

### Factsheet - Fusion Sophis

# **Convertible bonds**

Modern derivatives trading desks need a single solution that delivers an integrated approach to the complex challenges they face regarding trading, risk management and trade processing

Supported by a comprehensive database and years of quantitative research, Fusion Sophis supports all standard clauses for convertible bonds in a robust and precise pricing engine.

This functionality is fully integrated within a single front-to-back solution that offers portfolio and risk management, in addition to processing capabilities, across a wide range of asset classes.

As a result, all market participants can manage convertible bond products alongside the other instruments they trade using Fusion Sophis's industry-leading technology.

#### Key benefits

- Supports multiple business processes: market making, long/short investment, arbitrage, asset swap and ASCOT stripping, as well as synthetic convertible bond origination.
- "Pre-packaged" data sources for convertible terms and conditions (including clauses) as well as for underlying reference and market data.
- User-friendly interface incorporating years of experience with convertible bond trading.

- Robust valuation pricer: compute real-time prices and Greeks for most convertible bonds worldwide because of full support of most convertible bond clauses.
- Extensive asset class coverage to support convertible bond trading and hedging: asset swap, ASCOT, equity swap, equity options, CDS, CDX, IRS, IR futures, stocks, CFD and more.
- Aggregates P&L and risk in real-time across portfolios and provides flexible reporting and risk analysis.

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### Data model and definition of convertible bonds

¢	onvertible Bond "FORD	MOTOR CO 4.25	% 2016" (CB-O	TC)								
Ge	neral Fixed Income	lauses Redemptio	on Dividends	Deals Calcula	tion							
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	Clause Type	Start Date	End Date	Payment D	Minimum	Maximum	Value	Information	Historical			
	Call	20/11/2014	15/11/2016		130,000000 %	0,000000	100,000000 %		32			
	Coco	01/01/2010	15/10/2014		130,000000 %	0,000000	0.000000					
	CocoCB	09/11/2009	15/10/2014		0,000000	98,000000 %	0,000000		36			
	DivProtection	09/11/2009	15/11/2016		0,000000	0,000000	0,000000	Full dividend protecti				
2	Parisian	20/11/2014	15/11/2016		20.000000	30.000000	0.000000		-			

Convertible bond clauses: e.g. Call, Coco, Dividend protection, Parisian call

Percent Coup.   21,938333 2,193833   21,25000 2,12500   21,25000 2,12500   21,25000 2,12500   21,25000 2,12500   21,25000 2,12500   21,25000 2,12500	Redemption   833 0,00000   000 0,00000   000 0,00000   000 0,00000   000 0,00000   000 0,00000   000 0,00000	Nb of Redee	Nb of Conver	Notional 1 000,0000 1 000,0000 1 000,0000 1 000,0000
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#### Cash flow and redemption table

- Convertible bond reference data.
- From external sources (e.g., Bloomberg, Refinitiv, Markit): automatic updates of static and market data involved in convertible bond pricing such as equity, issuer, credit data, volatilities, and dividends.
- User-friendly administration GUI with updated schedule and management of data conflicts and errors.
- Ongoing innovations in new releases: new features can be developed in a short time by our quantitative teams.
- Quotation method: quotation currency, clean/dirty, in amount/in percent.
- Coupon schedule: fixed/floating, flexible frequency, step-up, step-down, flexible rate basis/mode.
- Redemption table: final, amortised, step up & down.
- Perpetual convertible bond and preferred shares.
- Exercise clause: underlying share, compo/quanto, exercisability periods, conversion ratio, conversion clause, accrued/full coupon.

- Issuer Call: hard/soft, Parisian, accreted (rate term structure), immediate/delayed, with/without making whole coupon, with/without accrued amount, cushion.
- Bear Put: strike, accreted (rate term structure).
- Contingent conversion: underlying price contingency (standard/Parisian), convertible bond price contingency.
- Contingent coupon: underlying price contingency, convertible bond price contingency, fixed amount/ accreted (rate term structure).
- Conversion ratio reset: spot value/average value, quanto resets, multiple resets, mandatory resets, Asian resets.
- Dividend protection: conversion ratio adjustment (single dividend/annual sum), dividend pass through.
- Redemption in stock: adjusted conversion ratio, incremental share factor, PRIDE.

## Pricing

- Market diffusion model:
- One-factor equity.
- Two-factor: equity and FX.
- Regime switching with default rate, jump rates and transition probabilities between regimes, considering the correlation between the equity and the credit risk.
- Numerical algorithm: lattice geometry (trinomial tree, PDE) with smoothing and Fourier transforms.
- Jump-diffusion model: Kou (exponential).
- Equity estimated dividend model: cash dividend in amount/in per cent, continuous dividend, proportional dividend.
- Equity volatility model: flat, time-dependent, local (Dupire).
- Equity repo model: flat, time-dependent.
- Credit model: reference entity CDS curve (spread/ up-front), default intensity curve, convertible bond basis spread.
- Tsiveriotis: credit applied to the fixed income part of the convertible bond distribution (bond floor filter on the distribution of paths without conversion).
- Deutsche Bank: credit applied to the convertible bond price excluding parity.
- Jump-to-default: regime switching.
- Calibration: implied credit spread, implied volatility.

# Portfolio management and lifecycle

- Dedicated convertible bond indicators: bond floor, break-even, yield-to-maturity, yield-to-call, yield-to-put, parity, premium to parity, premium to bond floor, bond floor without funding spread, equivalent dividend yield, accrued coupon, average life, MtM YTM, theoretical YTM, difference between market data and implied data (volatility, credit).
- Coupon: automatic cash flow, market, and special ex/cum coupon management.
- Redemption: automatic.
- Corporate action: automatic conversion ratio adjustment in case of split.
- User management: audit, user rights, user preferences.
- Distributed computations of the portfolio with risk analysis and real-time P&L breakdown: unrealised, realised, accrued, ex-coupon, cash income.
- Greeks: equity/FX delta/gamma (in quantity/ cash), equity/ FX delta/gamma, equity dividend delta, IR delta/gamma, theta, credit spread delta/gamma, sensitivity to recovery rate, sensitivity to funding spread.
- Management of funding: cost of funding, funding spread.
- Bucketed scenarios: IR delta (zero coupon per term/ per market plot), Vega (per strike and maturity), dividend (per term).



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