call option certifies the right to buy an underlying product Put option certifies the right to sell an underlying product
Underlying:	underlying products can be equities, interest, currencies, indices, baskets and commodities.
Exercise price (strike):	Price of the underlying product at which the option holder can purchase (call) or sell (put) the underlying product.
Maturity:	The day on which the right to exercise ends. American options can be exercised at any time until maturity, European options can only be exercised on maturity. Whether an option is American or European has nothing to do with the geographical location of the underlying product. Equity options are mainly American options, whereas index or commodity options are generally European.
Ratio (multiplier):	The multiplier indicates how many warrants are needed to purchase or sell one unit of the underlying product (e.g. 1 share) The ratio is only current for warrants. With Eurex options, the multiplier is generally 1.

Important: Not every option certifies the right to physical transfer, often only cash settlement is provided. Detailed information is available on our platform or in the issuer's prospectus.

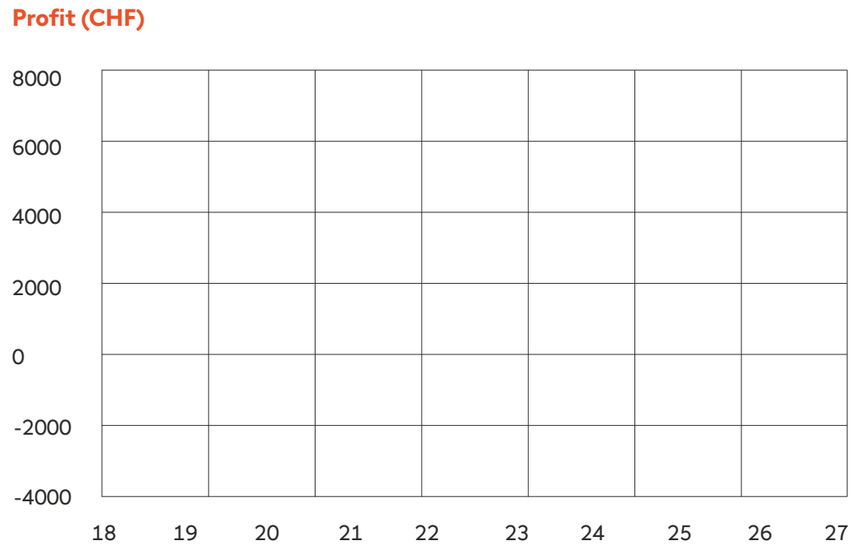
Types of trader

The speculator:
The speculator wants to take a particular market position. They are betting that the price either rises or falls.

Let us assume that you have CHF 2'000.00 available and believe that ABB (current price CHF 20.00) will rise to CHF 25.00 in the next 2 months.

Version A)	Purchase of 100 ABBN shares at CHF 20.00	= CHF 2'000.00
	Sale of 100 ABBN shares at CHF 25.00	= CHF 2'500.00
	Profit = CHF 500.00 or 25%	
Version B)	Purchase of 5'000 call options with a strike of 22 at CHF 0.40	= CHF 2'000.00
	Sale of 5'000 call options with a strike of 22 at CHF 3.00	= CHF 15'000.00
	Profit = CHF 13'000.00 or 650%	

Exercise: Sketch the payment diagram for versions A and B in the diagram:



The hedger:
Hedgers use derivatives to soften the risk that arises for them from potential future changes to a market variable.

Let us assume that you have 1'000 UBSN shares. The current price is CHF 19.20. You basically have positive market expectations, but you would like to protect yourself from a potential price fall. You can now buy 1'000 put options at an underlying product value of CHF 19.00. In this example, 1 put option would cost CHF 1.60 and the total cost of this hedging is therefore CHF 1'600.00 (1'000 put options x CHF 1.60). The strategy may cost CHF 1'600.00, but it does ensure that you can sell your shares at CHF 19.00 for as long as you own the put options.

The arbitrager:
Arbitragers are a third key group of participants in derivatives markets. Arbitrage aims to generate risk-free profits by simultaneously executing transactions on two or more markets. For example, this is possible if the future price of an asset is no longer in line with the spot rate.

EXCHANGES FOR WARRANTS AND OTHER DERIVATIVES

Germany trading
The German marketplace with Börse Stuttgart (previously Euwax) is the largest in Europe for derivative financial products.

Trading hours	8.00am to 10.00pm - Monday to Friday

The role of the issuers

Issuers use futures market instruments to be able to offer investors their own financial products. In this context, it is important to clarify a misunderstanding that is entrenched in many places, which says that issuers take a counterposition and therefore cannot have any interest in the investor targeting high returns over long time periods with their products. The issuer does not make any bets with the investor!

For example, the buyer of a call bets on rising prices. However, in this context, the issuer takes a different position. The issuer has no interest in incurring incalculable risks through its dealings with the investor. The risks that inevitably arise are neutralised by the issuer, who undertakes hedging transactions using futures (so-called «hedging»). Ultimately, its role can be described as an intermediary between investors and the futures market.

Like all private companies, issuers will of course also ultimately target commercial success. However, in both cases, the journey involves satisfied customers who gladly and repeatedly use the products on offer. In turn, this means that they should provide good quality at fair prices.

As an investor buying derivatives, you should focus not on the financial products themselves, but also on the associated services on offer. Take advantage of the competitive situation of various issuers, because it is always worth comparing. With standard products in particular, issuers often offer securities with almost identical conditions, making it very easy to compare them.

First and foremost, look at:

- Market making – how reliably does the issuer provide bid and ask prices?
- Consider not only buy/sell prices but also the spread (difference between buy/bid price and sell/ask prices)
- Volatility and therefore the risk premium

Warrant trading

Swiss DOTS > Full Quote > SMI C 8300 09/18 UBS 38747860 (38747860)

Reload | What's new | Trade

Market is open

Live Intraday | Analysis Tool | Add To

Full Quote | Intraday | Historical | News

Termsheet

Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:56	38'747'860	- (-%)
Volume	Close	Open	Last
-	1.291	-	1.293 CHF
Bid Size	Ask Size	Bid 11:16:19	Ask 11:16:19
200'000	200'000	1.288	1.30
52 Weeks High	52 Weeks Low	Today's High	Today's Low
2.356	0.562	1.321	1.293
Security Type / Issuer	Premium	Ratio	Last Trading Date / Expiration
2100 - Warrant / UBS	- (-)	500	20-09-2018 / 21-09-2018
Underlyings	Market	Strike	Price 11:16:41
SMI PR	SIX Indices	8'300.00	▼ 8'955.84 CHF (-4.24)

Bid/ask price

Swiss equities trading, for example, is order-driven, i.e. supply and demand affect the price (if many people want to buy a share, the price generally rises). A different principle applies to trading of warrants or other derivatives. Here we talk of quote-driven trading. Neither supply nor demand have any effect on the price of a warrant. The bid/ask prices are determined by the market maker (issuer), which adjusts the prices (quotes) based on changes to the underlying product.

