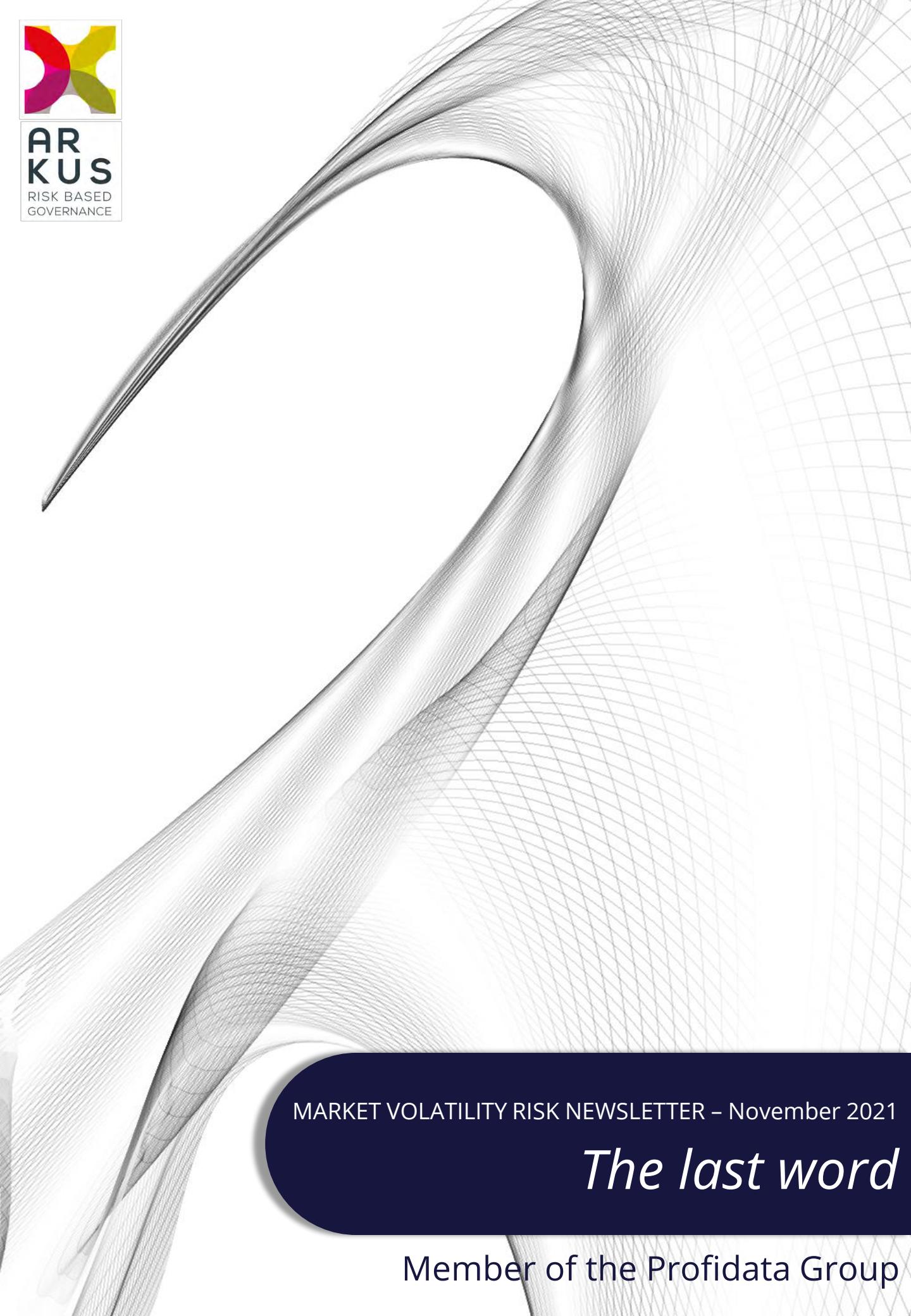




ARKUS
RISK BASED
GOVERNANCE



MARKET VOLATILITY RISK NEWSLETTER – November 2021

The last word

Member of the Profidata Group

Executive Summary

- **Region's volatility results were mixed.** Region volatility spanned a range that goes from 9.8% (Europe) to 19.6% (Japan Nikkei), with North America and Europe changing from medium down to low volatility regime, while Asia ex-Japan remaining in the low volatility regime, and finally Japan (Nikkei) on the high regime.
- **Realized volatility** (of the Euro Stoxx 50 index over 30 days) decreased from 16.6% (Medium) to 13.9% (Low).
- **Equity price sector results were all upward trending**, with Energy increasing the most (+7.9%). **Sector volatilities** spanned a range that goes from 7% (Consumer Staples) to 18.1% (Energy), with all sectors changing from medium down low.
- **Sovereign bond price movements were all downwards**, with Italy losing the most (-2.4%). **Volatility moves** were mixed and spanned a range that goes from 1.1% (Japan) to 5.3% (Italy).
- **€ price results were mixed**, with the EUR losing the most against Swiss Franc (-2.1%) and only gaining against the Japanese Yen (+2.2%). **FX volatility results were mixed**; ended ranging between 3.6% (€/CHF) and 6.3% (€/Yen).
- **Options' implied volatility decreased in both observed markets**, with the VIX going down from 23.1 to 17.6, and the VSTOXX from 23.2 to 17.6, with both markets changing from high down to low regime.
- **Commodities price changes were mixed**; with only Iron Ore losing (-8.4%) and Oil (Brent) gaining the most (+7.5%). **Volatility changes were mixed** and spanned a range between 11.3% (Gold) to 38.4% (Iron Ore).
- **Real Estate (equity) prices movements were mixed**, with only Japan losing (-0.4%) and US gaining the most (+7.7%). **Volatility moves were mixed**, ranging between 13.3% (US) to 14.04% (Europe).
- **The average PE Funds** gained +3.1%, while the **average Hedge Fund** lost +0.8%. **Volatility** for the average hedge fund decreased from 2.8% to 1.8%, while for the average PE fund went down from 12.9% to 11.5%, with the average hedge fund changing from medium down to low.

The Arkus Risk Team



Table of contents

1. Summary volatility matrix	p. 4
2. Key News	p. 5
3. Kurtosis & correlation in the equity markets	p. 6-7
4. Equities	p. 8-9
5. Equity Implied Volatility	p. 10
6. Fixed Income	p. 11
