Independent Analysis for Meteor FTSE STOXX Defensive Kick Start Plan - 14.12.2020

ISIN: XS1083619566

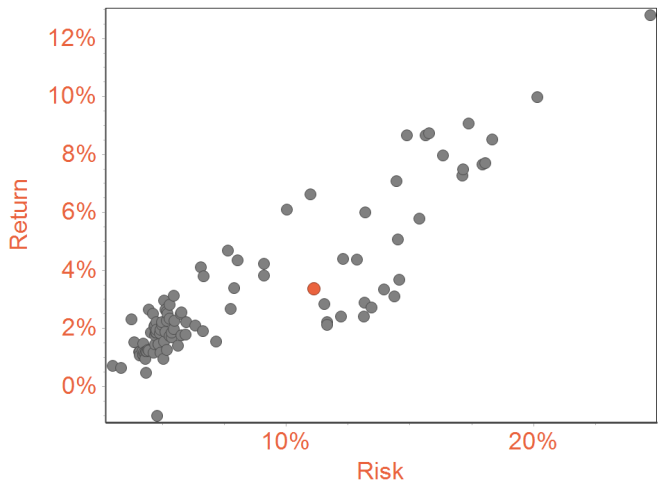
Product Summary

This is a 6 year product issued by BNP Paribas. It is an autocallable product linked to the performance of FTSE 100 Index and SX5E Index. Although the latest maturity date is 11/4/2020, the product will be monitored at annual periods. The product will mature early if at any annual date, from period 2, the worst performing underlying is at or above 95%, 95%, 95% and 90%) of its initial level (at the relevant date). In which case, the product will repay the initial investment plus a coupon of 20.25%, 29.25%, 38.25% and 47.25% (at the relevant date when the autocall is triggered). If the product runs to maturity, the product will repay the initial investment plus a coupon of 56.25% so long as the worst performing underlying is at or above 90%. Otherwise, the product will repay the initial investment less any negative worst performing underlying measured over the term of the product.

Risk-Return Analysis

We report the product's risk-return tradeoff and its positioning with respect to the structured products issued in the same market.

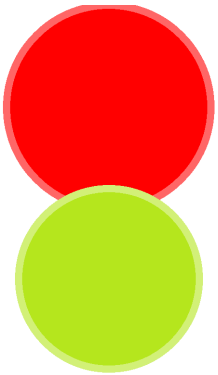
Risk	Ann. Return
11.1%	3.4%



Probabilistic Comparative Returns

This is the comparison between the Product and an alternative risk-free investment. Here you can see how the Structured Product is found to be better (green), in line (yellow) or worse (red) as compared with the alternative risk-free investment. For each scenario we provide the probability and the conditional expected returns.

Outcome	Probability	Ann. Return
Negative	41.5%	-8.1%
Neutral	0.0%	-
Satisfying	58.5%	4.5%



Risk Factors Impact

Buying this Product the investor bears several market risks. here some events whose realization has a negative impact on the performance of the Product: for example the fall of 30% of the underlying assets during the product life or the issuer's default.

Risk factor	Probability	Tot. Return
FTSE 100 Index	56.8%	-12.8%
SX5E Index	60.0%	-10.9%
All Equities	49.1%	-18.5%
Issuer's default	4.8%	-62.7%

Tail Risk

Here the expected returns of the product conditional upon the occurrence of extreme events whose probability of occurrence is equal to 1%, 5% and 10%.

Probability	Tot. Return
1%	-85%
5%	-75.8%
10%	-69.1%

Early Redemption

Here the probability of early redemption before the natural Maturity of the Product in each date of possible exercise.

