



**AR
KUS**

RISK BASED
GOVERNANCE

MARKET VOLATILITY RISK NEWSLETTER – MAY 2021

Uncle Sam's Benevolence

Member of the Profidata Group

Executive Summary

- **Region volatility movements were all downward.** Region volatility spanned a range that goes from 9.1% (Europe) to 16.3% (Japan Nikkei), with North America and Asia ex-Japan changing from medium down to low volatility regime.
- **Realized volatility** (of the Euro Stoxx 50 index over 30 days) decreased from **13.2% to 10.4%**.
- **Equity price sector results were all upward trending**, with IT increasing the most (+5.4%). Sector **volatilities** spanned a range that goes from 7.5% (Consumer Staples) to 20.2% (Energy), with IT changing from medium down to low volatility regime.
- **Sovereign bond price movements were mixed**, with Italy losing the most (-1.5%). **Volatility** moves were all downward and spanned a range that goes from 1% (Japan) to 3.9% (Italy).
- **EUR price results were mixed**, with the EUR losing against the Swiss Franc (-0.8%) and gaining against the remaining currencies. **FX volatility results were mixed**; ended ranging between 3% (€/CHF) and 5.7% (€/£), with €/£ changing from medium down to low and €/CHF changing 2 folds down from high to low.
- **Options' implied volatility results were mixed**, with the VIX decreasing from 19.4 to 18.6 and the VSTOXX increasing from 18 to 20.6, with both observed markets remaining in the low volatility regime.
- **Commodities price changes were all upward**; with Iron Ore gaining the most (+19.4%). **Volatility changes were mixed** and spanned a range between 12.1% (Gold) to 27% (Oil Brent).
- **Real Estate (equity) prices results were mixed**, with US increasing the most (+8.1%). **Volatility moves were downward**, ranging between 11.3% (Europe) to 12.3% (US).
- **The average PE Funds** gained +8%, while the **average Hedge Fund** +1.5%. **Volatility** for the average hedge fund decreased from 4% to 2.7%, while the average PE fund increased from 14% to 14.8%.

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 15-16	p.

Summary volatility matrix and outlook

The Western World hopes for a restriction-free summer as the virus still rages relentlessly in India and other parts of the world. The vaccination race is at full speed and countries with high vaccination rates that carefully return to some form of public life breathe a sigh of relief.

A good time for the US government (itself hoarding vaccines) to discover its charitable side and suggesting to suspend patent rights for COVID vaccines, which coincidentally mostly sit with European companies.

The leading economies seem to be slowly continuing their recovery while Inflation expectations keep rising both in the US and Eurozone. This induced some pressure in fixed income markets and also equities seem to be taking a breather after their rally this year. Let's see if the summer brings sunshine or rain.

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	10.7%	-1.1	low
	Asia ex-Japan	10.4%	-1.6	low
	Europe	9.1%	-1.3	low
	Japan (Nikkei)	16.3%	-0.3	medium
	Energy	20.2%	-1.1	low
	Consumer Staples	7.5%	-1.2	low
	Financials	11.8%	-1.0	low
	IT	16.8%	-1.0	low
VOLATILITY OF VOLATILITY	Volatility of VIX	75%	-1.0	low
	Volatility of VSTOXX	106%	-0.4	medium
GOVERNMENT BONDS	Germany	2.8%	-1.4	low
	US	3.8%	0.6	high
	Japan	1.0%	-0.6	low
	Italy	3.9%	-0.9	low
FX VS \$	€/\$	5.2%	-0.9	low
	€/Yen	3.9%	-1.6	low
	€/CHF	3.0%	-0.7	low
	€/£	5.7%	-0.7	low
COMMODITIES	Oil (Brent)	27.0%	-0.5	low
	Gold	12.1%	-1.3	low
	Copper	22.3%	0.1	medium
	Iron Ore	16.8%	-0.4	low
PROPERTY	US	12.3%	-1.2	low
	Europe	11.3%	-1.3	low
	Japan	11.6%	-1.0	low
ALTERNATIVES	HFRX Global HF	2.7%	-0.1	medium
	Avg PE Fund	14.8%	-0.3	medium
KURTOSIS	ZCF 1% left (vs -2.33 for normal curve)	-2.95	-0.9	high
CORRELATION	Average market correlation with euro equities	15%	-1.7	low

