# 8. knock-out cap collar

MIFID complexity
IR 3

**product description**

If you would like to improve the parameters of a zero cost collar, a knock-out cap collar is the obvious solution. Similarly to FX options, interest rate options can also be combined with each other, and combining a knock-out cap with a regular floor option results in a zero cost knock-out cap collar. This product creates a protection range we consider ideal, with the protection staying in place until the knock-out cap is terminated.

A knock-out cap collar involves the simultaneous conclusion of a knock-out cap and a floor option. Your company buys an option (knock-out cap) that provides protection in each interest period when the knock-out barrier is not reached and sells another (floor) option, which limits its benefits of favourable interest rate movements to ensure that the transaction is zero cost. This product can be particularly advantageous in case of a flat yield curve or if you believe that, despite the market expectations reflected by the yield curve, market interest rates will not change in the near future.

Knock-out cap collar concluded for a loan: the company buys a knock-out cap and sells a floor option:

Possible scenarios on the pre-agreed maturity dates (two banking days before each interest period)

- market interest rate ≥ knock-out barrier: there is no settlement
- knock-out barrier > market interest rate > knock-out cap strike
  You are entitled to pay according to the knock-out cap strike instead of the market interest rate, i.e. the Bank will pay the company the time proportional difference between the market and the cap interest rates.
- market interest rate between the knock-out cap and the floor strikes: there is no settlement
- market interest rate < floor strike
  You have an obligation to pay interest at the floor rate, which means that you will pay to the bank the time proportional difference between the market interest rate and the floor interest rate

In most cases settlement is based on the reference interest rate fixing 2 days before the end of the interest period, however it is possible to agree otherwise.

**an example for a zero cost knock-out cap collar transaction:** a company has a 3 year bullet loan with a notional of 300 000 EUR with a floating interest rate payment, on which it will be paying interest quarterly on the 3-month EURIBOR rate. The current 3-month EURIBOR is 0.50%. The fixed EUR interest rate on is 0.85%. The company believes that interest rates will not fall significantly in the future, but it would nevertheless like to be protected against a possible sudden surge in interest rates. It also believes that the 3-month EURIBOR rate is not going to rise above 2.00% in the coming 3 years. Thus it concludes a zero cost knock-out cap collar for term of 3 years, i.e. it buys a knock-out cap option with a 2.00% knock-out barrier and a 0.60% strike and simultaneously sells a floor option with a 0.30% strike for the same notional amount, in line with the notional schedule above. Thus it maximises its interest expenses at 0.60% and in exchange it is prepared to accept that its protection may cease in each interest period if the 3-month EURIBOR reaches or exceeds 2.00%. Furthermore the company accepts that should interest rates drop to a level below current market expectations (see the yield curve below), it will not be able to benefit from interest rates lower than 0.30%.

| parameters of a knock out cap collar transaction | |
|---|---|
| initial notional | EUR 300 000 |
| tenor | 3 years |
| variable notional | no |
| floor (minimum) interest rate | 0.30% |
| cap (maximum) interest rate | 0.60% |
| knock-out barrier | 2.00% (applicable separately to each interest period) |
| frequency of interest payment | quarterly |
| interest rate calculation convention | actual number of days / 360 |
| fixing day of floating interest rate | 2 working days before onset of given interest period |
| settlement of interest payments | net, at the end of each interest period |
| precondition for settlement of floor interest payment | if the 3-month EURIBOR is below 0,30% two banking days before the start of the interest period |
| precondition for settlement of cap interest payment | if the 3-month EURIBOR fixing rate is between 0.60% and 2,00% two banking days before the start of the interest period |
| current 3-year ICAP EURO offer rate against 6-month EURIBOR (Day count: ANN 30/360 vs 6M EURIBOR) | 0.85% |
| current 3-month EURIBOR | 0.50% |
| option premium (paid by the client on the trade date) | none |
| **possible scenarios at the end of each interest period assuming that on the fixing dates the 3-month EURIBOR is** | |
| A) on the fixing days 3-month EURIBOR below 2.00% | |
| A/1) 3-month EURIBOR above 0.60% | your company pays 0.60% interest on the loan in every interest period |
| A/2) 3-month EURIBOR between 0.30% and 0.60% | your company pays 3-month EURIBOR on the loan in every interest period |
| A/3) 3-month EURIBOR below 0.30% | your company pays 0.50% interest on the loan in every interest period |
| B) on the fixing days 3-month EURIBOR above or equal 2.00% | your company pays 3-month EURIBOR on the loan in every interest period |
| best-case scenario (treasury transaction on a standalone basis) | On every fixing day 3 month EURIBOR never reaches 2.00% and 3-month EURIBOR is above 0.60% but below 2.00%. Your company receives the time proportional difference between 0.60% and 3 month EURIBOR for the actual notional amount in each interest rate period. |
| worst-case scenario (treasury transaction on a standalone basis) | On every fixing day 3 month EURIBOR below 0.30%. Your company pays the time proportional difference between 0.30% and 3 month EURIBOR for the actual notional amount in each interest rate period with an unlimited interest rate loss potential. |