7. Foreign Exchange	p. 12
8. (Equity) Options	p. 13
9. Commodities	p. 14
10. Real Estate (Real Estate Share Prices) & Alternatives	p. 15-16

Summary volatility matrix and outlook

Among other drivers, the startling rise in household energy bills, which includes 18% in gas and 28% in electricity, have elevated the UK inflation rate to 4.2%, which is more than double the Bank of England's target. This higher than desired inflation rate, compounded with a very robust jobs report this week, has elevated the pressure for the BoE to consider hiking rates in their next monetary policy meeting, which is due to take place in under a month. As a result, investors have jumped on the possibility of a rate hike, strengthening the pound against other major currencies such as the dollar.

Meantime, according to the European Commission, the already elevated Inflation rates in the Eurozone are likely to ease down only modestly over the coming year. The main driver will be a bottleneck in the supply of raw materials compounded with a slowdown and stabilisation in energy prices.

After two weeks of hopeful discussions, Did the much-anticipated Cop26 deliver the intending results, or was it quite frankly another hyped up public display on climate change that sadly underdelivered? Overall, some may argue that the Glasgow COP did move things slightly but nowhere near what was expected. The goal of achieving 1.5 degrees is starting to look rather implausible.

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	11.0%	-0.5	low
	Asia ex-Japan	12.4%	-0.6	low
	Europe	9.8%	-0.6	low
	Japan (Nikkei)	19.6%	0.7	high
	Energy	18.1%	-1.1	low
	Consumer Staples	7.0%	-0.8	low
	Financials	11.6%	-0.8	low
	IT	15.1%	-0.4	low
VOLATILITY OF VOLATILITY	Volatility of VIX	79%	-1.2	low
	Volatility of VSTOXX	98%	-1.1	low
GOVERNMENT BONDS	Germany	4.3%	1.5	high
	US	3.7%	0.2	medium
	Japan	1.1%	0.2	medium
	Italy	5.3%	0.7	high
FX VS \$	€/\$	5.3%	-0.1	medium
	€/Yen	6.3%	0.8	high
	€/CHF	3.6%	0.1	medium
	€/£	4.1%	-0.9	low
COMMODITIES	Oil (Brent)	18.0%	-1.2	low
	Gold	11.3%	-1.1	low
	Copper	30.0%	1.3	high
	Iron Ore	38.4%	0.4	medium
PROPERTY	US	13.3%	-0.7	low
	Europe	14.036%	-0.2	medium
	Japan	13.978%	-0.1	medium
ALTERNATIVES	HFRX Global HF	1.8%	-1.3	low
	Avg PE Fund	11.5%	-1.1	low
KURTOSIS	ZCF 1% left (vs -2.33 for normal curve)	-2.55	0.4	medium
CORRELATION	Average market correlation with euro equities	17%	-1.3	low