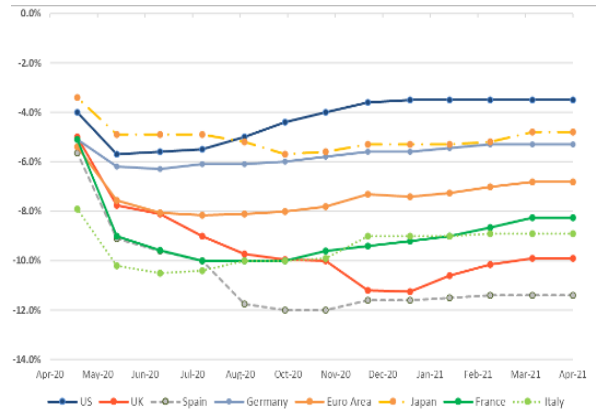
Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows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

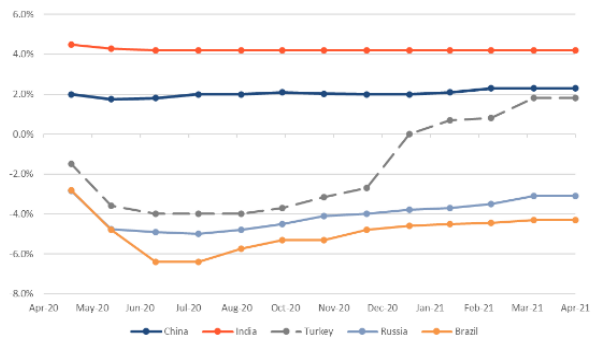
Major Volatility-Driving Events

- Clashes between Israeli police and Palestinians at the al Aqsa mosque led to an escalation of violence with the Hamas firing rockets on Israeli targets and air strikes on Gaza commanded by Israeli prime minister Benjamin Netanjahu in return.
- US pipeline operating company Colonial Pipeline was hit by a cyberattack cutting down around 50% of the pipeline network that supplies the US East Coast leading to a shortage in petrol in various state. The suspicion is that the attack was initiated by Eastern European/Russian cyber criminals.
- Tesla posts a record profit of \$438m in Q1 2021. However, delivery problems and the fact that profit was still driven by selling regulatory tax credits and Bitcoin gains cast doubt on the short-term outlook and persistence.
- Carmakers around the globe reported strong Q1 2021 results beating forecasts while being more and more exposed to the ongoing semiconductor shortage.
- Chinese food delivery company Meituan suffered a 14% loss in share price after the firms CEO Wang Xing posted an ancient poem on social media that was interpreted as criticism of Chinese government.
- In the midst of their restructurings the two largest German banks Deutsche Bank and Commerzbank report unexpectedly good results for Q1 2021.

GDP ESTIMATES FOR 2021, DEVELOPED COUNTRIES



GDP ESTIMATES FOR 2021, DEVELOPING COUNTRIES



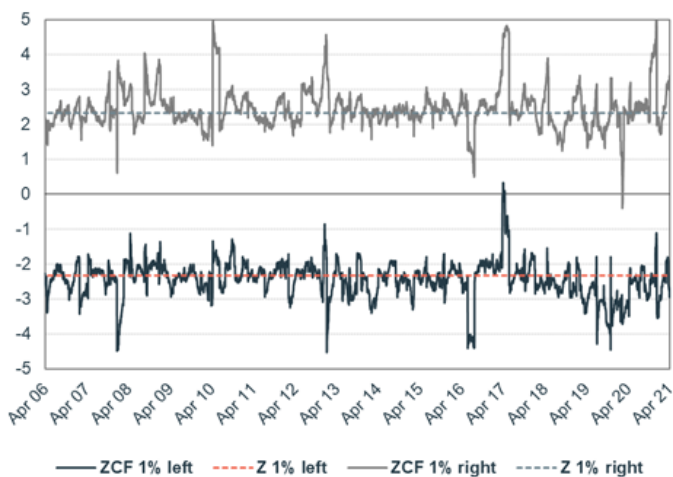
Kurtosis

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 -2.95 and the right ZCF 1% at +2.33 (both as of 30th of April).