Bid Size	Ask Size	Bid 11:18:26	Ask 11:18:26
200'000	200'000	1.288	1.30

In this example, the issuer offers 200’000 warrants each for purchase and sale. If you would like to buy, you pay CHF 1.307 (the issuer issues the warrants). If you would like to sell, you receive CHF 1.295 (the issuer takes back the warrants). For example, as soon as someone purchases 20’000 units at 1.307, the issuer immediately increases the offer again to 200’000 units, which is why a purchase can never take place below 1.307 in these circumstances. In other words, the market maker always takes precedence over other market participants. You may be able to input a buying limit of 1.30, but this is only executed if 1.30 is adopted by the issuer as the ask price.

Price gradations

The minimal price level for warrants at Swiss Dots is CHF 0.001; for SIX Structured Products, the minimum price level is CHF 0.01. Issuers at Swiss Dots therefore have more leeway to provide narrower spreads.

Smallest trading unit

Generally, the smallest trading unit is 1 warrant or a multiple thereof.

Euwax/types of order

Stock Request > VA4BAT VON C 12/18 (VA4BAT) / Val: VA4BAT — Reload

The market is open.

Stock Exchange	Currency	Last 09:41:05	Multiplier
EUWAX	EUR	4.92 ▼-0.05 (-1.01%)	100
Bid Size	**Bid** *11:20:07*	**Ask** *11:20:07*	**Ask Size**
130'900	4.72	4.74	130'900
Strike	**Expiration**	**Underlying**	**Underlying Price** *11:22:33*
8500.0 CHF	21 Dec 2018	SMI PR	8'952.29 CHF ▼-7.79 (-0.08%)

Realtime prices

Euwax — Account EUR

	Quantity	ISIN	Trade Type	Trigger	Price Limit	Validity Type	Validity
○ BUY ○ SELL		DE000VA4BAT2	Limit / Market / Stop	----------	EUR	Good till Date	14/09/2018

Reset — Continue >

Explanation of the different order types

Order type: Best order (market)

A market order is executed at the best possible bid or ask price. However, this price cannot be determined in advance or guaranteed. The advantage of a market order is that it is generally executed immediately.

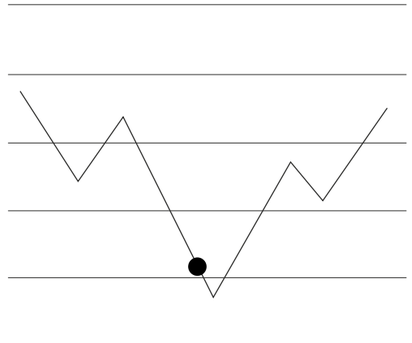
A market order can be difficult if a stock has only limited sales. This is because there may be a limited supply in the order book with a limit that is significantly above or below the other prices traded for this stock. In accordance with matching rules, however, a limit order determines the settlement price in such cases.

Order type: Limit

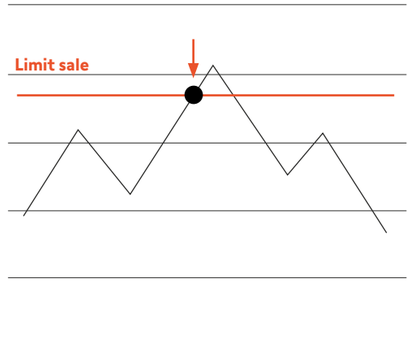
This is the most commonly used order type and offers good safeguards. The buyer names a maximum price they wish to pay, and the seller names the minimum price at which they wish to sell. If there is no counterparty who wishes to trade within the set limits, the trade does not take place.

In this case, the offer remains in the order book until the specified deadline has passed.

If you want to be sure that the order is executed and if the volume permits, you must select the bid price as the maximum limit when selling and select at least the ask price when buying.



Limit purchase
(Buy on dip)

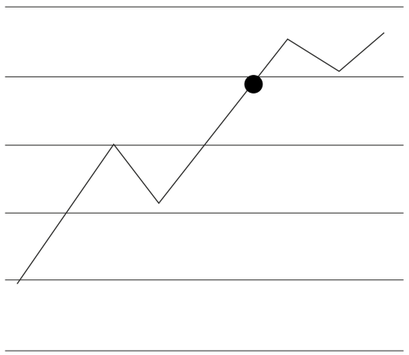


Limit sale
(Profit taking)

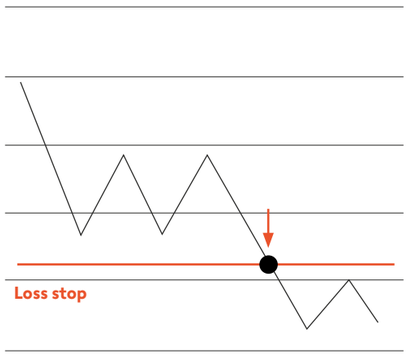
Order type: Stop

A stop order is linked to the condition that it is only placed in the order book when a certain price is reached. It is then entered in the order book as a market order, i.e. there is no price guarantee.

A buy stop order was previously known as an on-stop, while a sell stop order was known as a stop-loss.



Stop purchase

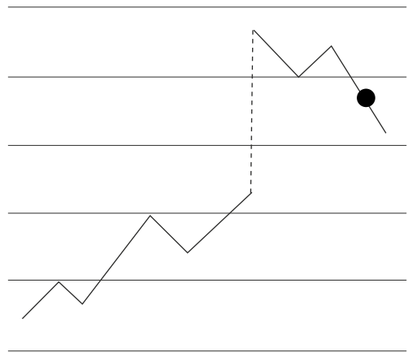


Stop sale

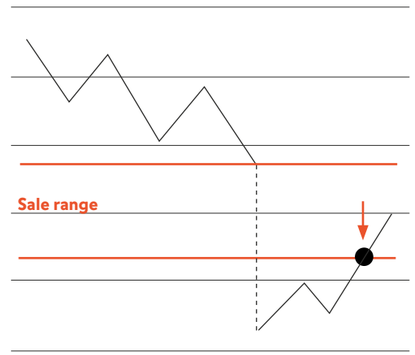
Order type: Stop limit

A stop-limit order is handled in a similar way to other stop orders, with the difference that it is entered in the order book as a limit order and not as a market order.