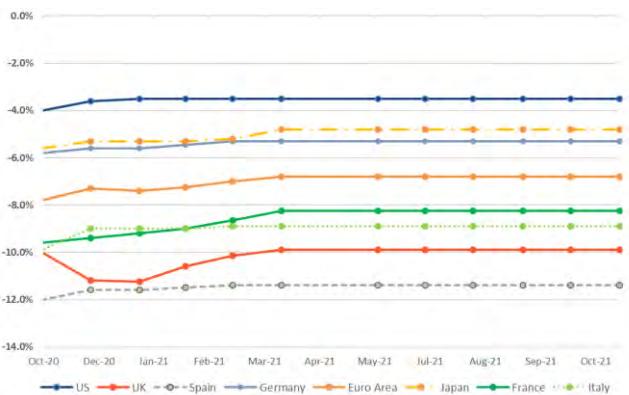
Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows the "z-score" of the volatility of each market, i.e. how many standard deviations above (or below) the mean over the last 12 months each market's volatility is.

Key News

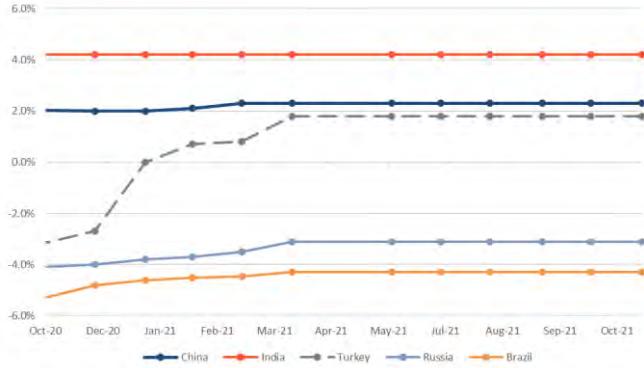
Major Volatility-Driving Events

- The CEO of Close Brothers asset management, Martin Andrew, has announced this week that he will be stepping down from his role after thirteen years at the firm's helm.
- Oil prices took another dive to six-week lows as the United States, and China joined forces to release reserves. The world's two largest economies are collaborating to slow down the global rise in prices.
- The UK economy has been gripped by a combination of soaring Inflation and tax hikes. Inflation has accelerated to its fastest pace in over a decade, climbing to a remarkable 4.2% in October. A general increase in prices would threaten the willingness of brits to spend, the last thing needed while we enter the usually busy festive buying period.
- After a failed attempt to merge with Aon earlier this year, Willis Towers Watson has re-shuffled their board and have appointed four new directors to help them move forward independently.
- Leaf Mobile, Canada's largest video game developer, is eyeing out a £130m dual listing on the London stock exchange. The Chief executive has stated that the reason behind the move has been urged by the deep investor interest in the mobile gaming business.
- Shell has officially moved its headquarters to the UK from Hague, following a lengthy tax dispute and activist pressure. The Energy giant has dropped its dual share structure, which it has used since 2005 and are ditching their royal designation and will, moving forward, be known as simply 'Shell'.
- The EU and Britain are locked in a heated discussion and risk starting a trade war as talks over Northern Ireland have intensified and reached a pivotal point.
- Amazon, the retail conglomerate, has officially announced it will stop accepting credit card transactions from the 19th of January. The high credit card transaction fees spurred on the reasoning behind the decision, but visa debit cards will still be accepted.

GDP ESTIMATES FOR 2021, DEVELOPED COUNTRIES



GDP ESTIMATES FOR 2021, DEVELOPING COUNTRIES



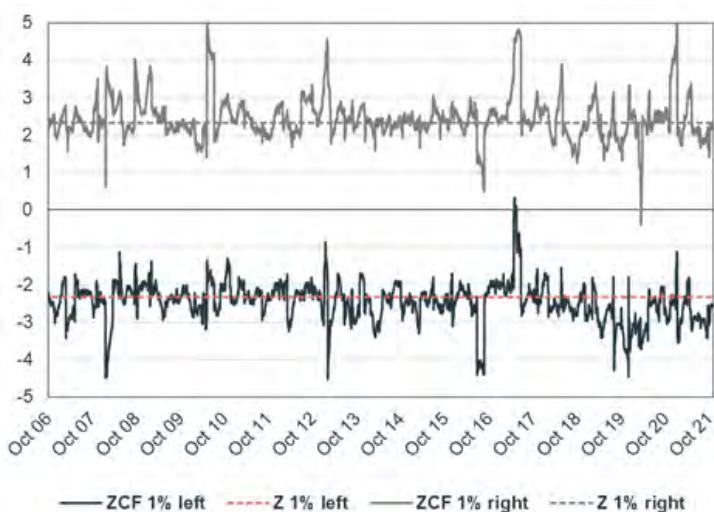
Kurtosis

Correlation in the equity markets

Kurtosis (against normal +/- 2.33)

The distribution of risks in European equity market displays denormalization on the left side with the ZCF 1% left at -2.55 and the right ZCF 1% at +2.2 (both as of 29th of November).

