STOXX® CURRENCY HEDGED INDICES

March 2015

STOXX

INNOVATIVE. GLOBAL. INDICES.

Agenda

1. EXECUTIVE SUMMARY

STOXX Currency hedged indices: a complete index suite to hedged away undesired currency risks

Currency risk

» Investment total return = Security return + Currency return

» Currency return → currency risk

» Investor may have a view on securities' behaviour, but not on currencies' one

» Investor may be not willing / not allowed to take currency risk

Currency hedging

» Currency risk can be hedged away via currency forward trades

» A 100% hedge ratio fully offsets currency movements

» Over/under-hedging may be exploited to take advantage of contingent market conditions

Daily/monthly hedging

» Daily adjustment of hedge ratio and currency weights
+ higher responsiveness
- higher complexity

» Monthly adjustment of hedge ratio and currency weights
+ easier maintenance
- reduced timeliness

STOXX Currency hedged index suite

» Meeting the demand for currency risk hedging

» Both daily and monthly versions available

» All major currencies covered, others available on request

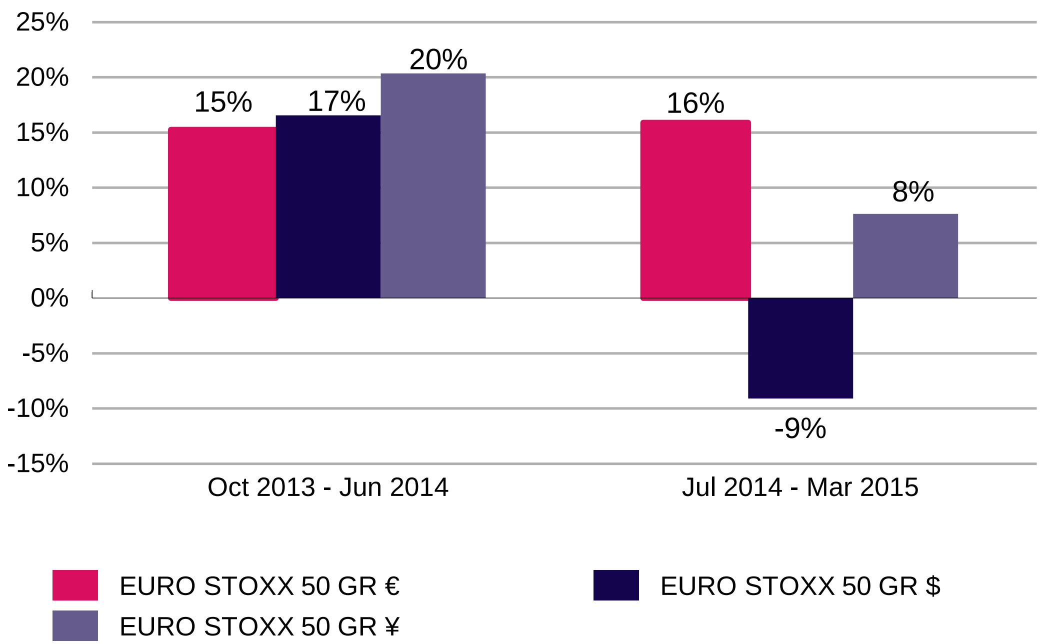
2. WHY INVESTORS MAY NEED CURRENCY HEDGING

Total returns from an investment may be significantly affected by currency exposures

Currency hedging isolates the return from underlying securities

How returns may look like from different (unhedged) currency perspectives

- » Investors typically create their portfolios based on their expectations about securities' future behaviour
- » Impact of returns from currency exposure may be not negligible



- » Similar € returns in both periods, but completely different $, ¥ returns:
  - » $, ¥ depreciated first (positive impact)
  - » $, ¥ appreciated later again (negative impact)