**the market value of the position one year after the contract conclusion from the customer's point of view**

market value: the cost of liquidating the position calculated at a given point of time and under the prevailing market terms and conditions (in case of a positive value the company can close the transaction with profit) (assumption: there is parallel shift in the entire yield curve in the extent of the change of the 3-month EURIBOR, and the shape of the yield curve remains unchanged)

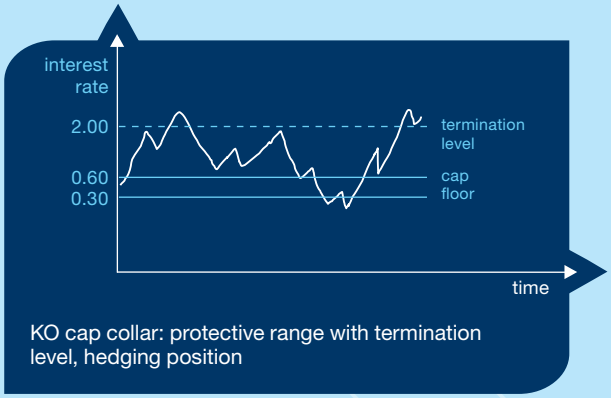
The number of possible outcomes is unlimited, and there may be even more extreme values than the ones presented below.

| 3-month EURIBOR in one year (%) | market value of the position (EUR) |
|---|---|
| -1.00 | -1 539 |
| 0.50 | -100 |
| 2.00 | 2 049 |

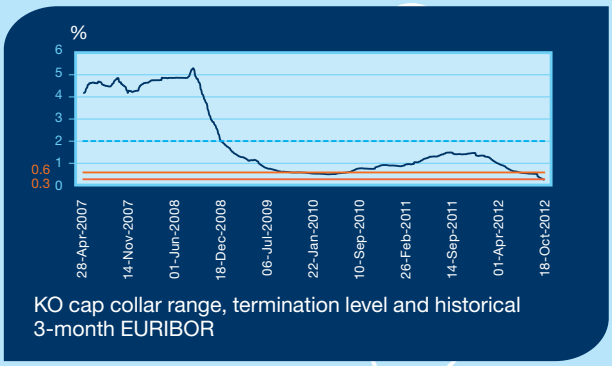
**financial outcome of some possible scenarios 1 year after the trade date, supposing that the 3-month EURIBOR evolves as below in the last quarter of the given year**

The number of possible financial outcomes is unlimited, and there may be even more extreme values than the ones presented below.