Cornish-Fischer expansion of Eurostoxx50 (60 days)



Methodology

To capture a measure of both Skewness and Kurtosis we look at the Cornish-Fischer expansion, which gives a good measure of the tails of the equity market. (We use a 60-calendar day rolling basis). The underlying market we plot is the Euro Stoxx 50, but other equity markets normally show very similar results.

We plot on the chart the expected Z-scores for 1% left tail (i.e., a 99% VaR) and a 1% right tail assuming a normal distribution: +/-2.33.

We also show the Cornish-Fischer expansion result for the same market. This indicates how far from a normal distribution each tail was.

On a long-term basis, on average, the tails are slightly fatter than the normal distribution would suggest, which should not come as a surprise. What is perhaps more surprising is how much variation in fat-tailedness there has been: a daily 99% VaR has varied between -1 and -4.5 standard deviations over time.

Inter-market correlations with EU equities

 **16.8%** AVERAGE CORRELATION

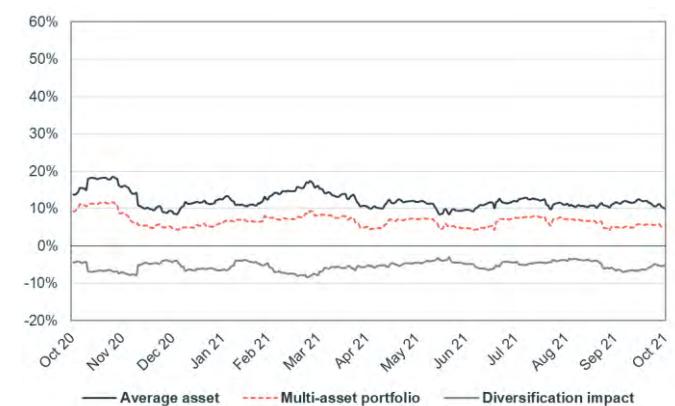
Inter-market correlations (with EU equities)



Correlation with euro equities increased during last month, leading our average correlation indicator to go up from 14.9% to 16.8% (low).

 **10.01%** AVERAGE VOLATILITIES

Multi-asset portfolio volatility



We also look at a hypothetical multi-asset portfolio consisting of equities, bonds, gold, oil, and hedge funds.

The average asset volatility decreased, moving from 11.41% to 10.01%, while the benefit of multi-asset diversification decreased, moving from 6.3% to 5.1%.

In combination, multi-asset portfolio volatility decreased from 5.1% to 4.9%.

 **4.9%** PORTFOLIO VOLATILITY

Note: The chart shows 30-day correlation over time between different markets and the pan-Euro equity market. Higher levels of correlation will in general lead to less ability to diversify risks, and higher portfolio volatility for given position holding volatility.

Equities

Stock price

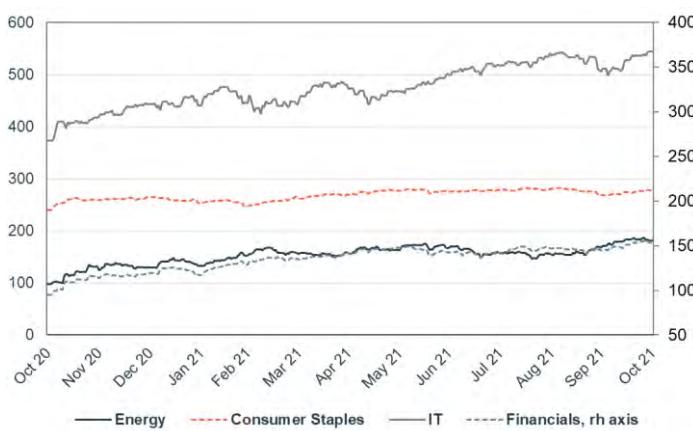
STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)



Equity region price movements were mixed. North America gained +6.9%, Asia ex-Japan gained +1.1%, Europe gained +3.6%, Japan (Nikkei) lost -1.9%.

+3.6%
Europe

STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)



Equity price sector results were all upward. Energy gained +7.9%, Consumer Staples gained +3.3%, Financials gained +6.1%, IT gained +7.5%.

