

## Eurex MSCI derivatives – synthetic exposure to the MSCI Korea Index

With institutional investors shifting their focus more and more towards emerging markets, and in particular on the Korean Peninsula, the South Korean market is increasingly gaining attention. Eurex recently expanded its MSCI offering with the launch of MSCI Emerging Markets Asia ex Korea Index Futures, making it the first exchange with a listed solution to extrapolate the Korean exposure.

In this note, we illustrate how to create a synthetic exposure to the MSCI Korea Index through a spread trade between the existing MSCI Emerging Markets Asia Index Futures (FMEA) and the recently listed futures on the MSCI Emerging Markets Asia ex Korea Index (FMXK). We show that, at various rebalancing frequencies, this synthetic exposure could be achieved at substantially below 1% tracking error over the period from 2012 to 2017.

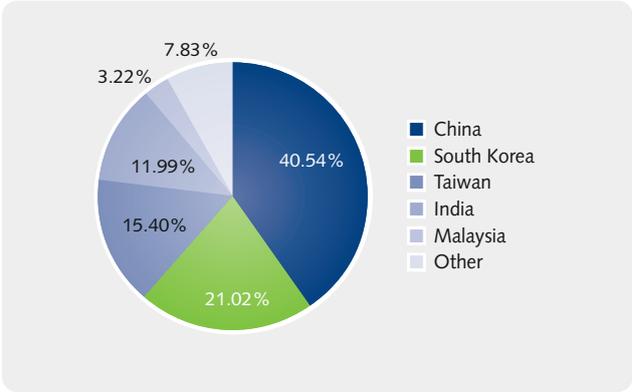
Currently, no listed market place offers a future on the MSCI Korea Index. However, Eurex can create a synthetic exposure by trading the futures spread between the MSCI Emerging Markets Asia Index and the MSCI Emerging Markets Asia ex Korea in Table 1 below provides a summary of the product specifications of the two futures products.

Table 1: Contract specifications: FMEA & FMXK

Futures on	MSCI Emerging Markets Asia Index Futures	MSCI Emerging Markets Asia ex Korea Index Futures
Product ID	FMEA	FMXK
Contract value per index point (in USD)	100	10
Contract terms	Quarterly up to 36 months	
Minimum price change (in points)	0.1	0.5
Minimum price change (in USD)	10	5
Settlement	Cash settlement	
Final settlement price	Based on the closing index level on the last trading day of the maturity month	
Last trading day	Third Friday of the maturity month	
Continuous trading	08:00 – 22:00 CET	
Bloomberg code index Bloomberg code futures	NDUEEGFA Index ZTWA	M1CXNPSA Index MXAA
TES transaction fees per contract (in USD)	0.75	Fees waived until 31 December 2018
Position limits	None	None
Minimum block trading size	50	10

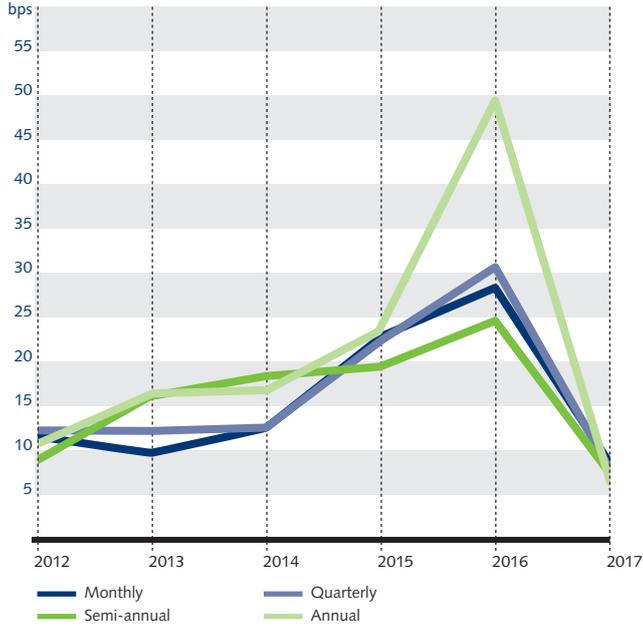
The weights of the spread constituents are chosen such that all country weights in the MSCI Emerging Markets Asia Index except for Korea will cancel out with the MSCI Emerging Markets Asia ex Korea Index. Figure 1 provides an overview over the weights of the MSCI Emerging Markets Asia. With this constraint, the weights of the spread constituents only depend on one variable – the country weight of Korea in the MSCI Emerging Markets Asia Index. In the following calculation, we use monthly data on the country weight of Korea to fix the relative size of our spread constituents.

