Convertible Bonds — An Introduction

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Convertible bonds are a combination of equities and bonds and possess various highly attractive characteristics. A fundamental feature of convertibles is that they offer high, equity-like upside potential while strongly limiting downside risk. This text looks at the following points in this regard:

— What is a convertible bond?
— Market structure and pricing of convertibles
— Advantages and disadvantages for investors

Although this investment instrument offers numerous advantages, even professional portfolio managers seldom make use of convertible bonds on a regular basis. Perhaps convertibles' relatively low level of recognition and the complications in valuing them at times creates (unjustified) fear. Whatever the case may be, this situation frequently opens up surprisingly advantageous investment opportunities for specialists in this area.

WHAT IS A CONVERTIBLE?

Convertible bonds have already existed for quite some time as an investment instrument. The very first convertible was issued around 150 years ago in the USA in order to finance a railroad company.

Convertibles are distinguished by a simple fundamental structure. They provide...

— a fixed maturity,
— a fixed repayment,
— and fixed interest payments.

We are essentially talking about a conventional bond with the associated low downside risk.

Added to this is the so-called conversion privilege.

Note: Bonds
Bonds are issued in the capital market by private or public borrowers who wish to raise money. Hence, from the perspective of the issuer they represent debt requiring interest payments and eventual repayment of the capital at maturity.

THE CONVERSION PRIVILEGE

The conversion privilege entitles the owner of the convertible to exchange the bond into a specified number of common shares of the issuer at any time. For example, let’s look at the following (fictitious) bond:

<table>
<thead>
<tr>
<th>3% Nestlé 2000 - 30 June 2008 (par value of CHF 5000)</th>
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</thead>
<tbody>
<tr>
<td>convertible into</td>
</tr>
<tr>
<td>10 registered shares of Nestlé</td>
</tr>
</tbody>
</table>
Note: Equities vs. bonds; underlying security

Similarly to bonds, equities are issued in the stock market by companies who wish to raise capital. In this case, however, we are talking about share capital, i.e. no repayment of capital takes place on equity (no fixed maturity). Moreover, the shareholder is a pro rata co-owner of the respective firm and thus has the right to share in decisions. After they are issued, equities are generally traded daily on the stock exchange.

By issuing a convertible, a company takes on debt capital that will be fully or partially converted into share capital (depending on the stock market trend) during the convertible’s lifetime. The issue of a convertible is thus equivalent to a share capital increase that is spread over an extended time period. In particular, the capital raised in this way does not have to be repaid, which is often why issuers choose this method of financing.

The equity into which a convertible bond can be exchanged is known as the underlying security (or simply the underlying). In the case of the (fictitious) convertible bond above, the underlying security would be Nestlé registered shares.

The conversion privilege is contractually stipulated and normally applies during the entire lifetime of the bond. Of course, the specific conditions and conversion privileges are different for each bond. But the general principle (i.e. the right of conversion into equities) remains unchanged.

At the same time, there is no obligation to convert. The owner of the bond decides if and when he wants to convert. A conversion is generally only interesting if the corresponding shares have risen sharply and thus exceed the par value of the bond. In such instance, a capital gain could be achieved by converting to the shares and selling them immediately on the stock exchange. In the case of falling equity prices on the other hand, if the owner keeps the bond, he will continue to receive interest payments and also get his invested capital back when the bond matures. Hence, the decisive advantages of convertibles are already apparent: They offer the opportunity to participate in appreciation of the underlying equity while simultaneously providing capital protection. The precise mechanism at work here will be described in somewhat greater detail in the following paragraphs.

Note: Profit potential

3% Nestlé 2000 - 30 June 2008 (par value of CHF 5000) convertible into
10 registered shares of Nestlé (= underlying security)

We assume that the bond was bought at 100% and thus cost CHF 5000. Through conversion, the owner would receive 10 registered shares of Nestlé. Hence, as long as the underlying security (Nestlé registered shares) is trading at less CHF 500 on the stock exchange, conversion is unattractive. But if the stock is selling at CHF 580, for example, there is a profit:

\[
\text{SFr. } 5800 = 10 \times \text{SFr. } 580 = \text{value of shares received} \\
- \text{SFr. } 5000 = \text{purchase price of bond} \\
\hline
\text{SFr. } 800 = \text{profit from conversion}
\]
The converted shares can be sold immediately on the stock exchange, thus locking in the profit.

Furthermore, it becomes clear that the price of the convertible can be strongly influenced by the performance of the underlying equity. Indeed, in the example discussed here, it is immediately obvious that given a share price of CHF 580 the convertible bond is no longer available on the stock exchange at the original price of 100% (CHF 5000), but rather must cost at least CHF 5800 (= 116% of the par value). If the bond were cheaper, investors could buy it, convert immediately and achieve a risk-free profit. This means that in this example, owners of the bond would not sell below 116% since such action would amount to giving money away to the new buyer. The bond must therefore trade at no less than 116%.