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.

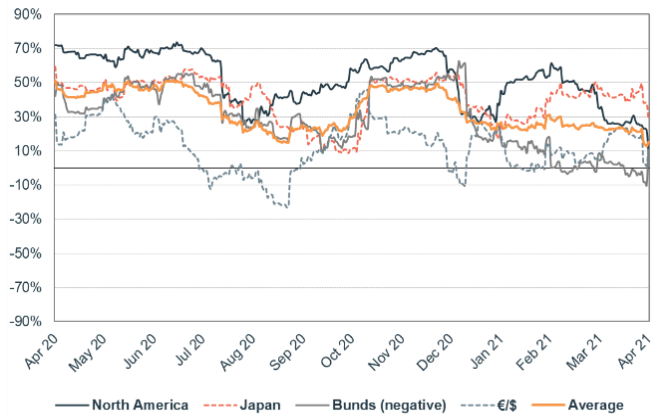
Inter-market correlations with EU equities



15.2%

AVERAGE
CORRELATION

Inter-market correlations (with EU equities)



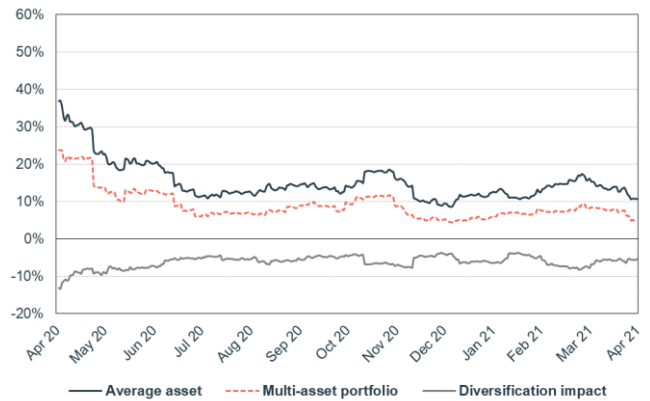
Correlation with euro equities decreased during last month, leading our average correlation indicator to change from 23.7% to 15.2% (low).



10.59%

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 16.1% to 10.59%, while the benefit of multi-asset diversification decreased, moving from 7.9% to 5.4%.

In combination, multi-asset portfolio volatility decreased from 8.2% to 5.2%.