In contrast to a stop order, the stop-limit order allows better control of the execution price, as the stop and limit levels define a range for the execution price. On the other hand, execution is not guaranteed in the event that the price continuously moves outside of this range.



Stop limit purchase



Stop limit sale

Trailing stop

The trailing stop is the same as a stop order but with a variable stop level.

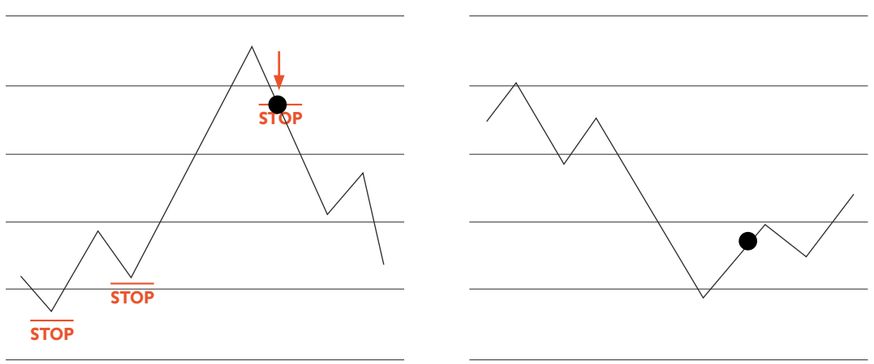
When selling, this order type makes it possible to follow the rising price until the trend reverses. The aim here is to follow the market trend and protect profits.

When buying, the aim is to optimise the entry point so as to follow the falling price until the market value begins rising again.

	Trailing stop sale	Trailing stop purchase
Objective	Hedge profits, by following an upward trend	Optimise entry level, by following a downward trend

	Trailing stop sale	Trailing stop purchase
With an upward trend	The stop level follows the price rise.	The stop level stabilises up to the purchase.
With a downward trend	The stop level stabilises up to the sale.	The stop level follows the price fall.

Example



Trailing stop limit

This order differs from a trailing stop in the same way as a stop-limit differs from a stop order: as soon as the stop level is triggered, a limit order is automatically entered in the order book.

OCO

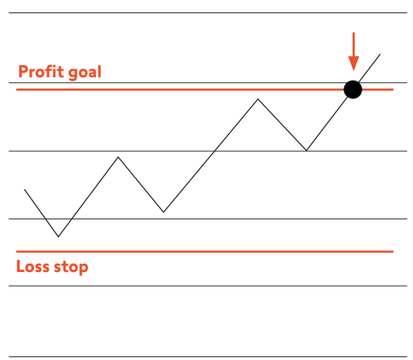
The OCO (one-cancels-the-other) order consists of two components: a limit and a stop order. When one of these orders is executed, it automatically cancels the other.

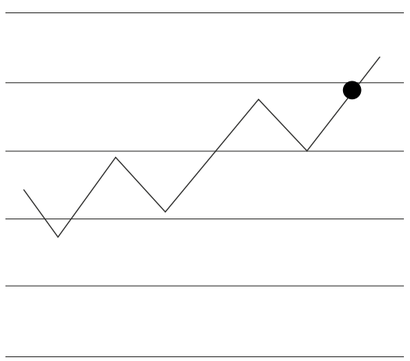
This order type enables sellers to set an profit objective (limit component) while at the same time protecting against any price losses (stop component).

The order type enables buyers to buy while the price is falling (limit component) or when a predetermined threshold is exceeded (stop component).

	OCO sale	OCO purchase
Objective	Simultaneous control of the profit and loss potential	Purchase while the price is falling or when a predetermined limit is exceeded while the price is rising

Example





OPTION PRICES

The price of an option comprises two components, intrinsic value and time value.

Option price = Intrinsic value + Time value

Intrinsic value

Call	A call option has an intrinsic value when the price of the underlying product is above the strike price.

Call Intrinsic value =	Underlying product price - Strike
	Ratio (multiplier)*

Put	A put option has an intrinsic value when the price of the underlying product is below the strike price.

Put Intrinsic value =	Strike – Underlying product price
	Ratio (multiplier)*

*only for warrants; there is no ratio for standardised options!

Important: The intrinsic value cannot be negative.

In-the-money	**Call**	**Put**
	Strike < Underlying product price	Strike > Underlying product price
Out-of-the-money	**Call**	**Put**
	Strike > Underlying product price	Strike < Underlying product price
At-the-money	**Call**	**Put**
	Strike = Underlying product price	Strike = Underlying product price

Time value

The time value reflects the potential (opportunity, possibility) that price developments for the underlying product meet the investor's expectations during the residual maturity. For this, he or she is ready to pay a specific amount – the time value. The closer the option comes to the expiration date, the smaller the time value, until it ultimately reaches zero at the expiration date.

Time value influence factors

In the previous section, we learnt that changes to the underlying product have a direct impact on the intrinsic value. We now want to look at the four factors that influence time value.

Residual maturity

The longer the residual maturity of a warrant, the greater the risk for the seller that the underlying product price does not perform as expected and the warrant will be exercised at the end of its term. The seller compensates for this risk via a premium. The shorter the residual maturity, the lower this premium.

Risk-free interest rate
The seller of a call requires capital to keep the underlying product in custody. He or she would have invested this capital in an interest-bearing asset and thereby been able to obtain interest income. This lost interest income is compensated by the purchaser of the warrant. If interest rates rise, the lost interest increases, which means call warrants also become more expensive. The opposite applies to put warrants. In practice, for short maturities, LIBOR or the money market rate is used, whereas swap rates are taken for longer maturities.

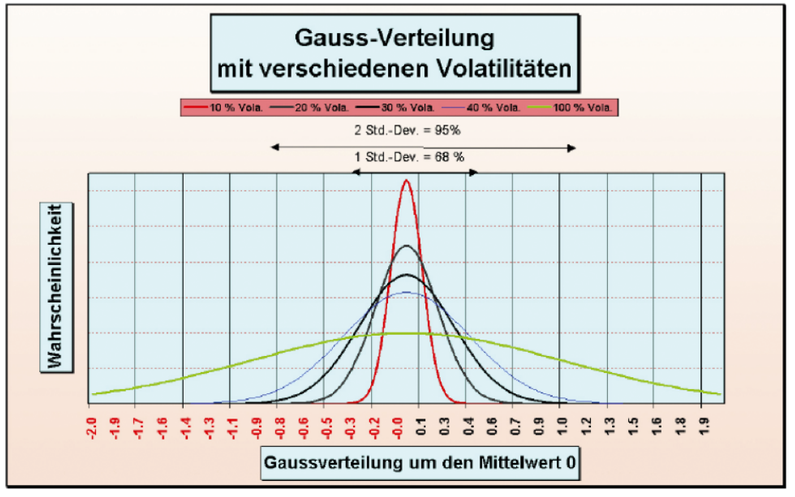
Dividends
Dividend payments lead to a correction of the share price equal to the dividend amount paid. Because the dividends are due to the shareholder and not the warrant owner, there is a corresponding price adjustment for the warrant. A high dividend therefore reduces the price of a call option and increases the value of a put.