The relationship between the number of shares each bond is convertible into (10 shares in our example) and the par value of the bond (CHF 5000 in our example) yields the so-called

conversion price = 5000 / 10 = CHF 500

The conversion price thus corresponds to the "exchange price" of the shares and remains fixed during the entire lifetime of the bond. Conversion becomes attractive as soon as the share price on the stock exchange exceeds the conversion price.

A convertible may therefore be appraised very precisely based solely on the conditions (par value, conversion price, maturity of the bond) and the market price of the underlying equity (see following note). Of course, mathematically correct analysis of a convertible bond requires much more rigorous methods, extending far beyond the approximate valuation procedure described thus far. A brief explanation of some simple ground rules in this regard will be presented in the next section.

MARKET STRUCTURE AND PRICING OF CONVERTIBLE BONDS

The following diagram summarizes what has been said thus far. It shows the value of the convertible on the maturity date (last day of its life) at different share prices. Remember that in the previous section, we already saw that the stock exchange price of the underlying equity influences the value of the convertible. And that is especially the case on the maturity date:
Note: Value at maturity

The illustration shows the so-called payoff diagram of a convertible. You can thus see how high the value of the convertible bond will be at maturity (i.e. the payoff). This value is a function of the price of the underlying equity on the maturity date. Since this value is not known in advance, the payoff diagram shows an entire range of possible share prices (from CHF 340 to CHF 580 in this instance) and the corresponding repayment values of the convertible.

The convertible is a cross between a bond (red line) and an equity (orange line). All possible (optimal) values of the convertible on the maturity date are represented by the bold (red-blue) line.

The red line shows that the bond component of the convertible will be repaid at 100% (CHF 5000 in our example) on the maturity date, and this occurs - as is customary for bonds - independently from the value of the underlying equity.

Case 1: If the share price is at CHF 420, for example, it is not worthwhile to exchange the convertible bond into 10 shares since they would only be worth CHF 4200, which is less than the CHF 5000 for repayment of the bond.

The orange line shows all possible values of the equity component on the maturity date of the convertible bond.

Case 2: If the closing share price on the maturity date is above CHF 500, at CHF 580 for example, then it is worthwhile to exchange the convertible into 10 shares (10 x CHF 580 = CHF 5800) and immediately sell the shares, which brings in more proceeds than the CHF 5000 for repayment of the bond.

As already stated, the bold red-orange line shows all possible (optimal) values of a convertible bond on the maturity date.
**Profits also arise without conversion**

As has already been pointed out several times, it is possible to realize a profit through conversion if the share price exceeds the conversion price. In practice, however, conversion is not even necessary in most cases since through the mechanism described above, the convertible appreciates by the same magnitude in percentage terms (in our example, the convertible costs 116% if Nestlé’s share price rises to CHF 580). The convertible bond can therefore simply be sold on the stock exchange for the correspondingly higher price. A conversion would not result in any additional profit for the owner of the convertible after deducting all of the fees (the actual conversion is carried out only by stock market dealers, who can achieve a small profit from this activity depending on the market situation).

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**THE VALUE OF A CONVERTIBLE BOND DURING ITS LIFETIME**

In our examples up to now, we have looked at the minimum value or repayment value of a bond at different share prices exclusively on the maturity date. This resulted in a price of 116% for the bond when Nestlé’s share price was at CHF 580. At share prices below the conversion price (CHF 500), on the other hand, the owner would choose repayment of the bond at 100% instead of conversion (see preceding note).

In the strict sense, however, these calculations are only valid on the maturity date of the bond. During its lifetime, there are generally deviations from these critical values. Since the bond is traded daily on the stock exchange, it is exposed to certain influences (e.g. interest rates and market fluctuations). The precise reasons for the deviations will be discussed later. The following diagram shows the theoretical value of a convertible on a specific day during its lifetime. Also in this instance, we assume that the share price fluctuates and settles at a specific price at the conclusion of trading.
This price ultimately determines the value of the bond on this day:

The value of the bond on the maturity date is again represented by a bold line. At the same time, however, the thin red line shows the theoretical value of the convertible on a day during its lifetime. You see, for example, that at a share price of CHF 580, the value of the bond is no longer at 116% but at a higher level of approximately 120%. On the other hand, if Nestlé’s share price falls below the conversion price on this day (the left-hand side of the diagram), at some point the convertible would also drop below the contractually guaranteed repayment price. In contrast to the equity (diagonal line), this decline is limited in the case of the bond. It is now important to recognize, however, that these deviations (the thin red line) from the repayment value (thick black line) must grow smaller as the convertible bond approaches maturity (arrows in the diagram). The reasons for these deviations from time to time will be explained briefly in the following section.

Note: Intrinsic value; bond floor
Intrinsic value
The intrinsic value of a convertible is defined as the value of the shares obtainable through conversion. The intrinsic value thus fluctuates constantly along with the share price. If the price of Nestlé’s registered shares is at CHF 580 in our (fictitious) example, this results in

\[
10 \times \text{CHF } 580 = \text{CHF } 5800 = \text{intrinsic value of the bond (≈116%).}
\]

At a share price of CHF 400, the intrinsic value would be CHF 4000. A convertible bond cannot fall below its intrinsic value because if it did, it could be purchased and converted immediately in order to lock in a risk-free profit.

