



**AR
KUS**

RISK BASED
GOVERNANCE

MARKET VOLATILITY RISK NEWSLETTER – October 2020

Swing Back

Member of the Profidata Group

Executive Summary

- With the exception of Japan (Nikkei), all observed market volatilities increased during the last month. Region volatility spanned a range that goes from 12.6% (Japan-Nikkei-) to 24.4% (US), with Japan changing from medium to low volatility regime, and all other observed markets settling in the medium regime.
- Realized volatility (of the Euro Stoxx 50 index over 30 days) increased from 16.9% to 21.9%.
- All observed equity markets decreased in prices during the last month. Sector volatilities spanned a range that goes from 13.4% (Consumer Staples) to 33.5% (IT), with all sectors migrating from low to medium volatility regime.
- Sovereign bond price movements were mixed. We have that on the negative side (increase in yield) we have Germany with -0.6%, and on the other side of the price spectrum we have US with +0.1%. Volatility moves were mixed. Volatility regimes spanned a range between 0.8% and 4.7%, with all markets settling in the low regime.
- The EUR closed the month appreciating against the Swiss Franc (+0.2%) and the British Pound (+1.7%). Regarding all the other currency pairs we have that the Euro lost -1.9% against the US Dollar, and -2.1% against the Japanese Yen. FX volatility results were mixed. FX Volatility ended ranging between 3.9% and 9.5%, with all pairs settling in medium regime.
- Options' implied volatility results were mixed, with the VIX remaining from 26.4 (medium), and the VSTOXX declining from 26.7 to 26.1 (medium)
- Commodities' price all moved downwards, with the Oil (Brent) losing the most with -9.6%, Gold -4.2%, Copper -0.3%, and Iron Ore -6.3%. Volatility changes were mixed. It spanned a range between 14.4% to 36.9%, with the Oil Brent experiencing the biggest increase moving from 18.6% to 36.9%.
- Real Estate (equity) prices dropped in all observed markets, with the US decreasing -3.6%, Europe -1.8%, and Japan -1.9%. Volatility moves were mixed, ranging from 14.4% (Japan) to 27.5% (USA).
- The average PE Funds lost a marginal -0.2%, while the average Hedge Fund dropped -0.4%. Volatility for the average hedge fund increased from 1.8% to 2.9%, while the average PE fund ramped from 11% to 14.9%.

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

The virus is spreading again in most countries and seems to be out of control in some regions of the world. While political leaders unanimously aim to circumvent a second lockdown to avoid further damage for the economy, they still have to tighten strings by reinstating corona restrictions as people get more and more careless about the virus.

Given this and upcoming US elections, Brexit limbo and rising tensions between the EU and Russia it is not surprising that equity markets took a timeout from their rally and were slightly down this month.

On the Fixed Income side, the pursuit for return has driven yields to ever lower regions also for countries that already pre-corona were displaying suspiciously high debt levels in combination with weak economic data. If, and when the crisis will strike through to bank books through rising default rates is still unclear, warning voices are becoming more and more numerous. The sunny days may well be over, better get your raincoats on.

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	24.4%	0.0	medium
	Asia ex-Japan	14.4%	-0.4	medium
	Europe	18.5%	-0.2	medium
	Japan (Nikkei)	12.6%	-0.7	low
	Energy	24.5%	-0.4	medium
	Consumer Staples	13.4%	-0.2	medium
	Financials	19.0%	-0.3	medium
	IT	33.5%	0.3	medium
VOLATILITY OF VOLATILITY	Volatility of VIX	127%	-0.1	medium
	Volatility of VSTOXX	139%	0.1	medium
GOVERNMENT BONDS	Germany	3.6%	-1.2	low
	US	2.4%	-1.3	low
	Japan	0.8%	-1.6	low
	Italy	4.7%	-0.8	low
FX VS \$	€/\$	5.4%	-0.3	medium
	€/Yen	6.5%	-0.2	medium
	€/CHF	3.9%	0.1	medium
	€/£	9.5%	0.4	medium
COMMODITIES	Oil (Brent)	36.9%	-0.4	medium
	Gold	15.4%	-0.2	medium
	Copper	22.3%	0.3	medium
	Iron Ore	14.4%	-0.7	low
PROPERTY	US	27.5%	-0.2	medium
	Europe	23.2%	0.0	medium
	Japan	14.4%	-0.4	medium
ALTERNATIVES	HFRX Global HF	2.8%	-0.2	medium
	Avg PE Fund	14.9%	-0.1	medium
KURTOSIS	ZCF 1% left (vs -2.33 for normal curve)	-2.61	0.7	low
CORRELATION	Average market correlation with euro equities	24%	-0.7	low

