

# Citi's Guide to Structured Product Terminology

Structured products based on individual cap call options allow the investor to assume potentially higher exposure to the performance of the underlying basket, by accepting a limit to the maximum gain associated to each basket's component

## The definition

Structured products with an individual cap call payout are investment instruments that offer an enhanced exposure to a portfolio of underlying assets. The individual cap represents a pre-defined limit imposed in each single asset's performance. The payout of the structured product is equal to a participation in the growth of the underlying basket, taking into account the performance cap.

The buyer of an individual cap structure assumes a leveraged position on the underlying assets' growth, with a limit on the upside potential.

This synthetic exposure corresponds to a long position in the underlying basket and to a short position in each single asset's performance above the cap.

The investors become a 'writer' of a call option on each asset with a strike equal to the cap level. The premium obtained by the short position on this series of call options finances a higher participation in the performance of the basket.

## Behind the scenes

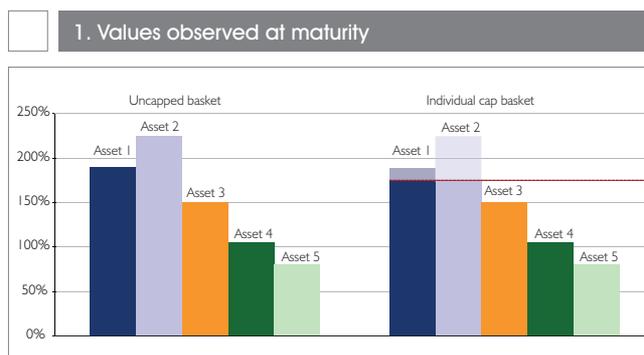
The typical use of individual cap is to obtain higher leverage on the underlying growth, by assuming the risk of losing the performance generated above a specific cap level by each asset composing the underlying portfolio.

The structure can be particularly interesting when the investor expects a moderately positive trend for the underlying basket of assets and a relatively high correlation between the components of the basket.

## Product rationale

Let's observe a structure that offers an exposure to the growth of the basket over a five year investment period; the structured product offers full capital protection for the amount initially invested. The underlying basket is composed of five assets and each is capped at 175% of its initial value.

In this example, Asset 1 and Asset 2 register a final value higher than the



cap level and are therefore considered at the fixed value of 175% in the basket's performance calculation; the remaining three assets are observed at their respective final value. The individual cap basket registers a lower value than the uncapped basket in any scenario where at least one of the assets reaches a final value higher than the fixed cap level.

However, the individual cap call option is cheaper to purchase than uncapped call on the same basket and therefore provides for structured investments with higher participation. This can allow for better returns overall, even in cases where some of the components perform better than the cap level.

## Scenario simulations

Using a Monte Carlo simulation approach, we can observe the average payout of an individual cap call and compare it to the performance of an uncapped call under various sets of volatility and correlation assumptions. For the purposes of this simulation, we consider fully capital protected structured products, linked to a basket of five equity stocks with a maturity of five years. The leveraged exposure to the growth is equal to 155% for the individual cap version and 110% for the uncapped version.

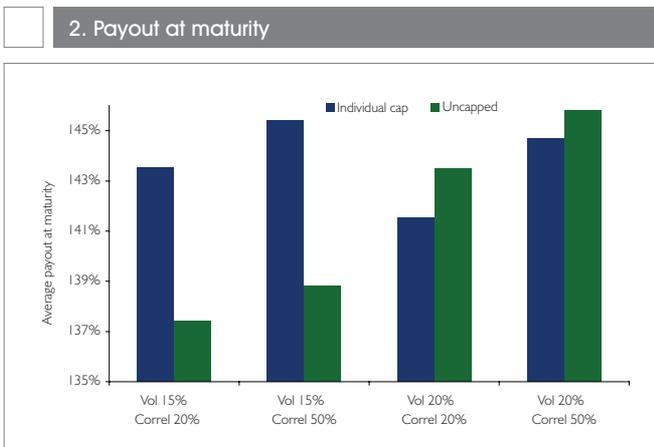
Financial terms of the hypothetical individual cap call structure	
Maturity	Five years
Underlying	Five equity stocks
Currency	EUR
Capital protection	100% of the initial invested capital
Final payout	155% of the individual cap basket's growth
Individual cap	175% of the initial asset's value

### Parameters of the simulations

In the simulations four different combinations of volatility and correlation are considered: annualised volatility of 15% and 20% for each stock and average correlation of 20% and 50% for the basket and growth rate of 5% per annum.

The value of the individual cap basket is then compared to the value of the uncapped basket in order to calculate the payout of the individual cap call and of the uncapped call.

The following graph represents the average payouts at the end of the life of a five year hypothetical investment associated with each set of volatility and correlation assumptions.



For example, given a volatility of 15% for each stock and an average correlation between pairs of stocks equal to 20%, the individual cap structured

product offers an average overperformance of more than 6%, thanks to the higher participation rate to the growth of the basket.

Clearly, a market environment characterised by low volatility will represent a favourable condition for individual cap structured products to perform better than uncapped call structures.

Both structures are positively affected by an increase of correlation. However, the individual cap structure benefits more from the higher correlation assumptions of simulations here presented.

### Variations

The individual cap call payout can be structured in different variations; here are presented some of the most common.

#### Variation 1

The premium amount received by imposing cap on the performance of the asset is used to finance floors on the single performance of the basket, in order to mitigate the effect of adverse market scenarios.

#### Variation 2

The cap level is fixed on the average basket's performance; the premium received is generally lower than the one obtained by selling a call on each single underlying asset.

#### Variation 3

The premium linked to individual cap is not invested to finance a higher participation to the individual cap basket but to generate fixed coupons paid to the investor during the product's life.



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