In the diagram, the intrinsic value of the convertible is represented by the dotted blue line that turns into the solid blue line sloping upward. However, a convertible bond generally trades at a price above its intrinsic value (red line) during its lifetime and approaches this value or the guaranteed repayment value (CHF 5000) only as it nears maturity.

Bond Floor
If the share price falls sharply below the conversion price, a conversion becomes increasingly unattractive. Or in other words, the share price would have to rise again significantly before a conversion is worthwhile. In this case, a convertible will respond less and less to small fluctuations in the share price. It detaches itself to a certain extent from the trend of the share price. In particular, if the share price sinks even further, the convertible bond will settle at a certain level and no longer decline. The price of the convertible will then move sideways. This level is defined as a bond floor. The bond floor can be calculated very easily: This involves comparing the convertible with a conventional bond (without conversion privilege) that has the same residual maturity and pays the same coupon as the convertible. The price of this conventional bond thus represents the bond floor of the convertible. How the price of a conventional bond is determined will be explained in one of the following sections.

REASONS FOR DEVIATIONS
Why does a convertible trade at a price above its intrinsic value during its lifetime, or more specifically, why would an investor have to pay approximately 120% in our previous example even though the intrinsic value of the 10 (fictitious) Nestlé registered shares is only 116% or CHF 5800? This can fundamentally be explained through the price protection feature of the convertible. As already mentioned several times, a convertible offers significantly better downside price protection than a direct investment in equities since the par value of the bond will be repaid in any event (i.e. regardless of possible sharp drops in equity prices). At the same time, however, a convertible also offers participation in rising equity prices. This mechanism was also already explained. As such, a convertible may be viewed as

an equity investment combined with insurance against losses.

But insurance costs money. Coming back to our example, this means that an owner of 10 (fictitious) Nestlé registered shares would immediately sell his position and instead buy the convertible if the share price reached CHF 580 and the convertible were available at 116%. In such
a case, he would have exactly the same upside price potential (since in our example the convertible also represents 10 shares with an intrinsic value of CHF 5800 (116% of par value). In contrast to a direct equity position, however, the maximum downside risk is limited to 16% because the bond will be repaid at 100%. An exchange of the equity position into the convertible at a price of 116% would result exclusively in advantages for the owner of the shares, whereas the opposite would be true for the seller of the convertible. The insurance, i.e. the downside protection, makes the convertible more expensive.

**Note: Premium; option premium**

Financial specialists also refer to the price of the conversion privilege as the "premium" - not coincidentally, a term also commonly used in the insurance business. The term "option" or "option premium" is also frequently used and relates to the possibility of achieving a profit or avoiding a loss. A specific amount (premium) must be paid for this possibility. In our concrete example, this premium amounts to the difference between 120% and 116%.

**THE FAIR PRICE OF A CONVERTIBLE BOND**

What is the fair price for the convertible or for the insurance premium? Given an intrinsic value of 116%, why must 120% be paid for the convertible instead of 125% or 117%?

Such considerations were already pondered around 300 years ago on Amsterdam’s tulip exchange, which had a well-functioning options market. At that time, there may have been no mathematical theory in this regard, but instinct and practical experience led to the identification of the following decisive factors that influence the price of a conversion privilege (price hedging premium) and thus the convertible:

— The time until expiration of the conversion privilege (time value)
— The volatility of the underlying shares
— The general interest rate level
— The expectations of market participants
— The quality of the issuer

**TIME VALUE; MATURITY OF THE CONVERTIBLE BOND**

It is immediately obvious that a convertible with a residual maturity of several years will have greater upside potential than one that matures next week (thus providing little time for the underlying shares to rise). Hence, a convertible with a longer maturity will be correspondingly more expensive than a comparable convertible with a shorter maturity (i.e. a convertible with the same conversion price and the same credit rating).

By means of example, we can show the influence of time value on the (fictitious) Nestlé convertible bond:

Intrinsic value of 116% (CHF 5800) with a ...

... residual maturity of 5 years: price 123%
... residual maturity of 3 years: price 120%
... residual maturity of 1 year : price 118%
... residual maturity of 0 years: price 116%
You see here that the convertible moves closer to its intrinsic value (= value of the underlying shares), or it approaches 100% if the intrinsic value is less than 100% (= CHF 5000). This summary was already illustrated in one of the previous diagrams. Financial specialists often refer to this situation as the time value of the conversion privilege (or the time decay).