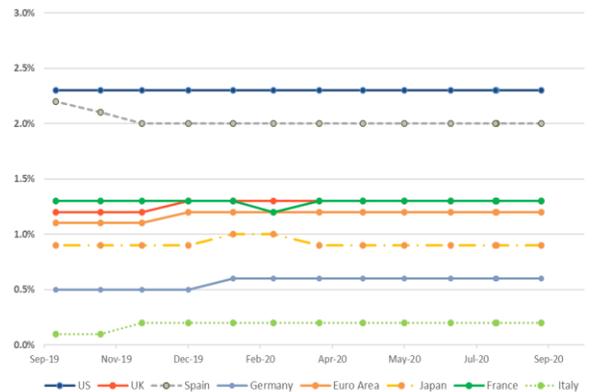
Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows 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

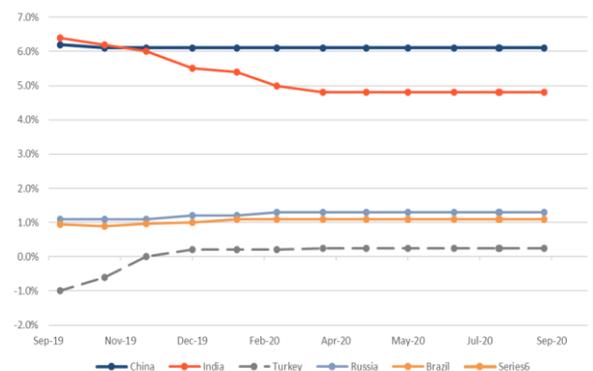
Major Volatility-Driving Events

- ▶ The FED confirmed a paradigm shift towards long lasting low interest rate politic to provide prolonged support for the US economy. Rates near zero expected for the next couple of years. FED Chair Jerome Powell said policy would only change until recovery was confirmed.
- ▶ UK's prime minister Boris Johnson raises pressure on EU as time runs out for deal negotiations as there is still not much progress in the exit negotiations.
- ▶ US election rallies intensify between Joe Biden and Donald Trump. The current US president was slightly losing ground as he joined the list of state leaders that have contracted corona virus and was partially disrespecting general precautionary rules.
- ▶ Cloud based data service provider Snowflake goes public as the biggest IPO in the US this year. Valuations soared to above \$ 32bn in fulminant stock market debut.
- ▶ UK-based Chip designer ARM Holdings is being acquired by Nvidia for \$ 40bn from Softbank, who had bought the company four years ago for \$ 32bn. Headquarters are supposed to remain in Cambridge, UK.
- ▶ Spanish and Italian Sovereign bonds yields are approaching ATLS, despite growing concerns about the economic recovery, political instability and new records of corona infections.
- ▶ The EU is planning to impose new sanctions on Russia after the poisoning of opposition leader Alexei Navalny.
- ▶ The conflict between Armenia and Azerbaijan over the Nagorno-Karabakh region escalated in heavy fighting. While international politicians (including Russia's Vladimir Putin) have called for a ceasefire both countries blame each other for the escalation.

GDP ESTIMATES FOR 2020, DEVELOPED COUNTRIES



GDP ESTIMATES FOR 2020, DEVELOPING COUNTRIES



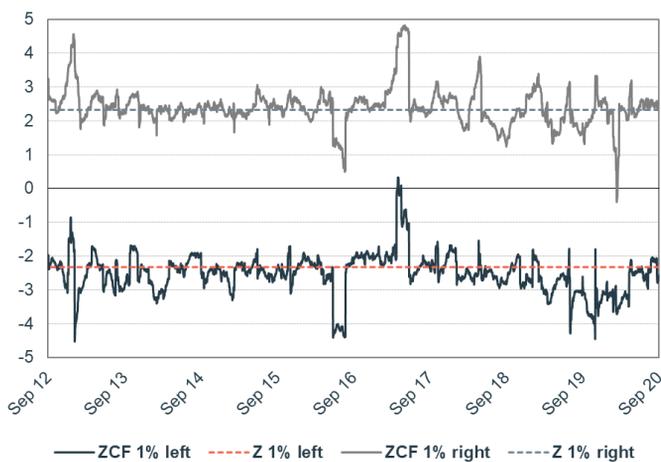
Kurtosis

Correlation in the equity markets

Kurtosis (against normal +/- 2.33)

The distribution of risks in European equity market displays denormalization with the ZCF 1% left at -2.61 and the right ZCF 1% at +2.63 (both as of 30th of September).