5.2%

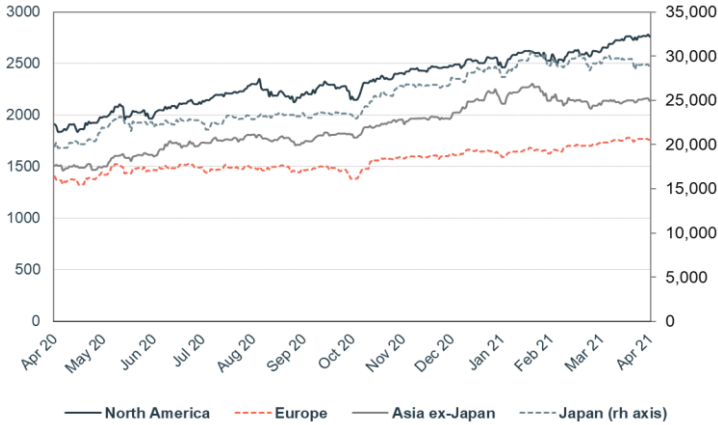
PORTFOLIO
VOLATILITY

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

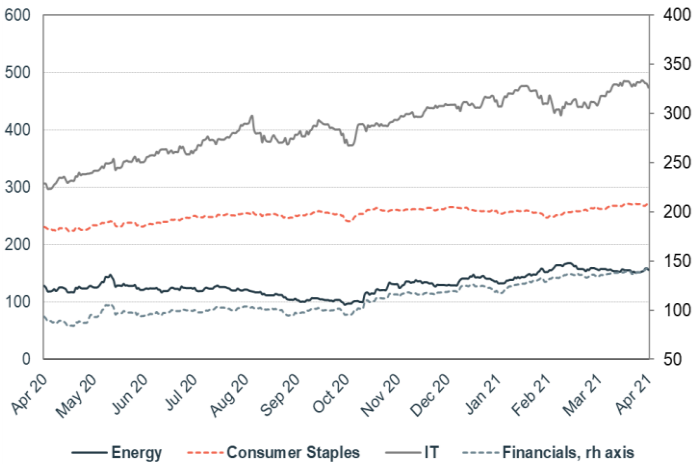
STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)



+2.0%
Europe

Equity region price movements were mixed. North America gained +5.3%, Asia ex-Japan gained +1.8%, Europe gained +2.0%, Japan (Nikkei) lost -1.3%.

STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)



+5.0%
FINANCIALS

+5.4% IT

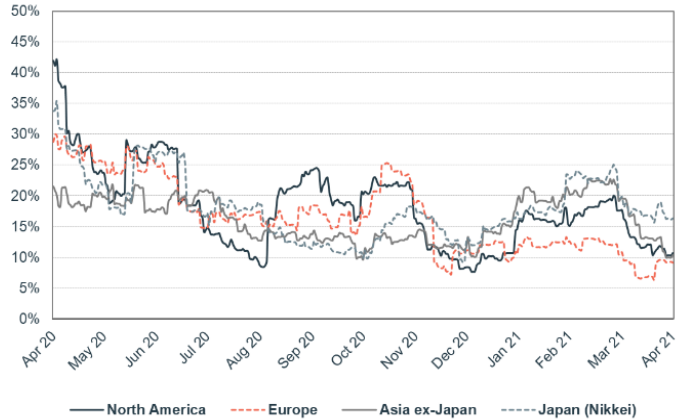
+0.3%
ENERGY

+2.7%
CONSUMER STAPLES

Equity sector results were all upward trending. Energy gained +0.3%, Consumer Staples gained +2.7%, Financials gained +5.0%, IT gained +5.4%.

Equities Volatility

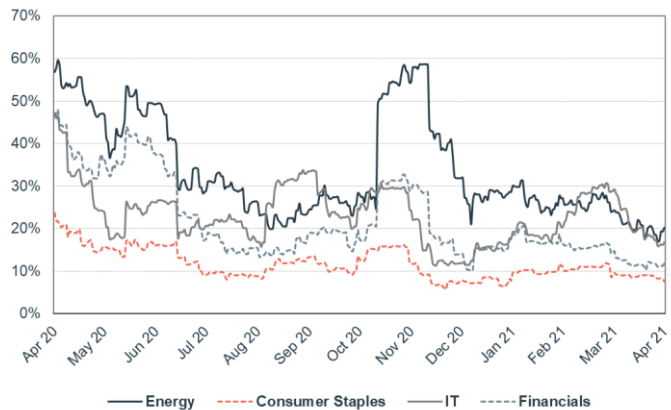
EQUITY VOLATILITY: REGIONS



9.1% EUROPE

Volatility results were all downward. North America fell from 17.7% to 10.7% (medium down to low), Asia ex-Japan fell from 19.6% to 10.4% (medium down to low), Europe fell from 10.8% to 9.1% (low), Japan (Nikkei) fell from 19.8% to 16.3% (medium).

EQUITY VOLATILITY: SECTORS



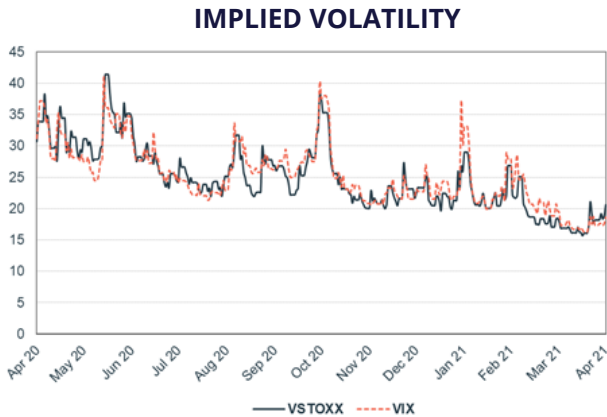
Volatility results were also downward. Energy fell from 24.3% to 20.2% (low), Consumer Staples fell from 9.6% to 7.5% (low), Financials fell from 14.6% to 11.8% (low), IT fell from 29.3% to 16.8% (medium down to low).