**VOLATILITY OF THE UNDERLYING SECURITY**

The volatility of the underlying security (see next note) also has an influence on the premium. Let us assume that instead of being convertible into shares of Nestlé (as in our example), the bond could be exchanged into the shares of a speculative, faster-growing telecommunications company whose stock price could double within a short time. Hence, the buyer of the corresponding convertible would also have significantly greater and swifter upside potential and be willing to pay a higher price for this. High volatility also means that the equity can drop very quickly (see the following example). But in this case, the capital protection mechanism of the convertible comes into play (as long as the convertible is not purchased at a price too far above its par value). This means that the owner of the convertible benefits only from the "upward volatility" and must therefore also pay a corresponding premium. The quality of the issuer naturally plays an important role in this regard. A poor-quality issuer will have to pay more interest on the convertible, or the price of the convertible will be lower. For convertibles with equal credit ratings, however, the following applies:

— The higher the volatility, the more expensive the conversion privilege (premium) and thus the convertible

Instead of the price of 120% for the Nestlé convertible assumed in our example above, a price of perhaps 123% would have to be paid, for instance, for a comparable Swisscom convertible (same interest rate, same current share price of CHF 580, same conversion ratio of 10-to-1). However, this difference would also fully disappear as the convertible approaches maturity. Overall, though, a Swisscom convertible would always have a higher time value than the less volatile Nestlé bond during its entire lifetime.

**Note: Volatility**

Mathematically speaking, volatility corresponds to the standard deviation of the relevant equity, and its formula is contained in every textbook on statistics. The standard deviation is a measure that indicates how strongly a price (or in general, a time series) deviates from its mean (average value) over time. To put it in more vivid terms, this key figure could also be described as the "kinetic energy" of a security. A security that does not fluctuate at all (for example, extremely short-term money market securities) have a volatility of 0.

The standard deviation (volatility) is always measured for a specific time period in the past, such as the standard deviation for a year. Hence, historical data is used. By means of a simple formula, this figure can also be adapted to cover other time periods (e.g. weekly, monthly or annual volatility). It is clear that an annual volatility figure must be greater than an average weekly volatility figure. In the valuation of convertible bonds, it is assumed that the standard deviation calculated on the basis of historical data will also be valid in the future, i.e. that the relevant equity will continue to exhibit a volatility of the same magnitude.
Here are the annual volatilities of some well-known equities:

- 20% Nestlé
- 39% Swisscom
- 34% Coca Cola
- 34% Roche
- 123% Amazon

The annual volatility of Nestlé (20%) specifically means that if an investor buys the share at CHF 500, he must reckon with prices ranging from CHF 400 (-20%) to CHF 600 (+20%) over the next year.

Moreover, the figures above clearly show that the US firm Amazon Corp. (Internet retailer of books, etc.) fluctuated six times as strongly as Nestlé. Owners of an Amazon convertible thus would have had considerably more opportunities to earn a profit and therefore also would have had to pay a correspondingly higher premium (= a higher price) for such a convertible.

In addition, the expectations of market participants are an important factor in the valuation of a convertible. For example, if sharp price gains are expected, significantly more will have to be paid for the convertible and especially for the conversion privilege than in a sluggish stock market environment. In financial terminology, this is described as a situation in which "the implied volatility is increasing". The previous volatility is thus no longer used as a basis for valuation, but rather an estimate (presumption) about the future upside potential. Hence, the price of a convertible can rise solely based on changed expectations, even if there are no changes in the share price or in other key factors (e.g. interest rates, volatility, etc.).

THE MATHEMATICAL VALUATION MODEL: OPTIONS AND BONDS

Up to now, we have employed readily understandable cases to explain several important influence factors that shape the prices and premiums of convertibles. This enables us to make an initial rough estimate of the value. It is insufficient, however, to allow us to calculate a mathematically correct price that a securities dealer needs in order to maintain an orderly market for a convertible. An extensive mathematical theory has been developed in this regard over the past 30 years. Since this approach is in some ways very formal and technical, we cannot go into it in detail in this introduction to convertibles. We will only briefly explain the relatively simple underlying principles. Many of the terms already mentioned (such as premium, option and volatility) play an important role in the mathematical theory.

In order to correctly value a convertible, the instrument is theoretically split into two separate securities:

Convertible bond = bond + conversion privilege
The conversion privilege gives the owner the right to obtain a specific number of shares (in our example: 10 registered shares of Nestlé) at a fixed price (in our example: CHF 500 = conversion price = par value of bond divided by number of shares = 5000/10). In financial theory, such a privilege is known as an option. This term is very appropriate since the phrase "to have an option on something" is truly understood this way in colloquial usage. To have an option always means that the holder simply has the opportunity to buy something (or do something), but never an obligation to do something. Option owners or convertible owners can therefore never be forced to exercise their option or convert their bond. This circumstance has already been mentioned. In summary, then, the following applies:

Convertible bond = bond + option
And
Conversion privilege = option

And we now point out again that an option is regarded as an independent security (similar to a gift certificate or trading stamps, which always represent a fixed value and theoretically could be traded on a stock exchange).