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.

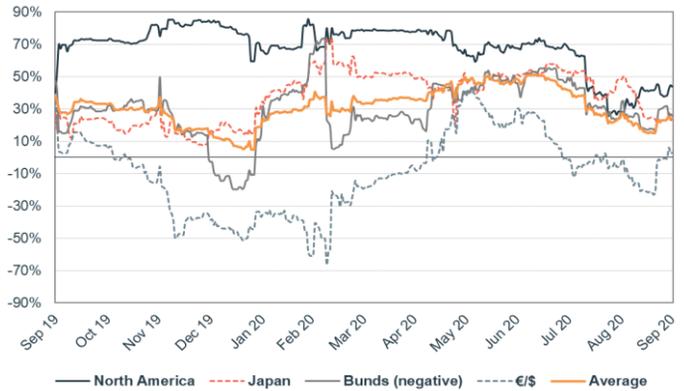
On a long-term basis, on average, the tails are slightly fatter than the normal distribution would suggest, which should not come as a surprise. What is perhaps more surprising is how much variation in fat-tailedness there has been: a daily 99% VaR has varied between -1 and -4.5 standard deviations over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

Inter-market correlations with EU equities



24% AVERAGE
CORRELATION

Inter-market correlations (with EU equities)



Correlation decreased during September, leading our average correlation indicator to change from 27.1% to 24%.

Multi-asset portfolio volatility



14.5% AVERAGE
VOLATILITIES



8.9% PORTFOLIO
VOLATILITY

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

The average asset volatility increased considerably, moving from 11.5% to 14.5%, while the benefit of multi-asset diversification increased from 5% to 5.7%.

In combination, multi-asset portfolio volatility increased from 6.6% to 8.9%.

***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

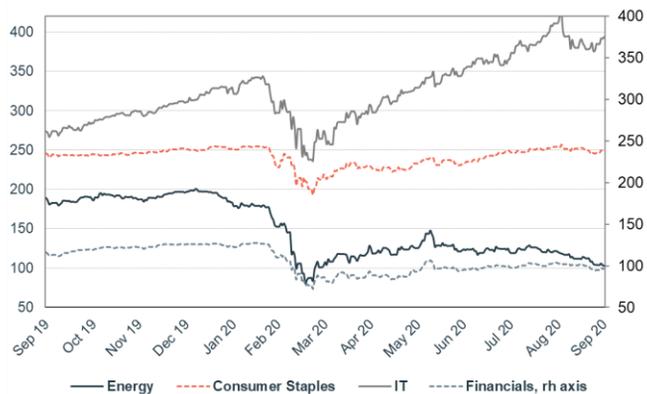
STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)



All equity regions, with the exception of Japan(Nikkei), decreased in price during September. North America lost -3.9%, Asia ex-Japan lost -2.0%, Europe lost -1.0%, and Japan (Nikkei) gained +0.2%

-1.0%
Europe

STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)



All equity sectors closed the month losing price momentum. We have that Energy was again severely punished by market participants losing -14.2%, Consumer Staples lost -1.4%, Financials lost -5.8%, and IT lost -4.6%.