Currency effects can significantly alter returns from sole equity exposure

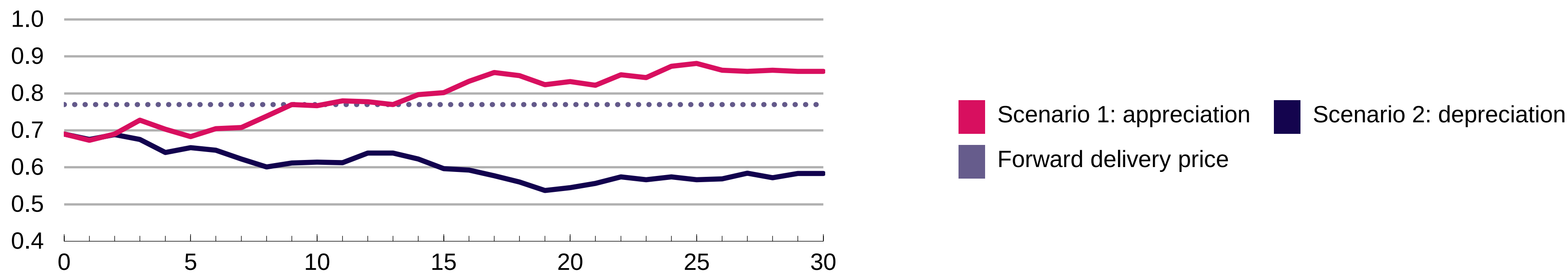
3. HOW A CURRENCY FORWARD TRADE WORKS

Trading currency rate forward contracts allows to offset the impact of currency movements

Forwards, being contractual obligations, may result in profits as well as losses

How a forward currency hedge trade works

» In t=0, USD-domiciled Home Company (HC) expects a EUR 100m payment in t=T
» HC expects its domestic currency (USD) to appreciate against the foreign currency (EUR), i.e. the EUR 100m payment will purchase in t=T less USD than it would in t=0
» HC enters a forward contract to sell EUR 100m in t=T at an agreed forward delivery price



» Scenario 1: domestic currency appreciates to or above the agreed forward price:
» $USDEUR_T \geq USDEUR_{fwd}$: HC records a profit from hedge

» Scenario 2: domestic currency depreciates, or appreciates less than the agreed forward price:
» $USDEUR_T < USDEUR_{fwd}$: HC records a loss from hedge

Trading currency rate forward contracts allows to offset the impact of currency movements

Forwards, being contractual obligations, may result in profits as well as losses

How a forward currency hedge trade works /2

Domestic (hedge) ccy	USD
Foreign (local) ccy	EUR

	USDEUR					
t	**Spot**	**Forward**	**EUR**	**Spot USD**	**Fwd USD**	**Hedge P&L USD**
0	0.6667		100	150		
T	0.8696	0.7692	100	115	130	15
						10.0%

» Equivalently, the hedge P&L can be seen as the difference between the returns from purchasing EUR at spot and reselling EUR at forward vs. purchasing EUR at spot and reselling EUR at the prevailing rate in T:

$$\left(\frac{1/FF_0}{1/FX_0}-1\right)-\left(\frac{1/FX_T}{1/FX_0}-1\right)=\frac{FX_0}{FF_0}-\frac{FX_0}{FX_T}=\frac{0.6667}{0.7692}-\frac{0.6667}{0.8696}=10.0\%$$

4. COMPARING ALTERNATIVES: DAILY VS. MONTHLY HEDGING

The choice between a daily vs. monthly hedge is driven by market conditions and portfolio construction approach

	Daily hedge	Monthly hedge
Pros	» Hedged notional and individual currency exposures timely updated » Indicated for volatile currency, equity markets » Indicated for high hedge ratios / over-hedging	» Virtually maintenance-free within the month » Indicated for stable currency, equity markets » Indicated for low hedge ratios
Cons	» May not be “worth the effort” in stable markets, low hedge ratios » Implementation costs	» Hedged notional and individual currency exposures held constant » Less responsive in volatile markets, high hedge ratios