Note: Warrant bonds
So-called warrant bonds also exist in the financial markets. Very similarly to a convertible bond, a warrant bond consists of a conventional bond and an option (i.e. the attached warrant). In the case of warrant bonds, however, the option can be separated and traded as an independent security. The bond by itself, the option by itself as well as the bond and option combined all have their own security ID numbers and can be bought and sold separately on the stock exchange.

Apart from this possibility to split up a warrant bond into its individual components, a warrant bond does not differ from a convertible bond in terms of its theoretical characteristics since the latter is at least theoretically also split into a bond and an option (i.e. the conversion privilege).

It turns out, however, that many investors (especially large investors) very much appreciate the possibility to split up a warrant bond and are willing to pay higher prices for such warrant bonds than for comparable convertibles. This results in turn in the situation that convertible bonds are generally traded too cheaply, which opens up above-average opportunities for investors to profit.

You should also be aware that options (conversion privileges) do not pay any interest or dividends.

Note: Exercise price; strike price
Options always have an exercise price. This is the price at which the respective shares are bought or sold. In our example, this would be the CHF 500 for each registered share of Nestlé. The exercise price is also frequently called the strike price and sometimes referred to as the option price.
Both for valuing a simple bond and for valuing options, there are profound mathematical theories. Bonds are valued through the traditional methods of interest calculation and compound interest calculation. This shows that the price of a conventional bond falls when interest rates rise and vice versa.

**Note: Example of how interest rates affect bond prices**

Let us look at the following bond (without conversion privilege):

3% Nestlé 2000 - 30 June 2008, with par value of CHF 1000

We additionally assume that the bond costs exactly CHF 1000 (100%) on the stock exchange. The general interest rate level for first-class issuers such as Nestlé is approximately 3%. Hence, CHF 30 worth of interest is paid on our bond. If interest rates now increase to 5%, for example, investors will no longer be willing to buy a bond that pays 3% interest. Our 3% Nestlé bond becomes unattractive relative to new bond issues that now pay interest of 5%. If we want to sell the bond before it matures, we must therefore reckon with lower prices. The bond will not enter a freefall, however, since it will become attractive again at a lower price level (for example, at CHF 900 = 90%). Indeed, at a price below 100%, the bond will not only pay 3% interest but also provide a capital gain when the bond is repaid at 100% (= CHF 1000). Hence, the lower price level will attract buyers again in the market.

We see that rising interest rates cause bond prices to fall and vice versa. At the same time, the price of a convertible is also affected by fluctuations in the general interest rate level. This is because a convertible consists of a conventional bond (without conversion privilege) and an option. The specific mathematical formulas are presented in many textbooks and programmed into various pocket calculators. Here is an example of how the bond described above could react to interest rate fluctuations (the precise magnitude of the fluctuations depends on the residual maturity of the bond):

- General interest level: 3% Bond price: 100%
- General interest level: 5% Bond price: 93%
- General interest level: 2% Bond price: 104%

In addition to valuing the bond component of a convertible, it is also possible to precisely calculate the value of the conversion privilege (i.e. the call option) through a mathematical formula. The basis for this is the so-called Black-Scholes option pricing model. This theory was developed by Myron Scholes and Fisher Black in the USA at the beginning of the 1970s, and it has been vitally important up to this day - with certain modifications - for valuing options and similar securities (derivatives). The precise connections at work here are somewhat more complicated than in the pricing of bonds. Some important factors included in the formula have already been discussed in previous sections of this introduction to convertibles and are even easy for laymen to understand:

- Volatility of the equity
- Maturity of the option (time value of the option)
- Interest rates
In addition, the following factors also play an important role:

— The purchase price / conversion ratio of the option (= conversion price)
— The stock exchange price of the equity

Let us assume that our Nestlé convertible can only be converted into a single share instead of into 10 shares. The conversion price would be exactly CHF 5000 in this instance. If the stock exchange price of Nestlé registered shares remained at around CHF 500, such a conversion privilege would have practically no value since the conversion would result in a massive loss (you would exchange a bond with a par value of CHF 5000 for a share with a value of CHF 500). Such a convertible would have more or less the same value as a conventional bond with the same interest rate and the same maturity.

In contrast, the convertible would be much more attractive if it carried the right to obtain 16.6 shares for example (corresponding to a conversion price of 5000 / 16.6 = 300). Given a stock exchange price of Nestlé registered shares of CHF 500, such a convertible would yield a profit of CHF 3320 since the owner could obtain 16.6 shares at CHF 300 each and immediately sell them on the stock exchange for CHF 500 each. This results in a profit of 16.6 x (500 - 300) = 16.6 x 200 = CHF 3320. A convertible with these conditions would be considerably more attractive and thus correspondingly more expensive. Of course, the share price also plays an important role in this regard. If the price of Nestlé registered shares rises from CHF 500 to CHF 5000 each, then the previously mentioned conversion privilege (1 share = 1 bond) suddenly becomes attractive.