-5.8%
FINANCIALS

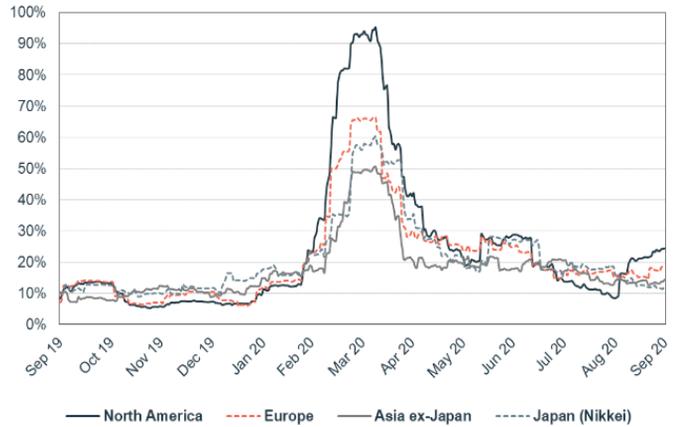
-4.6%
IT

-14.2%
ENERGY

-1.4%
CONSUMER
STAPLES

Equities Volatility

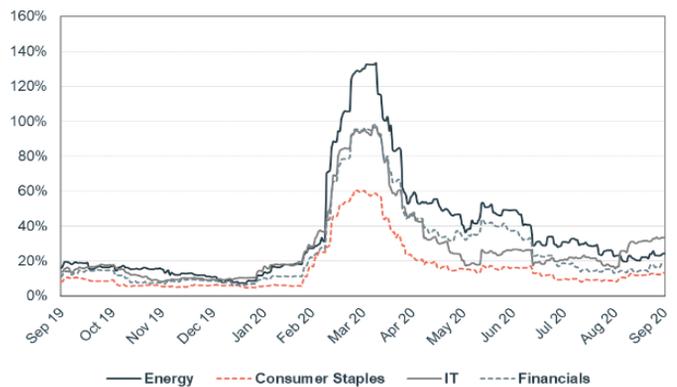
EQUITY VOLATILITY: REGIONS



With the exception of Japan, volatility changes were upwards trending. North America rose from 8.4% to 24.4% (low up to medium), Asia ex-Japan rose from 13.9% to 14.4% (medium), Europe rose from 15.1% to 18.5% (medium), Japan (Nikkei) fell from 15.8% to 12.6% (medium down to low). **Equity volatility: regions**

18.5% EUROPE

EQUITY VOLATILITY: SECTORS



All sectors volatility increased during the last month, with all sectors moving back to medium regime (from low).

Energy rose from 23.2% to 24.5% (low up to medium), Consumer Staples rose from 8.2% to 13.4% (low up to medium), Financials rose from 13.7% to 19.0% (low up to medium), IT rose from 15.8% to 33.5% (low up to medium)

Equity volatility: sectors

Equity Implied Volatility

Market-Implied Near Term Outlook

Implied Volatility

Implied volatility in the US remained unchanged, while the volatility in Euro zone increased marginally. VIX stayed almost steady at 26.4 (medium), while the VSTOXX fell from 26.7 to 26.1 (medium)

IMPLIED VOLATILITY



26.4% VIX

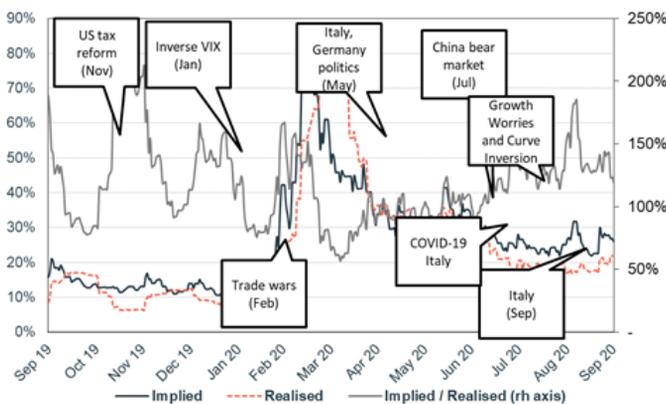
26.1% VSTOXX

Implied vs Realised Volatility

(European equity) implied volatility increased slightly. The realised volatility (of the Euro Stoxx 50 index over 30 days) was 21.9% (medium) bringing the ratio of implied/realised volatility to move down from 156% to 119%.

This ratio is suggesting that the market is currently anticipating future volatility to still be higher than current, but not as high as it was anticipating in the previous month.

IMPLIED VS. REALISED VOLATILITY



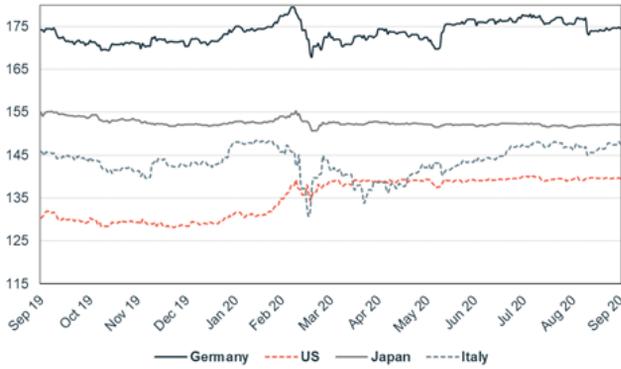
119% IMPLIED/REALISED VOLATILITY

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 calming "whatever it takes" comments).