Equity Implied Volatility

Market-Implied Near Term Outlook

Implied Volatility

Implied volatility results were mixed. VIX fell from 19.4 to 18.6 (low), VSTOXX rose from 18.0 to 20.6 (low).



18.6% VIX

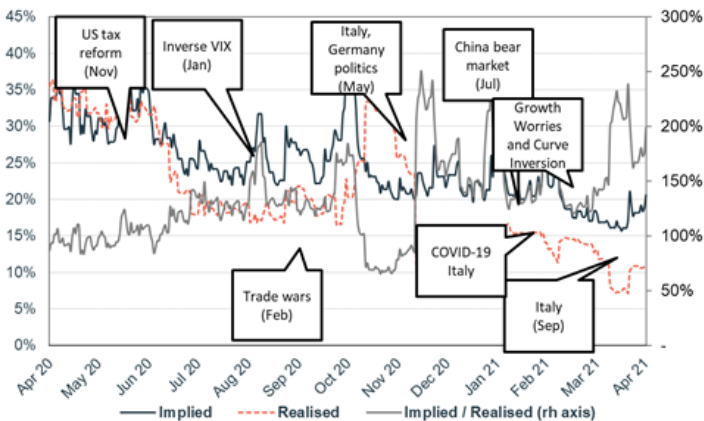
20.6% VSTOXX

Implied vs Realised Volatility

(European equity) implied volatility increased from 18% to 20.6%. The realised volatility (of the Euro Stoxx 50 index over 30 days) also decreased from 13.2% to 10.4% bringing the ratio of implied/realised volatility to move up from 137% to 199%.