+6.1%
FINANCIALS

+7.5% IT

+7.9%
ENERGY

+3.3%
CONSUMER
STAPLES

Equities Volatility

EQUITY VOLATILITY: REGIONS



9.8% EUROPE

Region's volatility results were also mixed. North America fell from 12.5% to 11.0% (medium down to low), Asia ex-Japan rose from 12.1% to 12.4% (low), Europe fell from 12.8% to 9.8% (medium down to low), Japan (Nikkei) rose from 18.3% to 19.6% (high).

EQUITY VOLATILITY: SECTORS



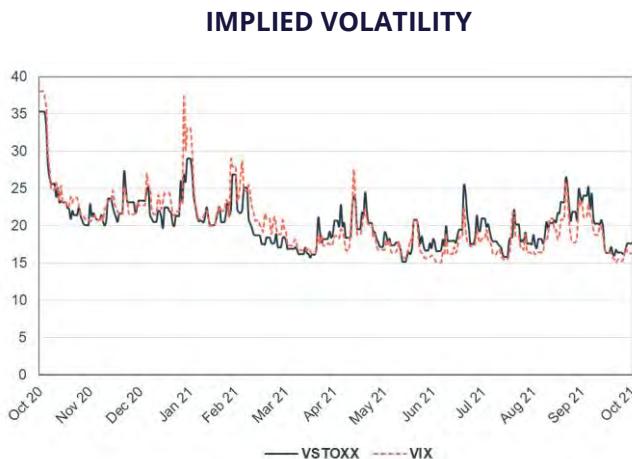
Volatility results were all downward. Energy fell from 25.2% to 18.1% (medium down to low), Consumer Staples fell from 8.3% to 7.0% (medium down to low), Financials fell from 15.4% to 11.6% (medium down to low), IT fell from 15.8% to 15.1% (medium down to low).

Equity Implied Volatility

Market-Implied Near Term Outlook

Implied Volatility

Implied volatility decreased from period end to period end since September in both observed markets. VIX fell from 23.1 to 16.3 (high down to low), VSTOXX fell from 23.2 to 17.6 (high down to low).



16.3% VIX

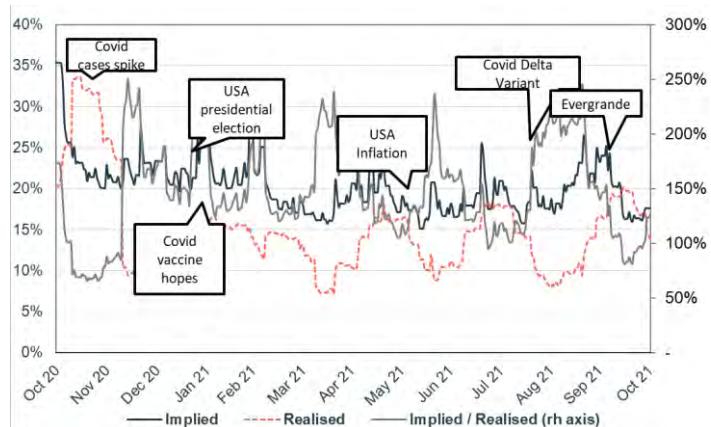
17.6% VSTOXX

Implied vs Realised Volatility

The realised volatility (of the Euro Stoxx 50 index over 30 days) decreased from 16.6% to 13.9% bringing the ratio of implied/realised volatility to move down from 140% to 127%.

This ratio is suggesting that the market is still anticipating future volatility to be higher than current.

IMPLIED VS. REALISED VOLATILITY



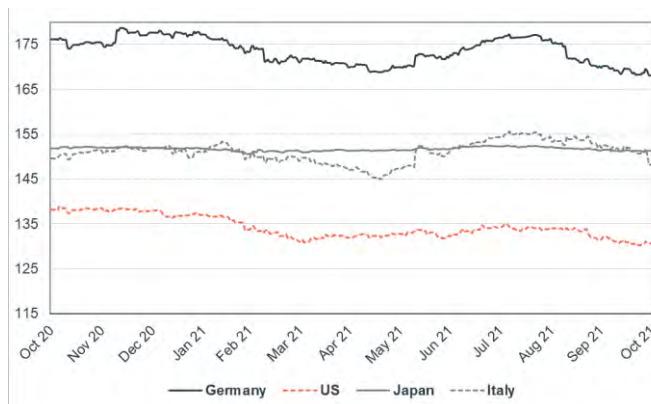
127% IMPLIED/REALISED VOLATILITY

Note: Note: the implied/realised volatility ratio gives an indication as to whether the market sees an event in the next 30 days (the implied volatility period) which will increase realised volatility (implied/realised >100%, e.g. within 30 days prior to the Greek elections during the Greek crisis) or a period of relative calm after high realised volatility (implied/realised <100%, e.g. immediately after Draghi's "whatever it takes" comments).