The Black-Scholes formula is additionally based on conclusions from probability and statistics and is thus in the broadest sense also related to actuarial mathematics. One of the key assumptions in this regard is that the probability of stock exchange prices rising is just as great as the probability of stock exchange prices falling in each instance. Such movements are known as a random walk and have well-defined statistical characteristics.

**Note: Random walk**

A very good example of a random walk is the walking pattern of a (very) drunken person who leaves a bar when it closes and staggers around aimlessly. In such case, the probability that the person stumbles along several meters in a specific direction is equally large for all directions. Hence, we can expect wild, uncoordinated movement back and forth that ultimately does not take the person very far from the starting point. In fact, the statistically expected outcome of the walk is precisely the starting point (the bar). The probability of the drunken person ending up close to the starting point again after some time has passed is much greater than the probability of this person accidentally finding their way home. You should note that in this example, the drunken person is capable of moving in any of four directions (left, right, up, down), whereas stock exchange prices can only move in two different directions (up and down). However, this has no effect on the general principle.

When all is said and done, with the help of the Black-Scholes formula, which is programmed into various pocket calculators, it is possible to calculate the precise value of an option and thus also of a conversion privilege. Hence, the above-mentioned components of a convertible (bond and conversion privilege) have been valued separately and add up to the value of the convertible, which is stated either in currency units (CHF) or as a percentage of the nominal
amount (CHF 5000 in our example). As also already mentioned, both the bond component and the option price fluctuate depending on the trend of interest rates and the stock markets. The values of the individual components of a convertible change constantly and must therefore be recalculated daily (even continuously for actively traded securities).

**Note: Example of fluctuation in the value of an option**

As already mentioned, options and thus also the value of a convertible fluctuate strongly in response to the share price.

Let us look at an example to illustrate this point. Assuming that the owner of the option has the right to obtain

— 10 Nestlé registered shares at a price of CHF 500 each.

A stock exchange price of CHF 600 per Nestlé registered share, for example, would result in a profit of CHF 1000 since the 10 shares could be obtained through the option for a price of CHF 100 less per share (10 x (600 - 500) = 1000). The option would thus have a value of at least CHF 1000. In reality, the option would be somewhat more expensive because of the price protection mechanism of the conversion privilege. This price protection mechanism means that in the event of a sharp price drop, "only" CHF 1000 could be lost, whereas considerably more value could be lost in the case of a pure equity position. If the share price now rises to CHF 700, the option would have a minimum value of CHF 2000 (10 x (700 - 500) = 2000). The following table summarizes a few of the possible combinations:

<table>
<thead>
<tr>
<th>Market price of Nestlé reg.</th>
<th>Intrinsic value of option (conversion privilege)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>1000</td>
</tr>
<tr>
<td>700</td>
<td>2000</td>
</tr>
<tr>
<td>800</td>
<td>3000</td>
</tr>
<tr>
<td>1000</td>
<td>5000</td>
</tr>
</tbody>
</table>

Da es sich bei dem Wandelrecht einer Wandelanleihe in Wirklichkeit um eine Option handelt, wird auch aus dieser Perspektive deutlich, dass der Wert (Kurs) einer Wandelanleihe mit steigendem Aktienkurs ebenfalls ansteigen muss - und umgekehrt.

**SOME ADDITIONAL CHARACTERISTICS: BOND COMPONENT = PRICE PROTECTION**

If we would divide convertibles into their individual components through the methods described up to now and analyze them, we would discover that most convertibles come to the market with the following structure:

convertible bond = bond + call option

100% = ca. 75% + ca. 25%

CHF 5000 = CHF 3750 + CHF 1250

The option component accounts for about 25% of the total value. The issuer can achieve this structure by correspondingly fixing the conversion price (= exercise price of the option) or the conversion ratio. The conversion ratio or conversion price influences the value of the conversion privilege and thus the value of the call option. Finally, the Black-Scholes option pricing
model is taken into consideration. Instead of the customary 25% option portion, another proportion could be chosen. The specific shape the conditions take depends on the objectives of the issuer and on the general stock market climate (interest rates, stock exchange trend).

A specific ratio fixed at the time the convertible is issued (for example, 75% to 25%) can subsequently change significantly due to the course of the markets. For example, the share price (Nestlé registered) could rise sharply. In such case, the option will also rise in value and thus make up an increasingly large part of the entire package. The value of the bond component usually fluctuates very little. We can thus now fundamentally state:

**The larger the option component, the greater the risk for the buyer.**

We already know that the value of the bond component forms a lower limit in the event of falling prices (bond floor). The bond component carries a fixed coupon and has a fixed repayment. In contrast, the option (conversion privilege) can expire or lose significant value if the corresponding stock loses value and thus makes the exercise of the option (i.e. a conversion) unattractive. And the smaller the bond component (i.e. the more options the convertible contains), the more money that can be lost. Hence, many issuers choose a ratio of 75% to 25% since the buyers of a convertible are generally interested in a good level of price protection and thus a relatively large bond component.