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

IMPLIED VS. REALISED VOLATILITY



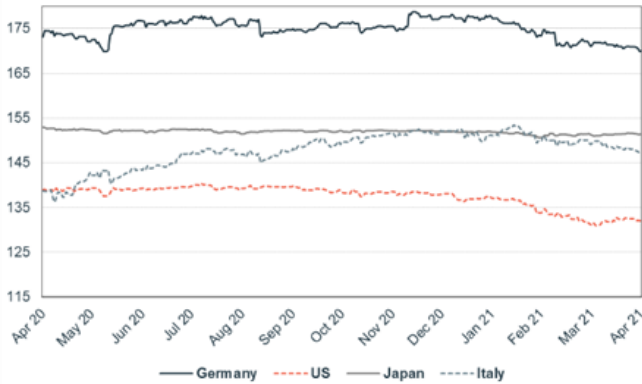
199% IMPLIED/REALISED VOLATILITY

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

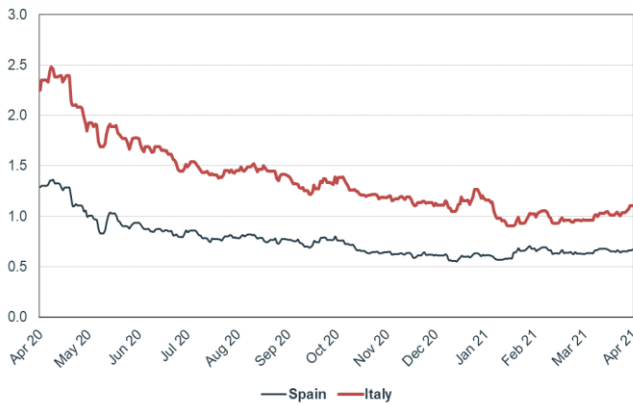
PRICES OF 10Y BOND FUTURES



Prices

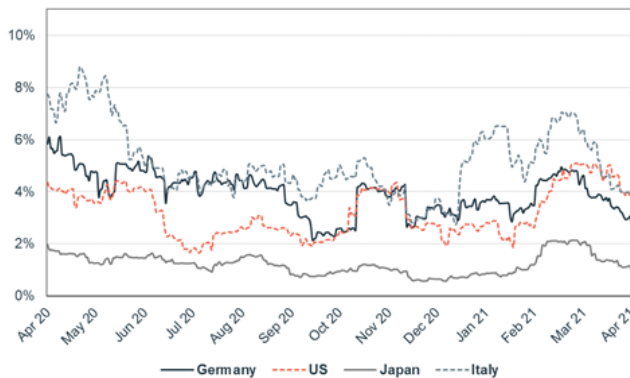
Government bond prices movements were mixed. Germany lost -0.7%, US gained +0.8%, Japan gained +0.1%, Italy lost -1.5%.

10 YEAR BOND SPREADS OVER GERMANY, %



Italian spreads over Germany increased from 0.96% to 1.11%, while the Spanish spreads against Germany increased from 0.63% to 0.68%.

VOLATILITY OF 10Y BOND FUTURES



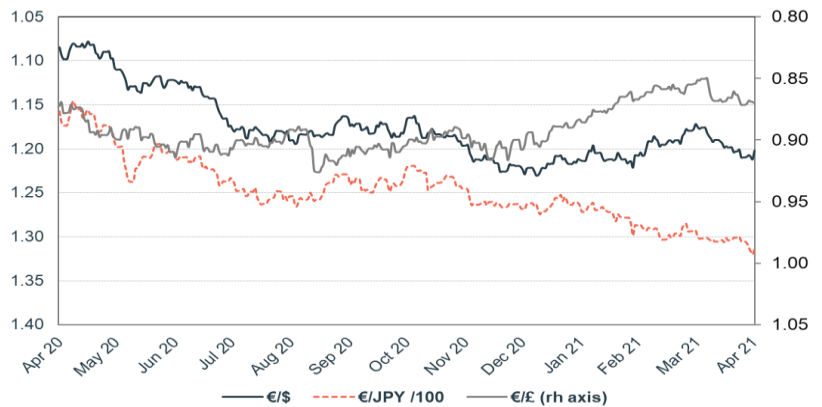
Volatility decreased in all observed markets. Germany fell from 4.6% to 2.8% (medium down to low), US fell from 5.1% to 3.8% (high down to low), Japan fell from 2.1% to 1.0% (high down to low), Italy fell from 6.4% to 3.9% (high down to low).

Foreign Exchange

Prices

Euro results were mixed. Euro gained 2.3% against the US Dollar, Euro gained 1.1% against the Japanese Yen, Euro lost 0.8% against the Swiss Franc, Euro gained 2.2% against the British Pound.

FX RATES VS. €



Volatility

FX volatility moves were also mixed. €/S fell from 5.8% to 5.2% (medium down to low), €/Yen fell from 5.2% to 3.9% (low), €/CHF fell from 5.1% to 3.0% (high down to low), €/£ rose from 4.4% to 5.7% (low).

VOLATILITY OF FX RATES VS. €



↘ 5.2% € vs. \$

↗ 5.7% € vs. £

↘ 3.9% € 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.

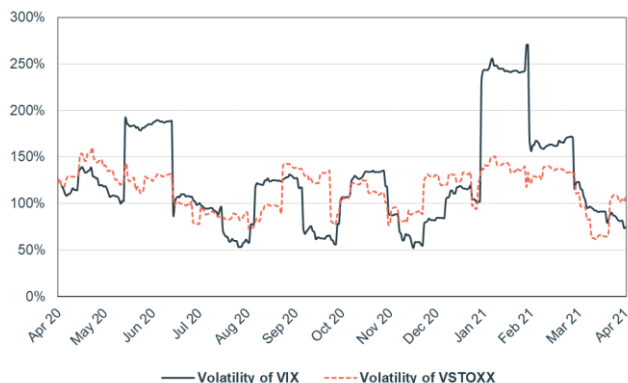
(Equity) Options

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 111.0% to 106.3% (medium) Volatility of VIX fell from 123.0% to 74.5% (medium down to low).