Volatility
Volatility, also referred to as «X», is the measurement of the fluctuation margin of the underlying product. The greater the volatility, the higher the option price. An underlying product whose price fluctuates greatly offers the option purchaser a greater chance that their price forecasts are fulfilled during the term. He or she is therefore prepared to pay a higher price for the options. However, the risks increase for the seller, which is why they require a higher price.

We basically distinguish between historical volatility and expected (implied) volatility: Historical volatility is based on historical data. It is calculated as the standard deviation of the daily price fluctuations (or continuous yields) of the underlying product. Implied volatility corresponds to market players' expectations about the future volatility of the underlying product, as reflected in the current option price.

For at-the-money and out-of-the-money options, volatility is the most important determining factor of the option price. For deep-in-the-money options, it plays a smaller role.

Normal distribution and random walk



Option price models cover the range from 1 standard deviation.

1. Standard deviation corresponds to 68.3%
2. Standard deviations correspond to 95.4%
3. Standard deviations correspond to 99.7%

To extrapolate daily volatility from annual volatility:

Annual volatility = Daily volatility x √number of trading days

Volatility	daily
5.00%	0.31%
10.00%	0.63%
16.00%	1.00%
20.00%	1.25%

Volatility	daily
25.00%	1.56%
30.00%	1.88%
40.00%	2.50%
80.00%	5.00%

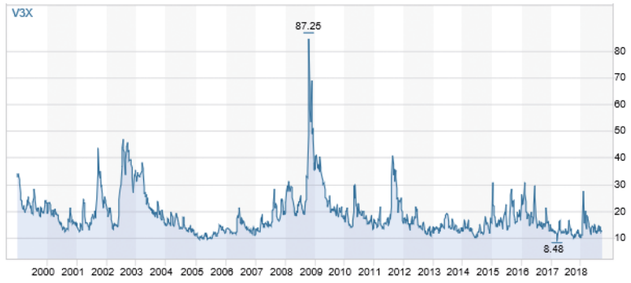
Tips in relation to volatility

High volatility
(Fear or hope of decreasing volatility)

- Purchase of short options
- Writing long options
- Sale of a time spread (sale of long option and simultaneous purchase of short option)

Low volatility
(Fear or hope of increasing volatility)

- Purchase of long options
- Writing short options



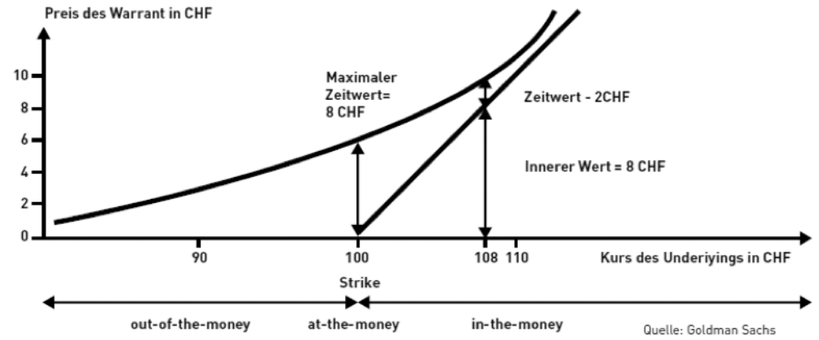
Source: SIX Swiss Exchange

Summary of time value influence factors

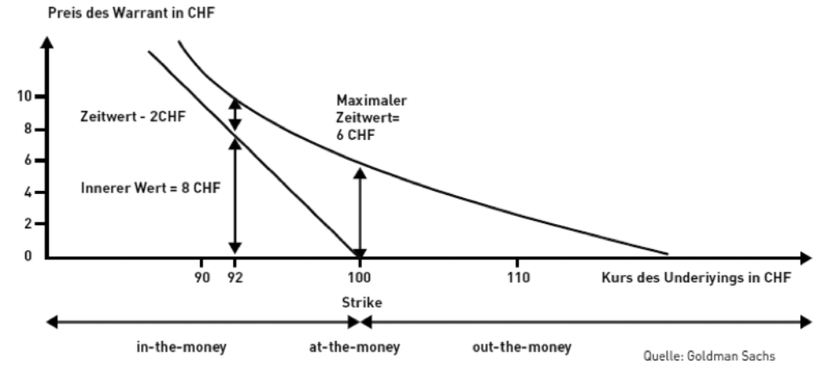
As a short exercise, fill in the following table:

Variable	Change in variable	Influence on fair price of a call	Influence on fair price of a put
Volatility	↑		
Residual maturity	↑		
Dividends	↑		
Interest	↑		

The price components of a call warrant – intrinsic value and time value



The price components of a put warrant – intrinsic value and time value



LEVERAGE

Leverage or omega is the leverage effect of a warrant.

The greater the leverage, the more speculative the investment instrument. Leverage of 5 means:

Change in underlying product: +1% -> Change in warrant: +5%

Change in underlying product: -1% -> Change in warrant: -5%

Leverage therefore gives a value for how much higher the percentage price change of the leveraged product is if the underlying product rises by 1%, which is both positive and negative.

The following should be noted in relation to leverage:

- Leverage is not fixed, but changes with every movement in the share
- Leverage should be chosen that reflects the investor's risk profile, e.g.:
- Leverage 1-3 smaller leverage effect; better to buy the underlying product
- Leverage 3-7 more moderate leverage effect; good opportunities
- Leverage 7-10 larger leverage effect; for risk-friendly investors
- Leverage > 10 very large leverage effect; not for the faint-hearted

Leverage = Gearing x Delta

Gearing

Gearing is often confused with leverage. Gearing only shows how many options you could purchase instead of an underlying product! This is therefore a measurement of capital outlay. This interpretation of leverage does not represent a meaningful concept in our view.