Fixed Income

10-Year Government Bond Futures

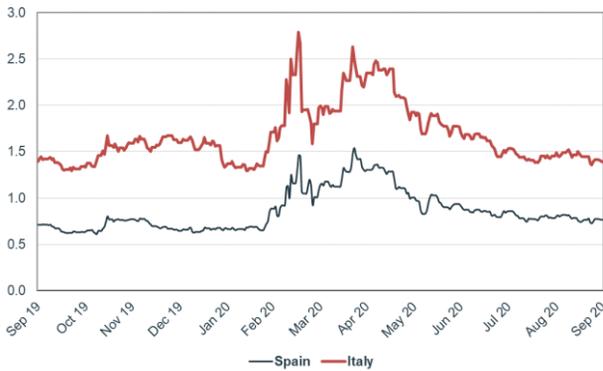
PRICES OF 10Y BOND FUTURES



Prices

Government bond prices movements were mixed. Germany lost -0.6%, US gained +0.1%, Japan gained +0.3%, and Italy gained +0.9%.

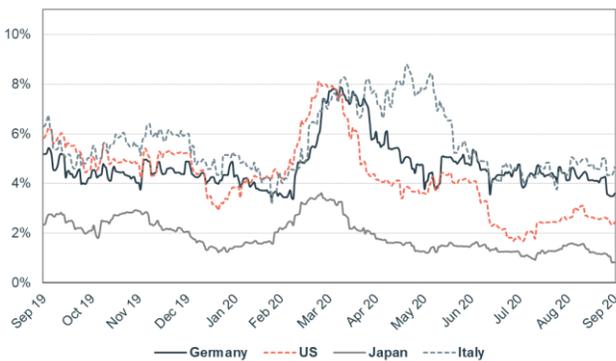
10 YEAR BOND SPREADS OVER GERMANY, %



Italian spreads over Germany decreased to 1.39%, and the

Spanish spreads against Germany decreased to 0.77%.

VOLATILITY OF 10Y BOND FUTURES



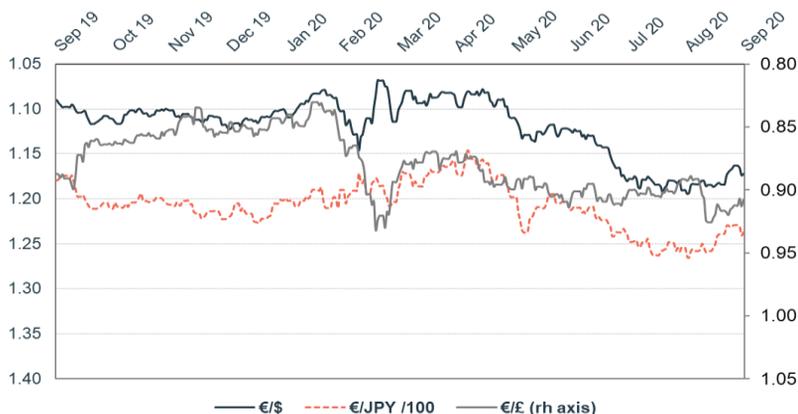
Volatility moves were mostly downwards, and all observed market settled in the low volatility regime. Germany fell from 4.1% to 3.6% (low), US fell from 2.6% to 2.4% (low), Japan fell from 1.5% to 0.8% (low), Italy rose from 4.4% to 4.7% (low).

Foreign Exchange

Prices

Euro results against other currencies were mixed. Euro gained +1.4% against the US Dollar, Euro gained +1.3% against the Japanese Yen, Euro gained 0.2% against the Swiss Franc, and finally Euro lost 0.8% against the British Pound.