VOLATILITY OF VOLATILITY



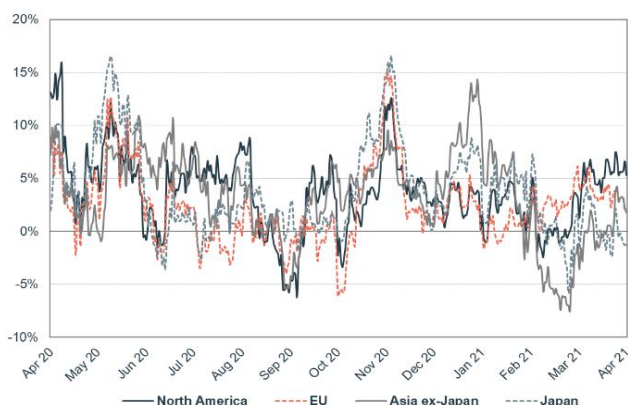
74.5% US

106.3% EUROPE

Major (Regional Equity) price moves

With the exception of Asia ex-Japan, all regions price movements were upward. We have that North America gained +5.3%, Asia ex-Japan gained +1.8%, Europe gained +2.0%, Japan (Nikkei) lost -1.3%.

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

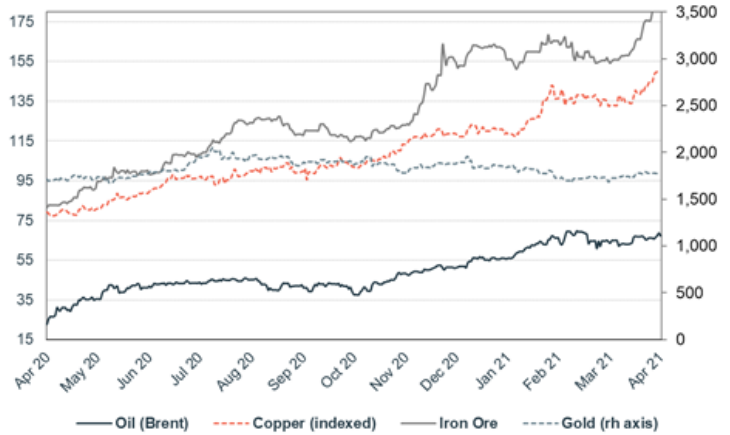
All commodity prices increased during April. We have that Oil (Brent) gained +5.8%, Gold gained +3.1%, Copper gained +12.1%, Iron Ore gained +19.4%

+5.8% OIL

+ 3.1% GOLD

+ 12.1% COPPER

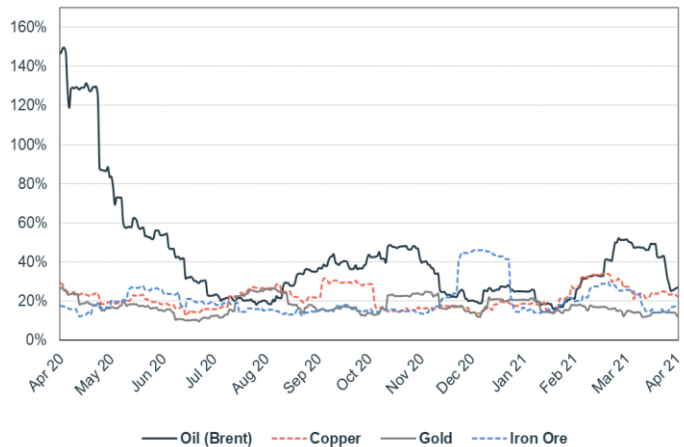
COMMODITIES PRICES, \$



Volatility

Volatility movements of Commodities were downward. On this regard, we have that Oil (Brent) fell from 51.6% to 27.0% (medium down to low), Gold fell from 14.8% to 12.1% (low), Copper fell from 27.5% to 22.3% (high down to medium), Iron Ore fell from 25.8% to 16.8% (high down to low).