Fixed Income

10-Year Government Bond Futures

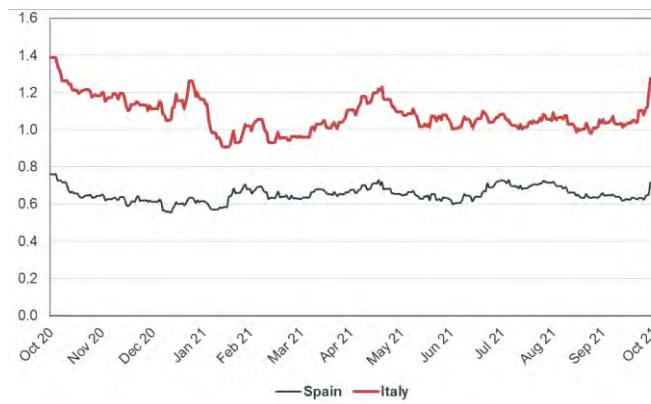
PRICES OF 10Y BOND FUTURES



Prices

Government bond prices movements were all downwards. Germany lost -1.0%, US lost -0.7%, Japan lost 0.033%, Italy lost -2.4%.

10 YEAR BOND SPREADS OVER GERMANY, %



Italian spreads over Germany increased from 1.06% to 1.28%, while the Spanish spreads against Germany increased from 0.66% to 0.71%.

VOLATILITY OF 10Y BOND FUTURES



Volatility results were mixed. Germany rose from 3.7% to 4.3% (high), US fell from 3.8% to 3.7% (high down to medium), Japan rose from 1.0% to 1.1% (medium), Italy fell from 5.4% to 5.3% (high).

Foreign Exchange

Prices

Euro results were mixed. Euro lost 0.1% against the US Dollar, Euro gained 2.2% against the Japanese Yen, Euro lost 2.1% against the Swiss Franc, Euro lost 1.7% against the British Pound.

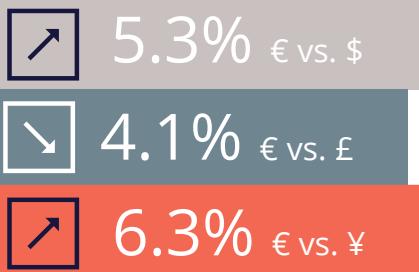
FX RATES VS. €



Volatility

FX volatility moves were also mixed. €/\$ rose from 3.6% to 5.3% (low up to medium), €/Yen rose from 5.0% to 6.3% (medium up to high), €/CHF fell from 4.1% to 3.6% (high down to medium), €/£ fell from 5.9% to 4.1% (medium down to low).

VOLATILITY OF FX RATES VS. €



Note: The charts show currencies vs. the €. Axes on the first chart are inverted to show conventional currency quotations, but with higher on the chart representing a stronger currency vs. the euro.

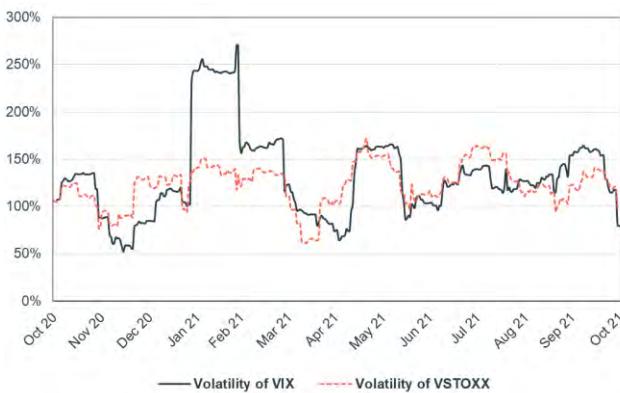
(Equity) Options

Option volatility is mainly driven by the volatility of volatility and moves in prices of the underlying instruments affecting options' deltas.

Implied volatility

Volatility of implied volatility decreased in both US and Europe. Volatility of VSTOXX fell from 123.1% to 98.1% (medium down to low), and the Volatility of VIX fell from 154.0% to 78.8% (high down to low).

VOLATILITY OF VOLATILITY



78.8%

US

98.1%

EUROPE

Major (Regional Equity) price moves

Regions price movements were mixed. North America gained +6.9%, Asia ex-Japan gained +1.1%, Europe gained +3.6%, Japan (Nikkei) lost -1.9%.