Gearing =	Price of underlying product
	Option price x Ratio

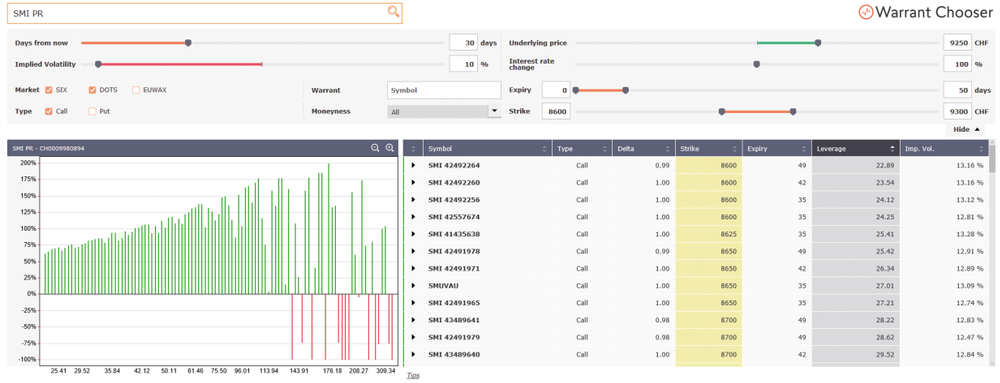
THE WARRANT CHOOSER

You may meanwhile have realised that options, particularly warrants, are harder to understand than you previously thought. Warrants are actually not the simplest financial instruments, but you also do not have to be a mathematician to make the right choice.

Swissquote has developed the Warrant Chooser, a tool to help you select the appropriate warrants for your market opinion.

Before we present the tool in more detail, let us first look at the underlying scenario for choosing a warrant.

1. To choose the underlying product
2. Over what time period will my expectation materialise?
3. Estimate change in the underlying product based on my market analysis (technical and/or fundamental)
4. Volatility: How great is the current implied volatility and how do you judge subsequent developments? With high volatility, taking a position in warrants is often not recommended.
5. Interest changes: Will the current market interest rate change during the holding period of my warrant? (Has the smallest influence on warrants)



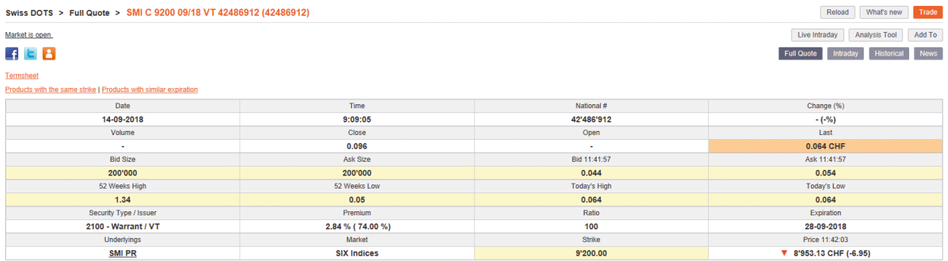
Notes

In the above example, we assume a price rise in the underlying product of 5% within the next 10 days. As the underlying product price rises, volatility falls, so we have therefore reduced this to a level of 10% (VSMI currently at 11.5%). Because we do not want to hold warrants or options for longer than 10 days, it does not make sense to choose a maturity of one year, for example, because these have much higher time values compared with a shorter-term product.

The green bar in the left-hand field shows us the various warrants with corresponding performance. By clicking on a field, details of the product appear on the right-hand side.

We shall now compare performance of two warrants if the same event occurs.

The current prices of the warrants to be purchased are:



Swiss DOTS > Full Quote > SMI C 9200 09/18 VT 42486912 (42486912)

Reload | What's new | Trade

Market is open.

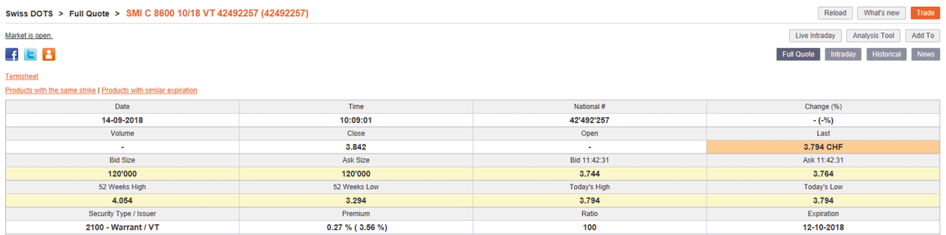
Live Intraday | Analysis Tool | Add To

Full Quote | Intraday | Historical | News

Termsheet

Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:05	42'486'912	- (-%)
Volume	Close	Open	Last
-	0.096	-	0.064 CHF
Bid Size	Ask Size	Bid 11:41:57	Ask 11:41:57
200'000	200'000	0.044	0.054
52 Weeks High	52 Weeks Low	Today's High	Today's Low
1.34	0.05	0.064	0.064
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	2.84 % (74.00 %)	100	28-09-2018
Underlyings	Market	Strike	Price 11:42:03
SMI PR	SIX Indices	9'200.00	▼ 8'953.13 CHF (-6.95)



Swiss DOTS > Full Quote > SMI C 8600 10/18 VT 42492257 (42492257)

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	10:09:01	42'492'257	- (-%)
Volume	Close	Open	Last
-	3.842	-	3.794 CHF
Bid Size	Ask Size	Bid 11:42:31	Ask 11:42:31
120'000	120'000	3.744	3.764
52 Weeks High	52 Weeks Low	Today's High	Today's Low
4.054	3.294	3.794	3.794
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	0.27 % (3.56 %)	100	12-10-2018

If we assume that the SMI is at 9'250 points in 10 days, the warrant with a strike of 9'200 has a value of CHF 0.50*(Underlying product price – Strike/Ratio)

The warrant with a strike of 8'600 has a value of CHF 6.50 at the same level of the SMI*

The profit can now be calculated as follows:

1. Example	Purchase at CHF 0.052 / Sale at CHF 0.50 = CHF 0.448	(860%)
2. Example	Purchase at CHF 3.71 / Sale at CHF 6.50 = CHF 2.790	(75%)

Conclusion:

As you can see, in the first example you will earn over 11 times more than in the second version if our expectations materialise. Judging the market correctly is already a real art, and gets even trickier if, despite accurate market analysis, you do not get the most out of your investment because the wrong products were chosen.

*Both warrants would still have to exhibit a time value, which is nonetheless negligible for this example.

A FEW TIPS ON SELECTION

Out of the money	Very risky	Speculative warrants	Highly sensitive to volatility
At the money	High time value loss	Preferred warrants	Highly sensitive to volatility
In the money	Equities similarly conservative	Scarcely traded	Scarcely traded
	Short term 1-4 weeks	Medium term 1-9 months	Long term > 9 months

PERSONAL RULES IN RELATION TO WARRANTS

1. Form your own view.
2. Compare critically.
3. Price is not everything.
4. Take your time.
5. Limit losses and achieve profits.
6. Do not invest all your money in warrants.
7. Buying later pays off only in very rare cases.
8. With identical conditions, where possible, choose a product that can be traded off-exchange.
9. Do not hold warrants for longer than 10 days.