COMMODITIES VOLATILITY

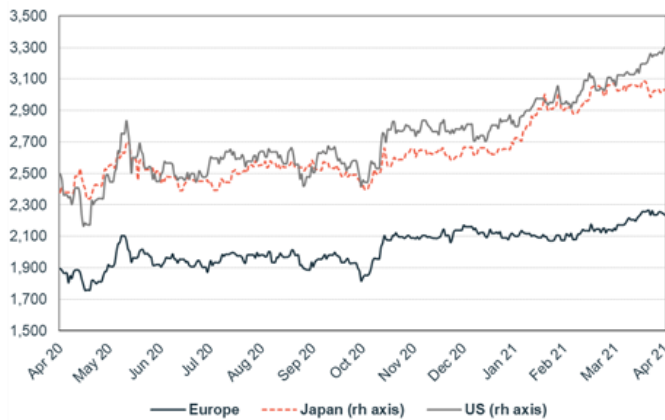


Note: all prices refer to near futures rather than spot with the exception of iron ore which is a spot price.

Real Estate and Alternatives

(Real Estate Share Prices)

REAL ESTATE (REIT) PRICES



+ 4.3% EUROPE

+ 8.1% US

- 0.5% JAPAN

With the exception of Japan, all real state prices were upward trending. We have that US gained +8.1%, Europe gained +4.3%, Japan lost -0.5%.

REAL ESTATE (REIT) VOLATILITY



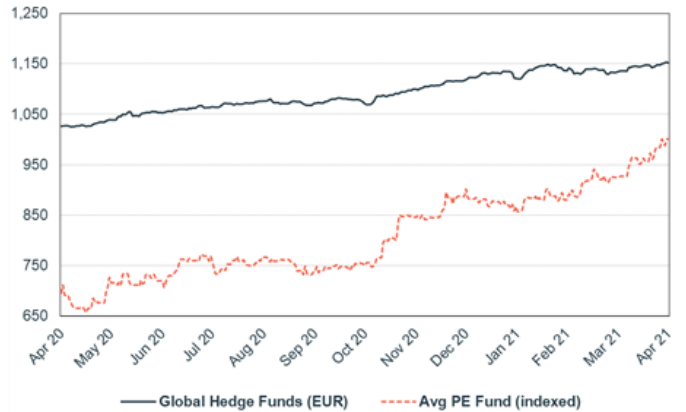
Volatility moves were all downward. We have that US fell from 16.4% to 12.3% (low), Europe fell from 16.2% to 11.3% (low), Japan fell from 13.4% to 11.6% (low).

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.

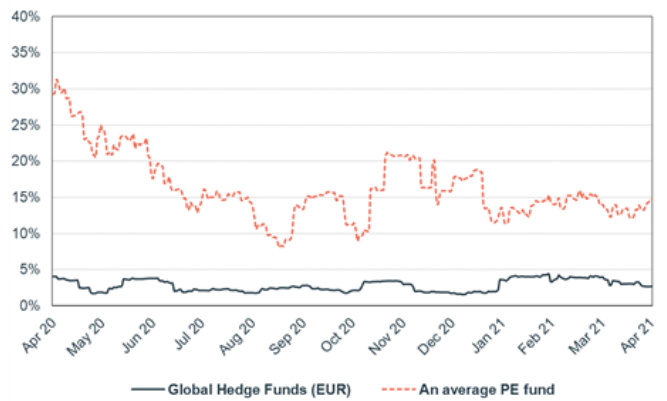
Alternatives

ALTERNATIVES PRICES



The average hedge fund gained +1.5%, an average PE fund gained +8.0%

AI VOLATILITY



Volatility results for Alternative Investments were mixed. We have that the average hedge fund fell from 4.0% to 2.7% (medium), An average PE fund rose from 14.0% to 14.8% (low up to medium).



2.7% HFRX
Volatility



14.8% 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 April 2021, and news and events are included up to that date. The commentary was written on or before May 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.

© Arkus - 2021

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 - 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.



**AR
KUS**
RISK BASED
GOVERNANCE



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.