Period	Probability
At period 1	38.3%
At period 2	8.6%
At period 3	5.1%
At period 4	4.7%
At Maturity	43.2%

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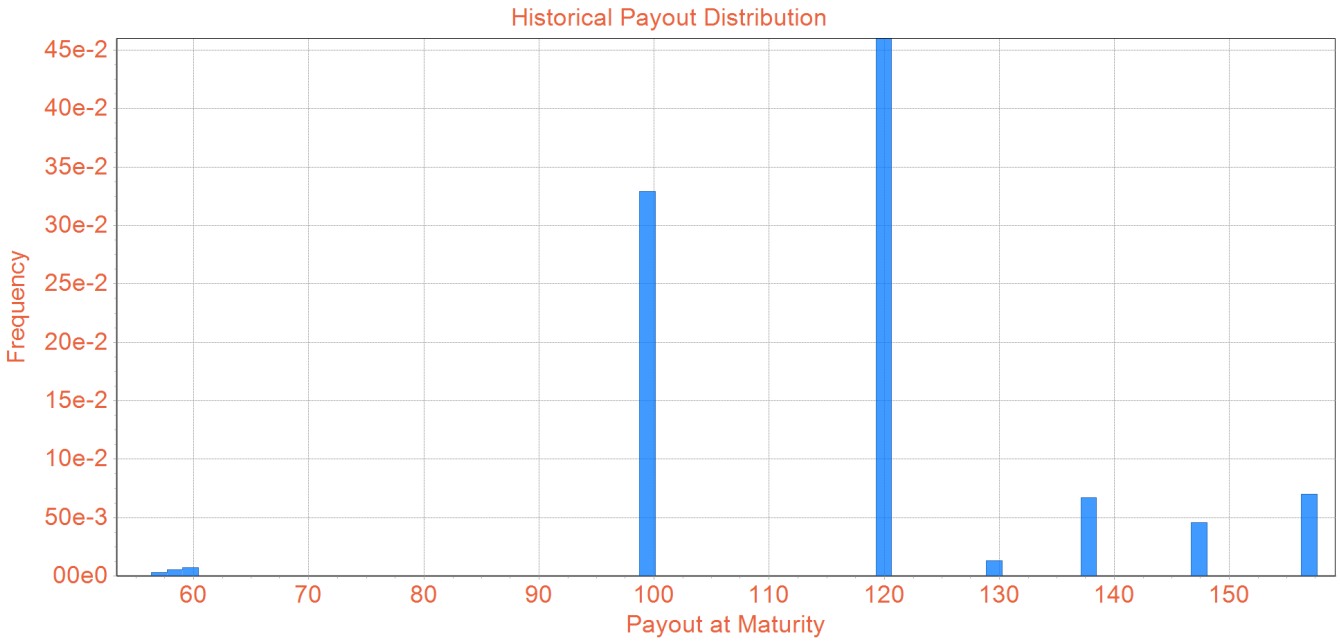
Back Testing

The performance of the product has been tested as it would have been issued at several different dates in the past. Below you can find the historical frequency of events driving the product's payout.

Payout	
Average historical yearly return	5.8%
Average return (cond. to positive outcome)	6.0%
Average return (cond. to negative outcome)	-8.5%
Matured with positive return	98.5%

Observed Early Redemption Frequency	
At period 1	46.0%
At period 2	1.3%
At period 3	6.7%
At period 4	4.6%
At Maturity	41.4%

Comparisons	
Outperformed market benchmark (FTSE 100 Index)	50.4%



* Analysis based on 2345 - product investment cycles. Simulated investments from 02 Jan 2000 to 25 Dec 2008.

Fairmat Cloud Quantitative Analytics Methodological Note

1. Premise

The goal of this Quantitative Report is to provide investors with an objective analysis about the likely future behavior of derivative products in order to provide understandable insights as well as common metrics which may be used to compare amongst different alternative investments.

All the offered analytics are calculated using public available quantitative information. We provide market consistent forward-looking analytics like early redemption probabilities, tail risks, etc. and historical analysis, in which we back-test the investment over market history.

Our forward-looking analytics are market consistent, meaning that they are obtained by calibrating theoretical models for the underlying assets' evolution in terms of the observed market prices of primary assets which are determined by the equilibrium between supply and demand (thus reflecting traders' expectations).

2. Analyses Description

Below we you can find more details about the provided analyses.

a) Risk-Return Analysis

According to the risk-return tradeoff which states that invested money can render higher profits only if it is subjected to a greater possibility of being lost. In this analysis, we report the product's annualized expected returns and implicit volatility.