CHANGE IN PRICES OF EQUITY INDICES, 30 DAYS



Note on Treatment: Options show more complex behaviour than the other instruments we look at in this report, so we make some simplifying assumptions. As Calls and Puts are in effect polar opposites and in and out of the money options behave very differently, it is hard to generalise all options' behaviour. However, we look at the two key drivers: volatility of implied volatility and major price movements of the underlying security.

Implied volatility (via an option's Vega) drives option prices, so a big indicator of option price volatility is the "volatility of implied volatility".

But usually the biggest driver of individual option prices is the movement of the underlying (via the option Delta): a move in either direction will cause the option to go more in or out of the money (and a corresponding change in the option's Delta and price volatility). As a proxy for this, we look at the 30-day price swing of equity market indices; options on bonds or FX could of course behave differently. The 30-day period is relatively close to the time to maturity of many options. Calls and Puts will respond in opposite fashions: calls becoming more volatile (relative to the size of the underlying notional) as prices rise.

Note on Convertibles: Convertibles are in effect a combination of a bond and a call option, with the bond portion usually making little contribution to the instrument volatility unless the option is significantly out of the money. As such, convertible portfolios' volatilities will tend to behave similarly to call option portfolios, and this commentary can be applied to convertibles as well as options.

Commodities

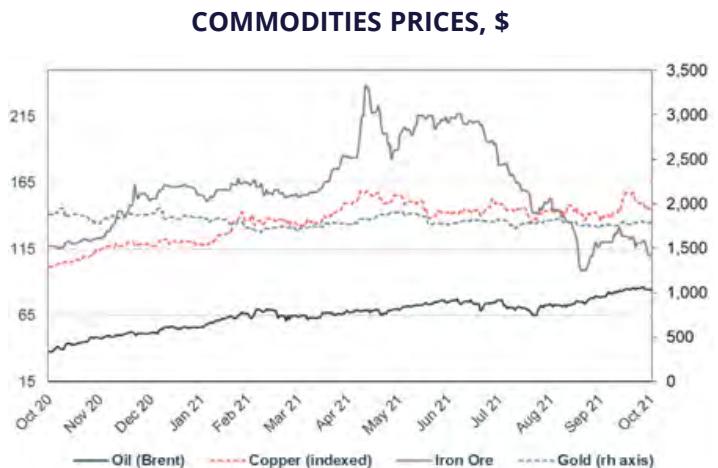
+ 7.5% OIL

+ 1.6% GOLD

+ 6.8% COPPER

Prices

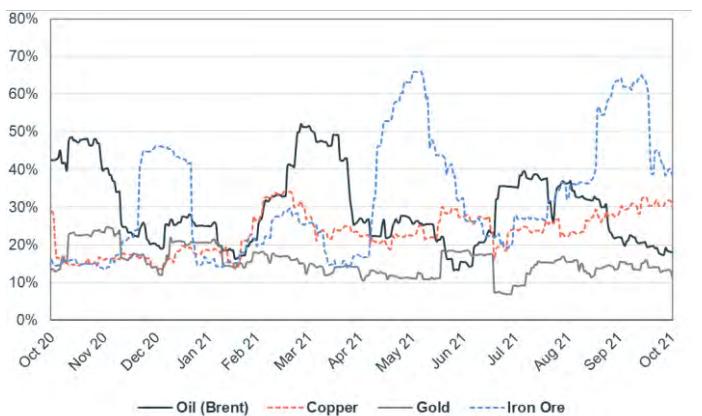
Commodities price movements were mixed during October. Oil (Brent) gained +7.5%, Gold gained +1.6%, Copper gained +6.8%, Iron Ore lost -8.4%.



Volatility

Volatility movements for Commodities were also mixed. On this regard we have that Oil (Brent) fell from 21.9% to 18.0% (low), Gold fell from 15.5% to 11.3% (medium down to low), Copper rose from 28.9% to 30.0% (high), Iron Ore fell from 64.2% to 38.4% (high down to medium).

COMMODITIES VOLATILITY



Note: all prices refer to near futures rather than spot with the exception of iron ore which is a spot price.

Real Estate and Alternatives

(Real Estate Share Prices)

REAL ESTATE (REIT) PRICES



Real Estate prices movements were mixed. US gained +7.7%, Europe gained +5.5%, Japan lost -0.4%.

