



**AR
KUS**
RISK BASED
GOVERNANCE

MARKET VOLATILITY RISK NEWSLETTER – June 2021

Early Spells of Summer

Member of the Profidata Group

Executive Summary

- **Region volatility movements were all upward.** Region volatility spanned a range that goes from 13.2% (North America) to 22% (Japan Nikkei), with Europe changing from low up to medium and Japan (Nikkei) changing from medium up to high volatility regime.
- **Realized volatility** (of the Euro Stoxx 50 index over 30 days) increased from 10.4% to 16.3% (medium).
- **Equity price sector results were mixed**, with Financials increasing the most (+4.5%) and only IT closing on the negative side with -1.2%. Sector **volatilities** spanned a range that goes from 9.5% (Consumer Staples) to 23.4% (Energy), with IT changing from low up to medium volatility regime.
- **Sovereign bond price movements were mixed**, with US gaining the most (+0.6%) and only Germany having negative results (-0.035%). **Volatility** moves were mixed and spanned a range that goes from 0.7% (Japan) to 4.2% (Italy).
- **€ price results were mixed**, with the EUR losing against the British Pound (-1.1%) and gaining against the remaining considered currencies. **FX volatility results were mixed**; ended ranging between 3.1% (€/CHF) and 5.8% (€/£), with €/£ changing from low up to medium and all the remaining pairs settling in the low volatility regime.
- **Options' implied volatility results were downward**, with the VIX decreasing from 18.6 to 16.8 and the VSTOXX from 20.6 to 19.1, with both observed markets remaining in the low volatility regime.
- **Commodities price changes were all upward**; with Iron Ore gaining the most (+9.1%). **Volatility changes were mixed** and spanned a range between 11.1% (Gold) to 65.9% (Iron Ore), with Iron Ore changing from low up to high volatility regime.
- **Real Estate (equity) prices were all upward**, with Europe increasing the most (+3.7%). **Volatility moves were mixed**, ranging between 11% (Japan) to 16.1% (US).
- **The average PE Funds** gained +0.5%, while the **average Hedge Fund** +0.3%. **Volatility** for the average hedge fund decreased from 2.7% to 2.5%, while the average PE fund increased from 14.8% to 17%.

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

Infection rates go down in the Western countries but are still concerning in other parts of the world. The vaccination race is still on as some countries stumble into some sort of new normal way of functioning with less (or without) restrictions. While people enjoy public life again the permanent threat of new waves still lurks around the corner.

The economic recovery continues in those countries that have opened-up again, but supply chain issues due to restricted trade become more and more of an issue for the production sector and endanger the fragile rebound.

Governments and central banks are still providing and promising ever more fiscal and monetary support. Against this rising inflation comes in handy as debt levels keep on rising. We shall see who has to pay the bill in the long run?

Enjoy the early spells of summer and this month's read!

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	13.2%	-0.6	low
	Asia ex-Japan	13.5%	-0.6	low
	Europe	13.6%	-0.4	medium
	Japan (Nikkei)	22.0%	1.0	high
	Energy	23.4%	-0.7	low
	Consumer Staples	9.5%	-0.5	low
	Financials	12.2%	-0.9	low
	IT	20.0%	-0.4	medium
VOLATILITY OF VOLATILITY	Volatility of VIX	162%	0.7	high
	Volatility of VSTOXX	154%	1.6	high
GOVERNMENT BONDS	Germany	3.1%	-0.9	low
	US	2.8%	-0.4	medium
	Japan	0.7%	-1.1	low
	Italy	4.2%	-0.6	low
FX VS \$	€/\$	5.8%	-0.1	medium
	€/Yen	3.9%	-1.4	low
	€/CHF	3.1%	-0.7	low
	€/£	5.6%	-0.6	low
COMMODITIES	Oil (Brent)	25.5%	-0.7	low
	Gold	11.1%	-1.4	low
	Copper	22.4%	0.2	medium
	Iron Ore	65.9%	3.6	high
PROPERTY	US	16.1%	-0.7	low
	Europe	12.9%	-0.9	low
	Japan	11.0%	-1.0	low
ALTERNATIVES	HFRX Global HF	2.5%	-0.4	medium
	Avg PE Fund	17.0%	0.4	medium
KURTOSIS	ZCF 1% left (vs - 2.33 for normal curve)	-2.83	-0.6	high
CORRELATION	Average market correlation with euro equities	24%	-0.7	low

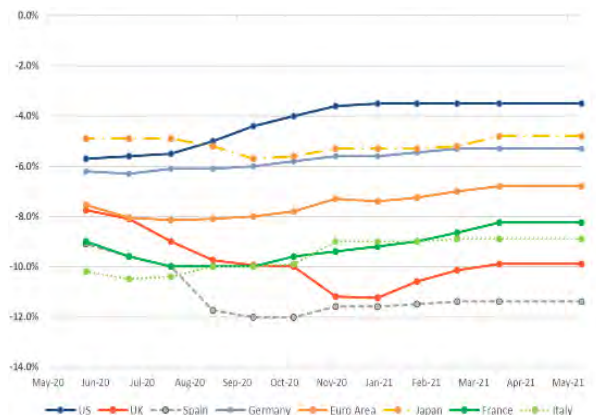
Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows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