THE GREEKS

The Greeks refers to the sensitivity figures for an option. The expression is based on the Greek words for performance indicators. The following count as Greeks:

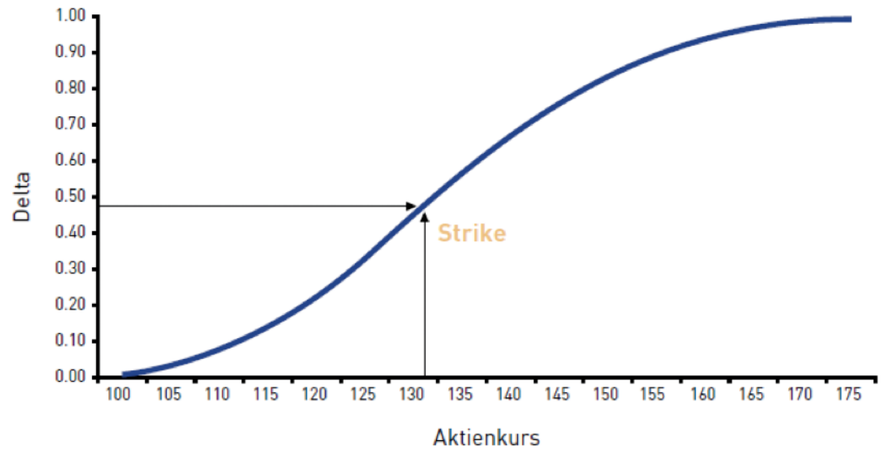
- Delta
- Gamma
- Vega
- Theta
- Rho

They express how precisely the option price reacts to the change of a particular cause variable.

Delta

Delta is a measure of sensitivity and shows the change in the warrant price as a function of the price change of the underlying product. We can simply also say that delta shows the velocity of the warrant.

- For call warrants, delta can be between 0 and 1, for put warrants between 0 and -1.
- Delta is smaller the further the warrant is out of the money, and larger the further the warrant comes into the money. Delta is generally 0.5 when it is exactly at the money.
- Very small delta therefore means that the warrant hardly reacts to changes in the underlying product. However, if delta is therefore almost 1, the warrant and underlying price move almost synchronously.



Example of a call warrant on the SMI, strike 8325, expiration September 2018.
The warrant below currently has delta of 0.97 with a ratio of 100. If the stock now increases by CHF 1.00, the warrant goes up by 0.97 for this monetary unit. Taking the multiplier into account, this means it rises by CHF 0.0097 (Delta/Ratio).

Swiss DOTS > Full Quote > SMI C 8325 09/18 GS 41124923 (41124923)

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:41	41'124'923	- (-%)
Volume	Close	Open	Last
-	6.27	-	6.275 CHF
Bid Size	Ask Size	Bid 11:43:48	Ask 11:43:48
10'000	10'000	6.258	6.358
52 Weeks High	52 Weeks Low	Today's High	Today's Low
8.819	2.713	6.496	6.275
Security Type / Issuer	Premium	Ratio	Last Trading Date / Expiration
2100 - Warrant / GS	0.04 % (2.02 %)	100	20-09-2019 / 21-09-2018
Underlyings	Market	Strike	Price 11:43:51
SMI PR	SIX Indices	8'325.00	▼ 8'956.51 CHF (-3.57)

Specific Data

HELP

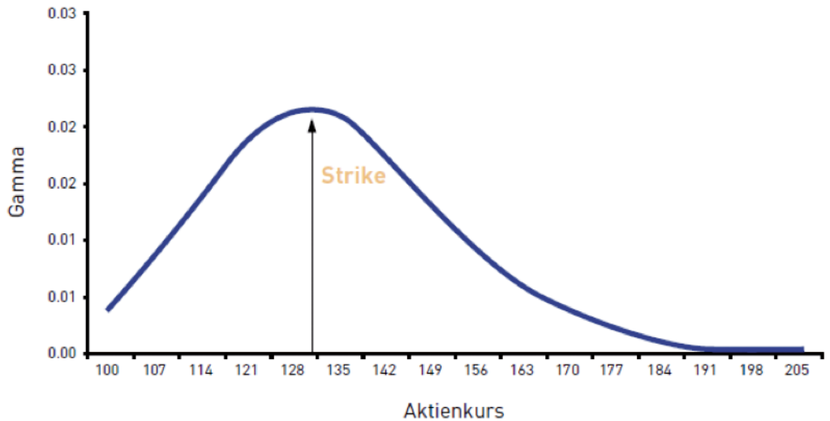
Volatility	Gearing	In / Out	Leverage
28.85 %	14.19	7.54 %	13.72
Delta	Gamma	Theta	Rho
0.97	0.0002	-1.72	1.54
Vega	Intrinsic val.	Time value	Break Even
0.92	6.27	0.03	8'955.80

Gamma

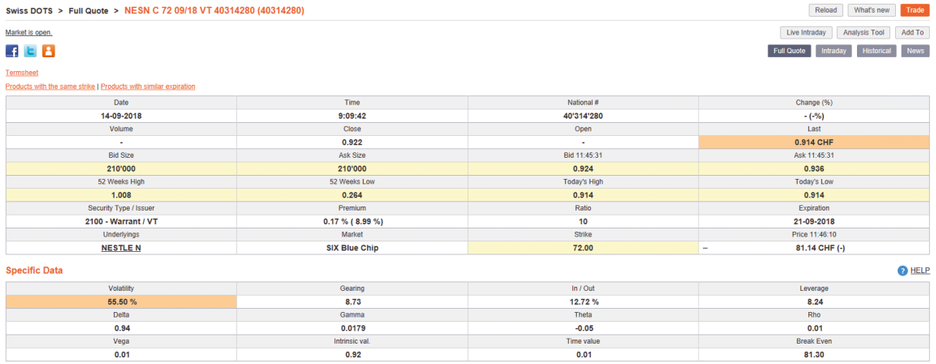
Delta also changes with every change to the underlying product. This change in delta is described by gamma. Gamma therefore shows how much delta changes when the underlying product changes by one unit.

- Because it expresses the gradient of the delta, both calls and puts always have positive gamma.
- The higher the gamma, the greater the change in delta when the price of the underlying product changes.
- Gamma is largest for at-the-money warrants, but delta hardly changes with warrants that are significantly out of the money or in the money, so gamma is smallest here.