+ 5.5% **EUROPE**

+ 7.7% **US**

- 0.4% **JAPAN**

REAL ESTATE (REIT) VOLATILITY



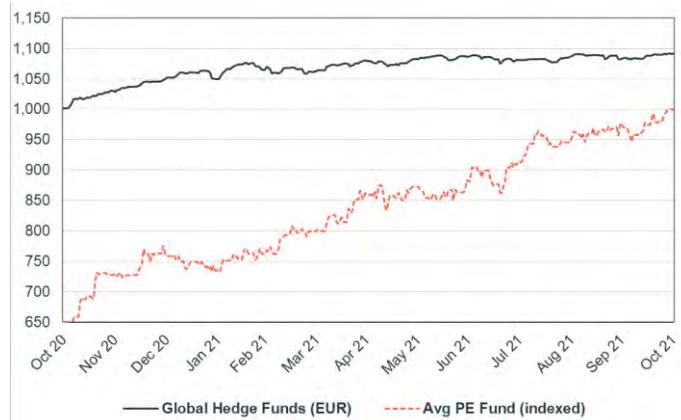
Volatility moves were mixed. US fell from 15.3% to 13.3% (low), Europe fell from 18.3% to 14.0% (high down to medium), Japan rose from 12.7% to 14.0% (low up to medium).

Note: Note that for property we look at indices of the share prices of REITs, and not the underlying property directly, for which little real-time data is available. This is usually consistent with funds which tend to invest in property indirectly, e.g. via REITs or property companies.

As REITs are usually focused on commercial property, residential property may also follow a slightly different pattern to that discussed in this article.

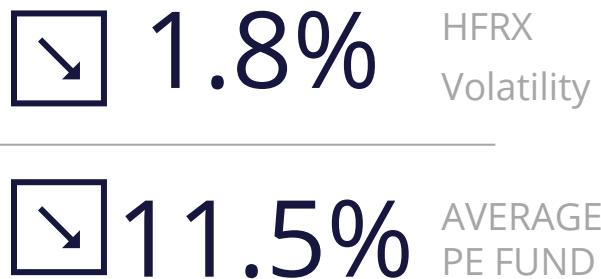
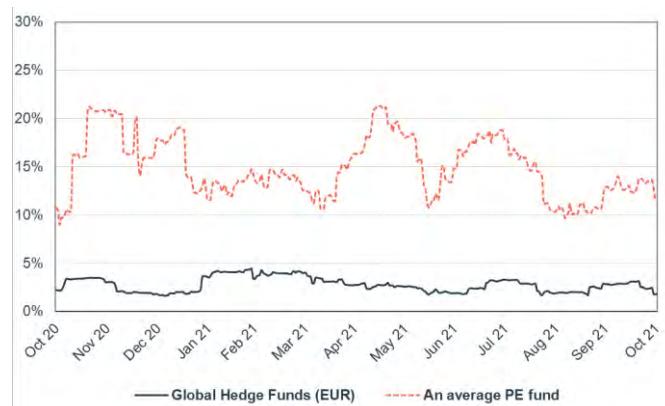
Alternatives

ALTERNATIVES PRICES



The average hedge fund gained +0.8%, and the average PE fund +3.1%

AI VOLATILITY



Volatility results for Alternative Investments decreased. We have that the average hedge fund fell from 2.8% to 1.8% (medium down to low), and the average PE fund fell from 12.9% to 11.5% (low).

Definitions

To avoid repetitions, the term volatility refers to annualised, 30-day average realised volatility in local currency unless otherwise specified. As such, it may be lower than, and lag, shorter-term market volatility in times of high market volatility.

Charts show data up to 31st October 2021, and news and events are included up to that date. The commentary was written on or before November 10th, 2021.

Disclaimer

The commentary does not constitute, and is not intended to constitute, investment advice.

Any views expressed in this report are based on historical market data and as such cannot be interpreted as being forward-looking, or to constitute forecasts. Past movements are not necessarily indicative of future movements.

Employees of Arkus FS may hold positions in securities mentioned.

All expressions of opinion reflect the judgment of ARKUS FS at this date and are subject to change. Information has been obtained from sources considered reliable, but we do not guarantee that the report is accurate or complete.

This document is not for US clients or distribution to the US.



Luxembourg Office (HQ)

Societe Anonyme
6B Route de Treves L-2633
Senningerberg
Luxembourg

T +352 42 26 11 111 F +352 42 26 399

info@arkus-fs.com

London Office

150 Minories
London
EC3N 1LS

T +44 (0) 207 264 2027

www.arkus-fs.com



© Arkus Financial Services - 2021

This document is the property of IRML/Arkus FS and should not be copied or distributed to any third party without the prior consent of IRML/Arkus FS – please contact us regarding distribution rights.