FX RATES VS. €



Volatility

FX volatility moves were mixed. €/€ fell from 6.4% to 5.4% (medium), €/Yen rose from 6.3% to 6.5% (medium), €/CHF fell from 4.6% to 3.9% (high down to medium), €/£ rose from 4.5% to 9.5% (low up to medium)

VOLATILITY OF FX RATES VS. €



5.4% € vs. \$

9.5% € vs. £

6.5% € 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 increased in both US, and Europe markets. Volatility of VSTOXX rose from 73.7% to 138.8% (low up to medium) Volatility of VIX rose from 77.6% to 127.2% (low up to medium),

VOLATILITY OF VOLATILITY



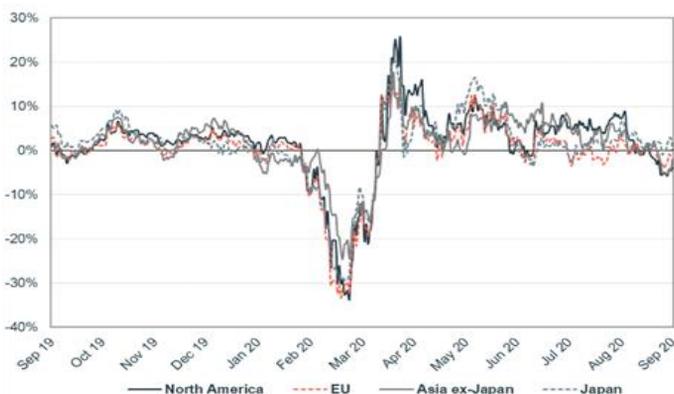
127.2% US

138.8% EUROPE

Major (Regional Equity) price moves

Price movements were mixed, with US losing the most, and only Japan (Nikkei) making a discrete price increase. We have that North America lost -3.9%, Asia ex-Japan lost -2.0%, Europe lost -1.0%, Japan (Nikkei) gained +0.2%

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

Prices

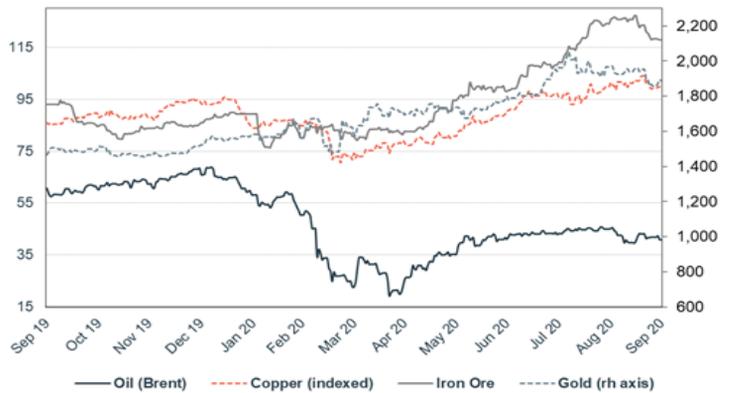
Commodity prices suffered a draw back during the last month, with again Oil Brent being the most punished. In this regard, we have that Oil (Brent) lost -9.6%, Gold lost -4.2%, Copper lost -0.3%, and finally Iron Ore lost -6.3%

-9.6% OIL

-4.2% GOLD

-0.3% COPPER

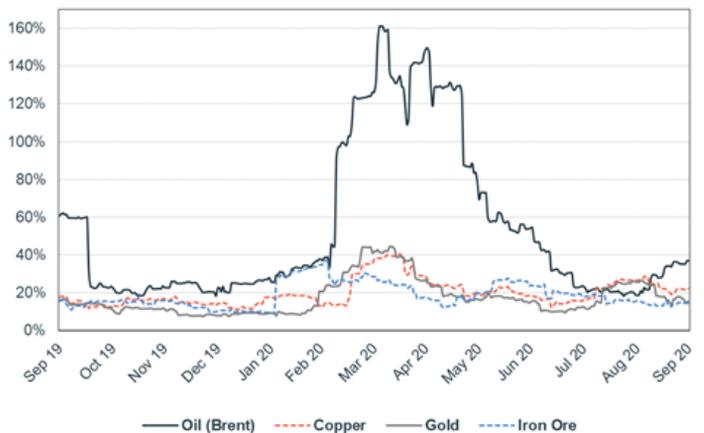
COMMODITIES PRICES, \$



Volatility

Volatility movements were mixed during September. With Oil (Brent) volatility almost doubling and moving from 18.6% to 36.9% (low up to medium), Gold fell from 25.8% to 15.4% (high down to medium), Copper fell from 26.5% to 22.3% (high down to medium), and Iron Ore fell from 15.3% to 14.4% (low) Commodities volatility