5. DAILY VS. MONTHLY HEDGING: FORMULAS EXPLAINED

Daily hedging is more responsive, monthly hedging more parsimonious

Mathematically, monthly hedging can be derived from daily hedging formula

Daily vs. monthly currency hedged formula explained

$$H\_IDX_t = H\_IDX_0 \cdot \left[\underbrace{\frac{UH\_IDX_t}{UH\_IDX_0}}_{\text{Unhedged return}} + \underbrace{\sum_{d=1}^{t} \underbrace{\frac{UH\_IDX_{d-1}}{UH\_IDX_0}}_{\text{Hedged notional scaling factor}} \cdot \underbrace{\sum_{c=1}^{C} \underbrace{HR_{c,d-1} \cdot}_{\text{Single currency exposure}} \underbrace{\left(\frac{FX_{c,0}}{IFF_{c,d-1}} - \frac{FX_{c,0}}{IFF_{c,d}} \right)}_{\text{Return from single currency forward}}}_{\text{Return from all currency forwards}}}_{\text{Return from daily hedging of whole portfolio}} \right]$$

The monthly hedge formula can be derived from the daily one by:

- » setting the notional hedged amount to 1
- » holding each currency's hedge ratio fixed at its month's end value

$$H\_IDX_t = H\_IDX_0 \cdot \left[\frac{UH\_IDX_t}{UH\_IDX_0} + \sum_{c=1}^{C} HR_{c,0} \cdot \left(\frac{FX_{c,0}}{FF_{c,0}} - \frac{FX_{c,0}}{IFF_{c,t}} \right) \right]$$

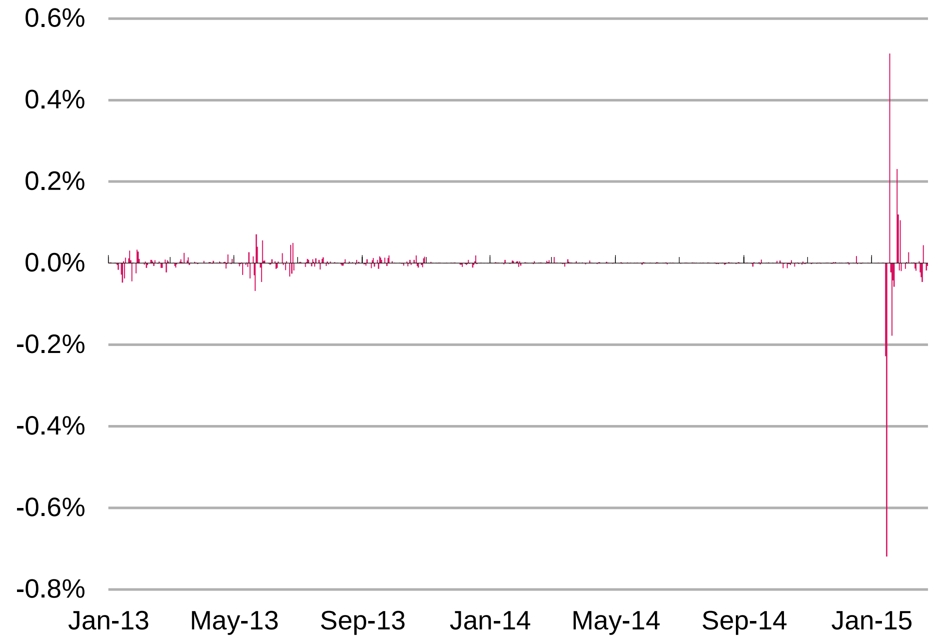
The interpolated forward rate is calculated as $IFF_{c,t} = FX_{c,t} + \left(1 - \frac{t}{T}\right) \cdot \left(FF_{c,t} - FX_{c,t}\right)$

6. SHOWCASE: EURO STOXX 50 CHF HEDGED

Daily vs. monthly hedging matters in terms of timeliness and accuracy, less for long-term returns [1)]

EURO STOXX 50 GR CHF HEDGED

DIFFERENTIAL RETURNS: DAILY vs. MONTHLY



Daily hedge
Monthly hedge

1) Based on back-test displayed; different behaviors may be observed with other time-series.

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