You should also note that interest is paid only on the bond component of a convertible. In contrast, the option (conversion privilege) is a security on which no interest is paid. The bond component carries a coupon in line with market rates (for the corresponding maturity) at the time of issue. A convertible thus pays lower interest than a conventional bond with the same maturity.

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**Note: Example of interest paid on a convertible bond**

Let us assume that a bond without conversion privilege issued by a first-class borrower (for example, Nestlé) has a lifetime of 2000 to 2008 and offers an interest rate of 3.75%.

We now use this bond as a component of a convertible and choose a bond/option ratio of 80% to 20%.

A convertible with a par value of CHF 5000 is composed of:

- 5000 (= convertible bond = 100%) = 4000 (= bond component = 80%) + 1000 (= option component = 20%).

As previously mentioned, only the CHF 4000 receives a coupon of 3.75%. This generates a yield of

- CHF 4000 x 3.75% = CHF 150
Based on the price of the convertible, this results in a total yield of 3% since

- CHF 150 = 3% of CHF 5000.

A convertible bond always provides a lower yield than a comparable conventional bond issued by the same borrower. In a certain sense, this cut in the yield can also be described as the price of the conversion privilege.

ADVANTAGES AND DISADVANTAGES OF A CONVERTIBLE BOND

ADVANTAGES

A convertible bond is essentially a warrant bond. This view allows us to correctly value the bond and the call option independently from each other at all times. The bond is valued according to the traditional bond valuation method, and the option is valued according to the Black-Scholes model. Despite their interesting characteristics (capital protection and simultaneously intact upside potential), convertible bonds are not a "gift from the market". Nevertheless, convertibles benefit from an often underestimated effect that ultimately does provide them with a valuation advantage. Indeed, despite the ability to theoretically split them into a bond component and an option component, the two components cannot be traded separately on the stock exchange - in contrast to a warrant bond, in which case the option alone, the bond alone as well as the bond together with the option can all be traded as an independent securities (each with its own security ID number). Many investors view this restriction as an inconvenience. For example, with respect to the restriction of investors’ freedom to act, an investor who is only interested in the conversion privilege of the option must always "drag along" the bond component. Hence, the conversion privilege is always valued somewhat lower in the market than a freely tradable option without the burden of an attached bond. These circumstances ultimately also reduce the price of the convertible. This can certainly be viewed as a slight market inefficiency, which can be systematically exploited to produce a profit through the consistent use of convertibles.

Moreover, strong psychological factors also influence convertibles due to the capital protection involved. Specifically, even in a very weak market environment, the owners of convertible bonds never come under pressure to take action or engage in panic selling - which usually occurs close to the bottom of a correction. Quite the contrary, in such situations the capital saved by the convertible can potentially be invested cheaply in new securities.

Of course, a convertible bond provides various advantages not only for the buyer but also for the issuer. Hence, this attractive financing instrument enjoys growing use, which should ensure a sufficiently broad offering of convertible bonds in the marketplace in the future as well. The main advantage for issuers is the conversion of the original debt (i.e. the bond that has been issued) into equity, which does not have to be repaid. The issuance of convertibles thus corresponds to a market-friendly capital increase since the conversion into new shares does not take place all at once but is spread out over the entire lifetime of the respective convertible. By issuing equity in such a way, it is possible to avoid the temporary price pressure that often occurs when shares are issued all at the same time. In summary, a convertible exhibits the following advantages:
Upside price potential while simultaneously providing good capital protection

— Inexpensive conversion privilege (= cheap option)
— Protection against bad decisions (especially during volatile stock markets)
— Market-friendly way of placing equity

DISADVANTAGES
The main disadvantage of a convertible is the fixed link between the conversion privilege (option) and the bond component. Investors who are only interested in the performance of the underlying stock and already own enough bonds therefore prefer to buy a pure option. However, such freely tradable options are usually much more expensive than a conversion privilege attached to a convertible. In summary:

— Restriction of the investor’s ability to act freely

PARTICULARITIES OF FISCH ASSET MANAGEMENT AG INVESTMENT FUNDS

The investment funds of Fisch Asset Management AG employ a special selection procedure with respect to the enormous offering of convertible bonds worldwide. To put it very simply, the funds fundamentally buy bonds whose value does not deviate too strongly from the guaranteed repayment value (par value). This effective yet simple selection principle is illustrated by the following diagram:

The red line shows the qualitative trend of the convertible as a function of the share price (underlying security). You see that at very low share prices (to the left of the green zone), the convertible no longer reacts strongly since a conversion is not a possibility in this case. In this zone, the convertible is viewed predominantly as a conventional bond and fluctuates only in response to changes in the general interest rate level. Rising or falling share prices thus result in practically no changes in the price of the convertible bond.
In contrast, as soon as the share price approaches the conversion price (green zone in the diagram), a conversion becomes increasingly likely. Accordingly, the bond also begins to rise as the share price rises. At latest by the time the conversion price is surpassed, the bond rises more or less parallel to the share price.