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



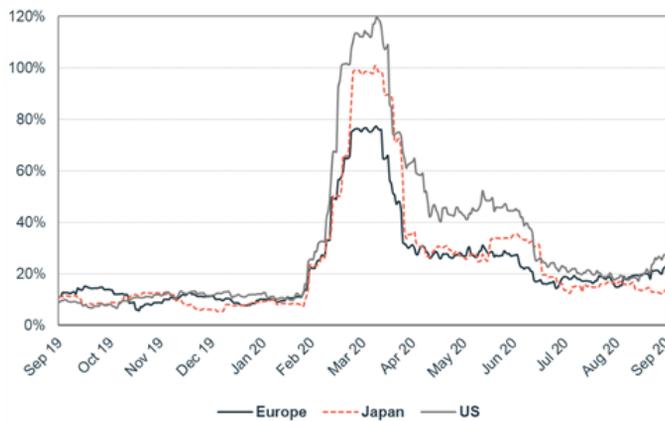
- 1.8% EUROPE

- 3.6% US

- 1.9% JAPAN

Real estate regional prices movements were all downwards. We have that US lost -3.6%, Europe lost -1.8%, Japan lost -1.9% Real estate (REIT) prices.

REAL ESTATE (REIT) VOLATILITY



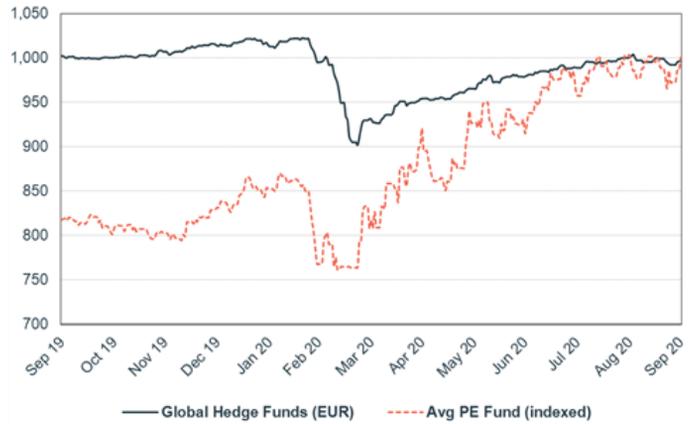
Volatility moves were mixed, and the volatility spanned a range that goes from 14.4% to 27.5%. We have that US rose from 18.3% to 27.5% (low up to medium), Europe rose from 18.8% to 23.2% (medium), and Japan fell from 15.7% to 14.4% (medium)

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.

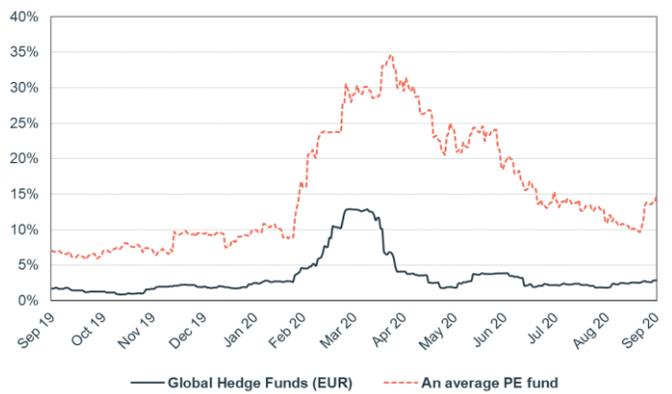
Alternatives

ALTERNATIVES PRICES



The average hedge fund lost -0.4%, and the average PE fund lost -0.2%

AI VOLATILITY



Volatility movements were upward. The results show that the average hedge fund rose from 1.8% to 2.8% (low up to medium), And the average PE fund rose from 11.0% to 14.9% (low up to medium).



2.8% HFRX
Volatility



14.9% AVERAGE
PE FUND

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 30th September 2020, and news and events are included up to that date. The commentary was written on or before October 7th, 2020.

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.

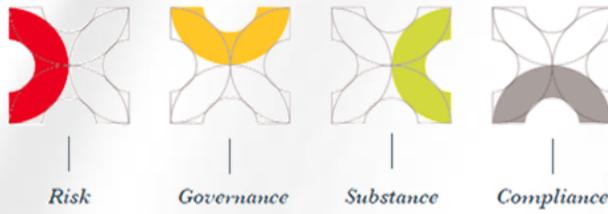
© Arkus - 2020

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

© Arkus Financial Services - 2020

Arkus is the brand under which IRML S.A. operates and provides services.

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.



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

150 Minories
London
EC3N 1LS
T +44 (0) 207 264 2027
www.arkus-fs.com