| end of period (outstanding principal EUR 300 000) | 3-month EURIBOR at the start of the interest period (%) | underlying exposure's financial outcome with no treasury transaction (3 months' interest expense without knock-out cap collar, EUR) | profit / loss of the product on a standalone basis (net settlement at the end period, client pays if value is "+", EUR) | underlying exposure's financial outcome with the treasury transaction, hedged position (3 months' interest expense with knock-out cap collar, EUR) | underlying exposure's financial outcome with the treasury transaction, hedged position (3 months' interest expense with 0,60% IRS, EUR) |
|---|---|---|---|---|---|
| **1 year** | -1.00 | -750 | +975 | 225 | 450 |
| **1 year** | 0.00 | 0 | +225 | 225 | 450 |
| **1 year** | 0.50 | 375 | 0 | 375 | 450 |
| **1 year** | 1.50 | 1 125 | -675 | 450 | 450 |
| **1 year** | 2.50 | 1 875 | 0 | 1 875 | 450 |




KO cap collar: protective range with termination level, hedging position




KO cap collar range, termination level and historical 3-month EURIBOR

The chart shows the interest level(s) of the treasury deal and the historical evolution of 3 month EURIBOR. The historical data is intended merely to compare the interest level(s) of the deal to the historical rates. Future evolution of interest rates and interest changes for the remaining tenor are unforeseeable in advance, actual profit and loss depends on the interest rate prevailing on the fixing days. The chart is not suitable to forecast interest rates and market value of the position.

**advantages of transaction**

- purchasing a knock-out cap option will provide limited protection against unfavourable movements in interest rates until the option knocks out.
- as a knock-out cap costs less than a plain vanilla cap the floor option can be sold at a lower strike than the floor strike of a normal zero-cost collar with identical parameters.
- limited benefit from interest rates that are more advantageous than the fixed interest rate on the trade date.
- the maximum / minimum future interest expense / income is predetermined (the worst scenario is known) in the event that the knock-out barrier is not reached.
- can be used to hedge both loans and deposits.
- it can also be concluded for loans granted by or deposits placed with other financial institutions, since the collar deal is separate from the underlying loan or deposit transaction.
- zero cost, this deal is available in most liquid currencies free of any special premium.
- the expiry date, the cap and floor interest rates (strikes), the knock out barrier and the frequency of interest payments can be set at your will, in accordance with your expectations, plans and budget; the change of one parameter will cause the rest of the parameters to change, too.
- available for any repayment schedule.
- if no longer needed, the knock-out cap collar can be closed at any time before expiry, by means of a counter trade.

**risks of transaction**

- the knock-out cap option part of the transaction does not provide full protection as the protection will disappear when mostly needed.
- the protection is in place until the knock-out barrier is reached, and it is for interest rates more adverse than the fixed interest rate applicable to the same tenor.
- you cannot take full advantage of favourable interest rate movements.
- in theory you may suffer an unlimited interest loss if interest rates exceed your expectations during the tenor of the transaction.
- if the underlying loan is repaid, it is advisable to close the knock-out cap collar too, since there is no longer any risk resulting from your core business. The closing of a collar deal before expiry will entail an obligation to settle, including the possibility of a loss.
- the market value of interest rate derivatives is determined by the evolution of market interest rates, the length of interest rate periods, the number of days remaining until the expiry of the transaction, the day-count method and the evolution of the notional until expiry. In the case of interest rate options the market value is also influenced by the evolution of market volatility. The drop in market liquidity could lead to a bid-offer spread widening, which could also affect the market value of the position negatively.
- the change in market value could lead to an obligation of temporary or permanent increase of collateral which may affect the company's liquidity and solvency negatively. In case of exceptional market circumstances (e.g. money market and other crises) the negative market value of the position from the Client's viewpoint could reach such extreme levels that providing sufficient collateral may cause the company to become insolvent. Moreover, failure to provide additional collateral in time might lead to the closure of open positions thus prompt realization of losses, which may affect the company's liquidity and solvency negatively.
- chapter I/b. entitled "Risk Factors" of "K&H Treasury Handbook of Market Risk Management" lists those risks that do not originate exclusively from the nature of the product described here, but rather, from other factors.

**product structure**

The product is built up of a barrier and a plain vanilla interest rate option. The sections on barrier and plain vanilla interest rate options of Chapter I/c. entitled "5 Basic Products" of "K&H Treasury Handbook of Market Risk Management", also applies to this product.