**Figure 1: MSCI Emerging Markets Asia country weights as of 29 December 2017**

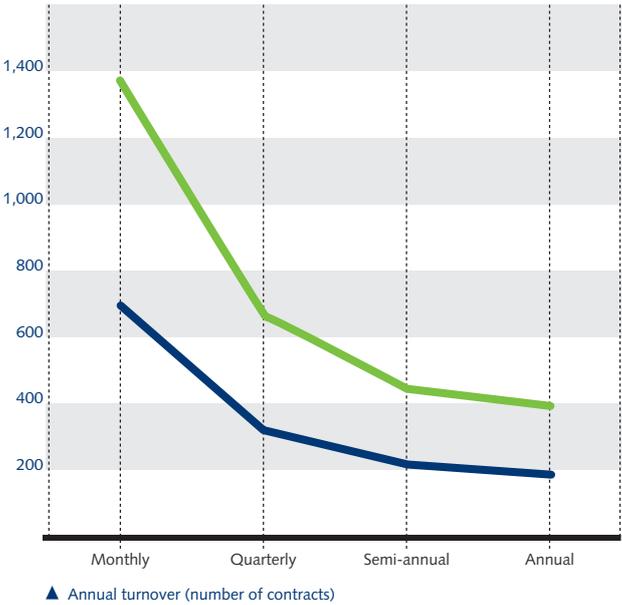


Below we illustrate this trade over the period from 2012 to 2017 by tracking a hypothetical position of USD 10 million in the MSCI Korea Index established at the beginning of the data period. Several rebalancing frequencies – annual, semi-annual, quarterly and monthly – are applied. Figure 2 and Figure 3 show the results in terms of annual tracking error in basis points (bps) and total annual turnover depending on the re-balancing period. The tracking error in all cases is substantially below 1% per year. The more often we adjust the positions, the lower the tracking error, falling as low as 10 bps for monthly rebalancing. The increase in tracking error for 2016 was a result of the increased volatilities after the Brexit vote. The total annual turnover is a measure for the expected cost to maintain the exposure on the MSCI Korea Index. It increases with the rebalancing frequency.

**Figure 2: Tracking error for different rebalancing frequencies**



**Figure 3: Turnover per year for different rebalancing frequencies**



Below we examine the calculations performed at the quarterly rebalancing period in detail. On 2 January 2017, a portfolio of futures contracts on the MSCI EM Asia and MSCI EM Asia ex Korea is created. To replicate the MSCI Korea index, 1,188 MSCI EM Asia futures contracts are bought (long position) and 2042 of the MSCI EM Asia ex Korea futures are sold (short position). The number of contracts are derived by evaluating:

$$N_{\text{MSCI EM Asia}} = \text{round} \left( \frac{1}{w_{\text{MSCI Korea}}} \times \frac{A_{\text{Portfolio}}}{M_{\text{MSCI EM Asia}} \times I_{\text{MSCI EM Asia}}} \right)$$

$$N_{\text{MSCI EM Asia ex Korea}} = \text{round} \left( \frac{1 - w}{w} \times \frac{A_{\text{Portfolio}}}{M_{\text{MSCI EM Asia ex Korea}} \times I_{\text{MSCI EM Asia ex Korea}}} \right)$$

Where N is the number of contracts, w stands for the weighting of the MSCI Korea in the MSCI EM Asia. A is the amount of the current portfolio (USD 10 million), M is the contract multiplier of the futures contract and I is the index level. After the first quarter, the portfolio is rebalanced. The new number of contracts is computed and the portfolio is adjusted. For Q2 we sold five contracts of the MSCI EM Asia futures and bought six contracts in the MSCI Emerging Markets Asia ex Korea futures. The process is repeated every quarter and leads to the following results for 2017:

**Table 2: Snapshot of positions and position changes for a USD 10 million portfolio tracking the MSCI Korea during 2017 with quarterly rebalancing.**

Futures on	MSCI Emerging Markets Asia		MSCI Emerging Markets Asia ex Korea	
	Long position	Difference	Short position	Difference
Q1	1,188		-2,042	
Q2	1,183	-5	-2,036	6
Q3	1,183	0	-2,036	0
Q4	1,171	-12	-2,011	25

Typically, the number of contracts of the MSCI Emerging Markets Asia ex Korea futures is approximately 1.7 times higher than the number of contracts of the MSCI Emerging Markets Asia futures.

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