In order to do that, we simulate the capitalized product payout for several risk factors scenarios, and from those scenarios we calculate the empirical expected returns and volatility.

Furthermore, we offer a comparison of the product risk-return tradeoff with respect to other structured products issued in the same market or currency.

Products return are calculated with respect to the products' theoretical prices which are calculated by simulating the future evolution of the contracts market risk factors and credit risk factors (i.e. issuers defaults).

b) Tail Risk

The expected returns of the product conditional upon the occurrence of certain extreme events that would imply large losses in the investment. Events are chosen so as they have a probability of occurrence equal to 1%, 5% and 10%.

c) Impact of Risk Factors / What-if analysis

We calculate the expected returns of the product conditioned to some adverse events whose realization have a negative impact on the performance of the product. We estimate the probability of occurrence of these events and the outcome achieved by the product under that scenario. In the case of equities, the event which we consider a fall (or rise) in price of at least 30% with respect to the initial level of a given equity and of the entire basket in the cases where the structure has a whole basket of equities as underlying assets during the entire product's life. The other adverse event we take into consideration is the issuer's default.
Note: in order to make the analysis more meaningful for the equity case, when stressing an equity market factor we assume the absence of credit events.

d) Comparison with Money-Market-Account

This analysis compares the performance achieved by the product with the performance of an alternative *risk-free* investment. The risk-free investment we consider is the investment in a safe (assumed free from default risk) bank deposit, technically known as money-market account. The expected returns of the product and the corresponding probability of occurrence are estimated in the cases where the certificate is found to be *better*, *in line* or *worse* as compared with the alternative *risk-free* investment.

The circles displayed in the traffic light figure measures the impact to the investor of a given scenario and have an area proportional to the absolute value of the product returns in a given scenario times the scenario's probability.

e) Expected Early Redemption

When the product has early redemption features, we calculate the probability of early redemption before the natural *Maturity* of the *Certificate* in each possible exercise date. This gives to the investor the information about the expected duration of the investment.

f) Back Testing

This analysis estimates the future performance of the product from its historical performance. This is done by analyzing the product performances by looking at what would have happened if the product would have been issued in the past. This procedure is repeated for (possibly thousands) different issue dates and from that, the distribution of historical performances can be computed. Every product's historical performances are also compared with an alternative investment as for example the investment on the market benchmark for the product's currency.

Note1: The benchmark used in backtesting is the main market index for the payout currency (I.e. EuroStoxx 50 for Euro, FTSE 100 for GBP and S&P 500 for USD).

Note2: In order to produce a more realistic outcome when performing backtesting on interest rate products, thresholds (on interest rates) are scaled accordingly to the ratio between the interest rate levels at the effective date and the interest levels at the backtesting date.

3. Numerical Methods

In this section we describe in more details how prices are obtained: given the complexity and heterogeneity of the certificates object of our analyses, we employ a decomposition approach in which the structure of the contingent cash-flows and of the events triggering early redemption are expressed in terms of the considered risk factors. The risk factors evolution is then simulated using a Monte Carlo approach following the frameworks proposed by Boyle, Phelim P. in Options, a Monte Carlo Approach (1977) and Longstaff, Schwartz in Valuing American Options by Simulation: A Simple Least-Squares Approach (2001).

In order to simulate the evolution of the equity assets that underlie many of these certificates, we use either the time-dependent volatility geometric Brownian Motion, the Heston Stochastic Volatility model (see https://www.fairmat.com/plugins/documentation/heston-model) or the Dupire Local volatility model (see https://www.fairmat.com/plugins/documentation/dupire). These models are industry standards to model equity derivatives.

In order to compare the product with the risk-free investment we followed the lines described in Minenna – A Quantitative Framework to Assess the Risk-Reward Profile of Non-Equity Products (2011). In particular we simulate a Money-Market-Account investment using the Pelsser Gaussian Squared Model (see https://www.fairmat.com/plugins/documentation/pelsser-squared-gaussian-model).

We model potential Issuers default using a reduced form intensity framework suitable for being calibrated to Credit Default Swap (CDS) data. For more details on this approach see Brigo, Mercurio - Interest Rate Models, Theory and Practice (2006).