It follows that with a large gamma value, the sensitivity of delta to price changes in the underlying product is high, which will then also impact the calculation of leverage.



Example of a call warrant on Nestle, strike 72, expiration September 2018.
The warrant below currently has delta of 0.91 with gamma of 0.0222 and a ratio of 10 (multiplier). If the equity now increases by CHF 1.00, delta rises by 0.0222, or taking the multiplier into account, by 0.00222 (Gamma /Ratio).



Swiss DOTS > Full Quote > NESN C 72 09/18 VT 40314280 (40314280)

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:42	40'314'280	- (-%)
Volume	Close	Open	Last
	0.922		0.914 CHF
Bid Size	Ask Size	Bid 11:45:31	Ask 11:45:31
210'000	210'000	0.924	0.936
52 Weeks High	52 Weeks Low	Today's High	Today's Low
1.008	0.264	0.914	0.914
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	0.17 % (8.99 %)	10	21-09-2018
Underlyings	Market	Strike	Price 11:46:10
NESTLE N	SIX Blue Chip	72.00	-- 81.14 CHF (-)

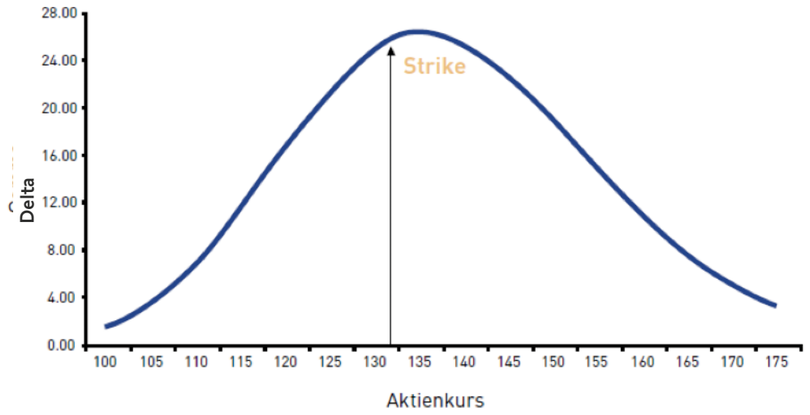
Specific Data — HELP

Volatility	Gearing	In / Out	Leverage
55.50 %	8.73	12.72 %	8.24
Delta	Gamma	Theta	Rho
0.94	0.0179	-0.05	0.01
Vega	Intrinsic val.	Time value	Break Even
0.01	0.92	0.01	81.30

Vega

The vega (sometimes also lambda, because vega is not a Greek letter) of an option shows how much the value of the option changes if the volatility of the underlying product changes by 1%.

- The higher the vega is, the more strongly the warrant price reacts to volatility adjustments.
- Vega is always positive and is identical for call and put warrants.
- At-the-money warrants exhibit the largest vega.
- The shorter the residual term, the smaller the vega, because the significance of volatility changes decreases.



Example of a call warrant on Nestle, strike 72, expiration September 2018.
The warrant below currently has vega of 0.02 with volatility of 64.87% and a ratio of 10. If volatility now decreases by 1%, the option price falls by 0.02, or taking the multiplier into account, by CHF 0.002 (Vega/Ratio).

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:05:42	40'314'280	- (-%)
Volume	Close	Open	Last
-	0.922	-	0.914 CHF
Bid Size	Ask Size	Bid 11:45:31	Ask 11:45:31
210'000	210'000	0.924	0.936
52 Weeks High	52 Weeks Low	Today's High	Today's Low
1.008	0.264	0.914	0.914
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	0.17 % (8.99 %)	10	21-09-2018
Underlyings	Market	Strike	Price 11:46:10
NESTLE N	SIX Blue Chip	72.00	-- 81.14 CHF (-)

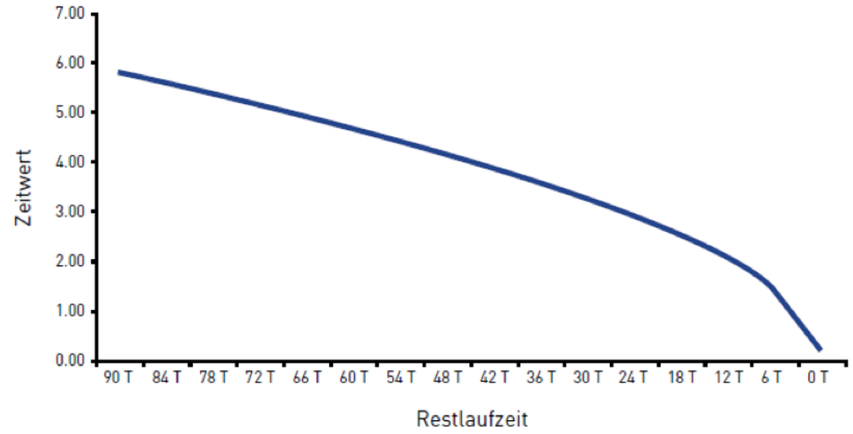
Specific Data HELP

Volatility	Gearing	In / Out	Leverage
55.50 %	8.73	12.72 %	8.24
Delta	Gamma	Theta	Rho
0.94	0.0179	-0.05	0.01
Vega	Intrinsic val.	Time value	Break Even
0.01	0.92	0.01	81.30

Theta

Theta shows how much the time value of an option decreases per day.

- The time value falls every day until it amounts to CHF 0.00 at the expiration date. Weekends and holidays must be taken into account as well.
- Theta is highest for warrants that are at the money.
- Time value depreciation is not linear but gains momentum as the residual maturity becomes shorter. Around 3 months before expiration, time value depreciation becomes significantly stronger.
- Time value depreciation is the only parameter that always develops against the investor, because the term cannot be extended.



Example of a call warrant on Nestle, strike 72, expiration September 2018.
The warrant below currently has theta of -0.08 and a ratio of 10. This means that the time value decreases by 0.08 every day. Taking the multiplier into account, this means it falls by CHF 0.008 per day. (Theta/Ratio).

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:42	40'314'280	- (-%)
Volume	Close	Open	Last
-	0.922	-	0.914 CHF
Bid Size	Ask Size	Bid 11:45:31	Ask 11:45:31
210'000	210'000	0.924	0.936
52 Weeks High	52 Weeks Low	Today's High	Today's Low
1.008	0.264	0.914	0.914
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	0.17 % (8.99 %)	10	21-09-2018
Underlyings	Market	Strike	Price 11:46:10
NESTLE N	SIX Blue Chip	72.00	– 81.14 CHF (-)

Specific Data

HELP

Volatility	Gearing	In / Out	Leverage
55.50 %	8.73	12.72 %	8.24
Delta	Gamma	Theta	Rho
0.94	0.0179	-0.05	0.01
Vega	Intrinsic val.	Time value	Break Even
0.01	0.92	0.01	81.30

Rho

Rho shows how much the option price changes if the interest rate (risk-free interest rate) increases or decreases by 1 per cent.