In the green zone, a convertible benefits from rising share prices (at nearly a rate of 1-to-1) and also moves quickly to the “flat” zone on the left if prices fall, thus protecting the convertible from any more notable losses. To the right of the green zone, the value (price) of the convertible moves increasingly higher than the par value (= guaranteed repayment value), at which point the bond essentially takes on equity character and the capital protection element functions only to a severely reduced extent.

All in all, a convertible bond that is in the green intermediate zone combines the advantages of a bond investment (high degree of capital protection) with the upside price potential of an equity investment. We can thus describe the green zone as a hybrid zone that is particularly well suited for a balanced investment strategy. The majority of the convertible bonds selected by Fisch Asset Management AG belong to this category. There are also funds with strategies that deviate from this approach.

ADVANTAGES
Already the purchase of a single convertible in the above-mentioned hybrid zone offers considerably better capital protection than a direct equity investment while simultaneously providing intact upside potential. Hence, taking up a broad selection of such securities in our investment funds results in a very pronounced diversification effect as well as exceptional capital protection without sacrificing any profit potential. It is therefore unsurprising that under certain circumstances a convertible bond fund may be classified as belonging to the investor’s bond portfolio instead to the investor’s equity portfolio. This especially offers pension funds interesting opportunities to enhance their yields while excluding larger risks.

ADDITIONAL SELECTION CRITERIA
When choosing convertibles for our funds, we additionally apply the following key selection criteria:

— Credit rating of bond issuers
— Reasonable conversion premiums
— Optimal average residual maturity (duration) of the bonds

By consistently overweighting issuers with high credit ratings, we achieve an additional safety effect, yet this strategy still also allows us to include a moderate number of somewhat more speculative but very promising special securities that provide the funds with some additional spice on the whole. The emphasis on reasonable conversion premiums guarantees that fund investors benefit directly from any stock market gains, while balanced duration management hedges the funds against unwelcome changes in the interest rate level.

UPSHOT
Although convertibles are essentially easy to understand, a broad spectrum of specialized knowledge and financial market theory is required to ensure the consistent and efficient use
of money invested in this area. This effort is rewarded with an advantageous risk-return relationship that is hard to beat no matter what additional lengths you are willing to go to.

At the same time, the constant monitoring of existing positions with respect to the above-mentioned criteria, the analysis of new issues as well as the continual need to rotate investments requires considerable administrative effort. Hence, managing individual client portfolios containing convertible bonds in the requisite professional manner outlined here quickly pushes the administrative apparatus to its limits. As such, the centralized management provided through a convertible bond fund offers significant advantages and synergy effects that benefit the end clientele as well as intermediaries to a large extent.

**ADDITIONAL INFORMATION**

**IBBOTSON STUDY**

According to a study on convertible bonds (Ibbotson), convertibles achieved an annual return of 11.80% during the period from 1973 through 1998. This places them behind equities (13.06%) but significantly ahead of conventional bonds (9.48%). What is most interesting, however, is the fact that despite their lower average return, conventional bonds exhibited a risk of 12.11% (measured in terms of standard deviation), which was higher than the 11.94% risk of convertibles. The risk associated with equities amounted to 17.12% during the study period and was thus sharply higher than that of bonds or convertibles. These figures impressively confirm the exceptionally advantageous risk-return relationship of convertibles.

**CONVERSION OF A CONVERTIBLE**

Both in the case of private investors and professional investors, a conversion usually never actually takes place. As long as a convertible exhibits a conversion premium, it is not worthwhile to convert, whereas in the event of sharp price increases (premium reduction), a conversion would result in an (unhedged) equity position. Quite often in such case, the convertible is simply sold in order to realize the gains achieved up to that point. At the same time, however, a conversion can be worthwhile for arbitrage reasons (conversion arbitrage). In such instance, the convertible is bought and converted, and then the shares are sold immediately on the stock exchange in order to lock in a small gain. This means that the convertible must exhibit a negative premium, i.e. the intrinsic value exceeds the price of the convertible.

**CONVERSION PRIVILEGE AS A PUT OPTION**

The conversion privilege of a convertible can be viewed as a call option since it allows the owner to purchase shares (the underlying security). At the same time, however, there are also put options that give their owner the right to sell a specific number of shares at a specific price. It is logical that a put option gains value in a bear market because the underlying shares can be sold at a fixed price even though they may have already fallen much lower than this price on the stock exchange. Put options are thus suitable for speculating on the belief that stock prices will fall, whereas call options rise in a bull market.

Apart from the perspective from which we have looked at convertibles up to now (combination of a bond and a call option), a convertible may also be viewed as a combination of an
equity, a bond and a put option. Also in this case, the same valuation criteria and price models apply.

LEGAL QUESTIONS
Depending on the viewpoint, a convertible can be classified as belonging to the equity investment category or the bond investment category. Classification in its own separate category is also a topic of discussion. From a practical standpoint, these classification questions do not play a significant role. In terms of the legal status of convertibles, on the other hand, there are important consequences, e.g. with respect to the inclusion of convertibles in the legally regulated portfolios of pension funds.