- Rising interest rates increase the value of calls, but have a negative effect on the value of a put.
- Rho is generally the Greek with the smallest impact on the option price, because interest rates normally change significantly more slowly than other relevant parameters for warrant valuation.
- In practice, LIBOR or the money market rate is used instead of the risk-free interest rate for short maturities, whereas swap rates are taken for longer maturities.

Example of a call warrant on Nestle, strike 72, expiration September 2018.
The warrant below currently has rho of 0.01 with a ratio of 10. If LIBOR now goes up by 1%, the option price therefore increases by 0.01. Taking the multiplier into account, this means it rises by CHF 0.001 (Rho/Ratio).

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:42	40'314'280	- (-%)
Volume	Close	Open	Last
-	0.922	-	0.914 CHF
Bid Size	Ask Size	Bid 11:45:31	Ask 11:45:31
210'000	210'000	0.924	0.936
52 Weeks High	52 Weeks Low	Today's High	Today's Low
1.008	0.264	0.914	0.914
Security Type / Issuer	Premium	Ratio	Expiration
2100 - Warrant / VT	0.17 % (8.99 %)	10	21-09-2018
Underlyings	Market	Strike	Price 11:46:10
NESTLE N	SIX Blue Chip	72.00	– 81.14 CHF (-)

Specific Data

HELP

Volatility	Gearing	In / Out	Leverage
55.50 %	8.73	12.72 %	8.24
Delta	Gamma	Theta	Rho
0.94	0.0179	-0.05	0.01
Vega	Intrinsic val.	Time value	Break Even
0.01	0.92	0.01	81.30

EXOTIC WARRANTS

We have discussed traditional warrants in the above sections. They are strongly impacted by fluctuations and therefore by volatility. Because these warrants have a time value, they can only be recommended for short-term speculation. It has been shown that a holding period longer than 10 days pays off only in very rare cases. This is because warrants only fall on average by around 15-20% if the underlying security does not move within ten days.

Alongside standard warrants, there are also a host of special warrants that we will look at in more detail in the next sections.

Knock-out warrants (KO warrants)

Knock-out warrants rank among leverage products and have some special features compared with so-called normal warrants:

1. KO warrants can expire early if the price of the underlying product penetrates a predetermined threshold on the downside (for KO calls) or upside (for KO puts). They then either expire without value or a specific residual value is repaid, depending on the configuration of the product. Once the KO level is reached, the investor no longer participates in developments in the underlying product.
2. In contrast to classic warrants, the influence of implied volatility is very low or non-existent with KO warrants. Pricing is therefore more transparent and easier to understand for the investor.
3. KO warrants have a lower or no time value and therefore also have higher leverage than warrants with a comparable set-up.
4. However, because of the risk of a knock-out and higher leverage, KO warrants are riskier than comparable warrants.

The fundamental rule: the closer the current market price is to the limit, the greater the leverage effect.

Example of a knock-out warrant:

Swiss DOTS > Full Quote > DAX P 12599.32 DB 42402162 (42402162)

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	10:00:00	42'402'162	- (-%)
Volume	Close	Open	Last
100'000	6.36	-	5.90 CHF
Bid Size	Ask Size	Bid 11:50:47	Ask 11:50:47
100'000	100'000	5.89	5.90
52 Weeks High	52 Weeks Low	Today's High	Today's Low
8.08	0.95	5.90	5.73
Security Type / Issuer	Premium	Ratio	Last Trading Date / Expiration
2200 - Warrant with Knock-Out / DB	- (-)	100	- / Open-End
Underlyings	Market	Strike / Knock-out	Price 11:51:07
DAX (PERFORMANCE INDEX)	Xetra	12'599.3191 / 12'599.3191	▲ 12'088.92 EUR (+33.37)

Mini-futures

Mini-futures function in a similar way to KO warrants. This means that with this type of warrant, volatility has only a marginal effect, if any. They also have no time value, which means that investors can also benefit from a greater leverage effect here.

Special features of mini-futures

1. Mini-futures do not have a fixed term.
2. They have a financing level (strike 1 or level 1) and a stop-loss level (strike 2 or level 2). Like KO warrants, the product is no longer traded if the level 2 threshold is penetrated on the upside or the downside. However, the investor still generally receives a part-payment. The maximum payment if the barrier is breached = (Level 2/Level 1)/Ratio, but total loss cannot be excluded with this version either.
3. A further specialism of mini-futures is that the interest costs are calculated every night and these are factored into the financing and stop-loss level, i.e. the levels increase daily. You should therefore ensure that you know the latest levels (see the issuer's platform).

Example of a mini-future

Swiss DOTS > Full Quote > DAX P 12422.35 VT 42491813 (42491813)

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Products with the same strike | Products with similar expiration

Date	Time	National #	Change (%)
14-09-2018	9:09:55	42'491'813	- (-%)
Volume	Close	Open	Last
-	4.22	-	3.738 CHF
Bid Size	Ask Size	Bid 11:52:08	Ask 11:52:08
150'000	150'000	3.716	3.728
52 Weeks High	52 Weeks Low	Today's High	Today's Low
5.926	3.722	3.738	3.564
Security Type / Issuer	Premium	Ratio	Last Trading Date / Expiration
2210 - Mini-Future / VT	- (-)	100	- / Open-End
Underlyings	Market	Financing Level / Stop Loss	Price 11:52:23
DAX (PERFORMANCE INDEX)	Xetra	12'422.35 / 12'310.00	▲ 12'089.96 EUR (+34.41)

WHICH WARRANT FOR WHICH MARKET OPINION?

In conclusion, it is not just a market opinion – whether the market is rising or falling – that counts; instead, it is important that you as an investor deal with the volatility and set yourself a time horizon.

	Market opinion	Volatility	Time horizon
Warrants	Strongly positive/ negative	Must be low	Max. 10 days
Knock-out warrants	Positive/negative (market cannot fall/ rise significantly, otherwise it will KO!)	Volatility-neutral for pricing (high volatility nevertheless increases the probability of a KO event)	Usually intraday, but can also be held for longer
Mini-futures	Positive/negative to strongly positive/ negative	Volatility-neutral	Usually from one day

Notes

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