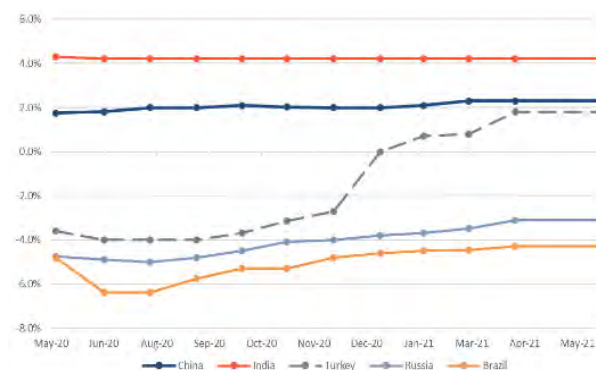
Major Volatility-Driving Events

- Inflation keeps on rising: 2% inflation in the Eurozone as the economic recovery continues and shortages in raw materials, as well as higher energy prices prevail. Some experts expect it to rise >4% as catch-up effects from the pandemic and prices for raw materials and energy might come into play later this year.
- ECB balance sheet keeps on rising as Lagarde keeps the gates open. New ATH recorded close to € 7,680 bn or 77% of Eurozone GDP.
- The world's largest energy company, Saudi Aramco, placed \$6bn in its first US dollar-denominated Islamic bond issue to support the financing of its planned \$75bn distribution in dividends.
- Bitcoin down from >\$60,000 to around \$35,000 and remains still highly sensitive to statements of high-profile individuals, such as Tesla's Elon Musk.
- Apple will enhance privacy features in its new iOS15 after being under pressure to reduce data collection from users. Those features won't be available in some countries, e.g., China where the company generates 15% of its revenues.
- Google was fined € 220mn by French authorities for abusing its market position. With its ad management platform Google Ad Manager, the internet giant favoured its own products, like GoogleAdX.
- US Pharma company Biogen receives FDA approval for the Alzheimer's drug in the first sign-off by the authority for a new treatment of the disease in 20 years.

GDP ESTIMATES FOR 2021, DEVELOPED COUNTRIES



GDP ESTIMATES FOR 2021, DEVELOPING COUNTRIES



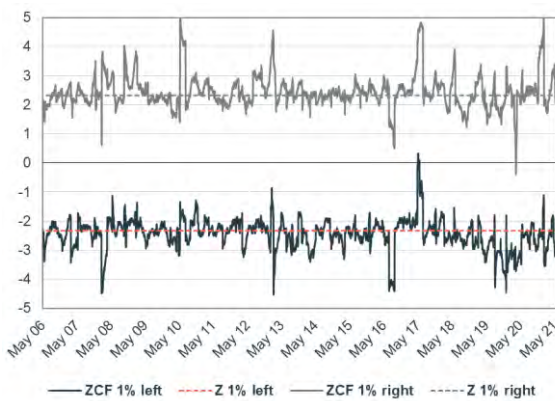
Kurtosis

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 -2.83 and the right ZCF 1% at +2.16 (both as of 31st of May).

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

Inter-market correlations (with EU equities)



24.0%

AVERAGE
CORRELATION



Correlation with euro equities increased during last month, leading our average correlation indicator to increase from 15.2% to 24% (low).

Multi-asset portfolio volatility



11.72%

AVERAGE
VOLATILITIES



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

The average asset volatility increased, moving from 10.59% to 11.72%, while the benefit of multi-asset diversification decreased, moving from 5.4% to 4.6%.

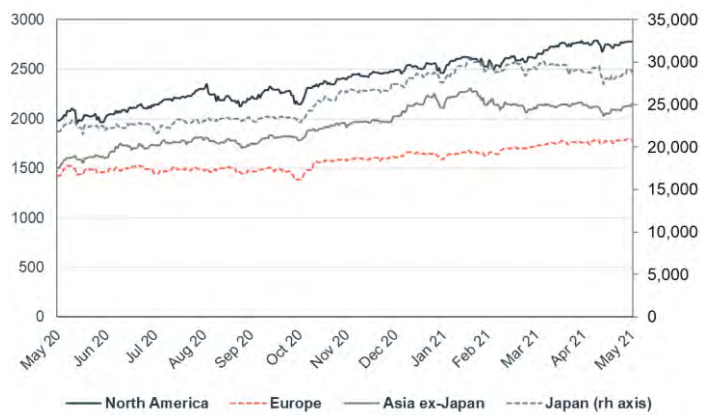
In combination, multi-asset portfolio volatility increased from 5.2% to 7.2%.

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

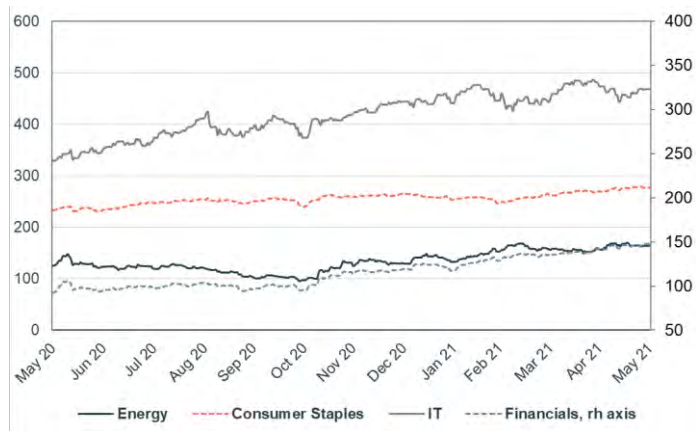
Stock price

STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)



Equity region price movements were all upward. North America gained +0.6%, Asia ex-Japan gained +0.5%, Europe gained +1.9%, Japan (Nikkei) gained +0.2%.

STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)



Equity sector results were mixed. Energy gained +4.5%, Consumer Staples gained +2.8%, Financials gained +4.5%, IT lost -1.2%.

+1.9%
Europe

+4.5%
FINANCIALS

-1.2% IT

+4.5%
ENERGY

+2.8%
CONSUMER
STAPLES

Equities

Volatility

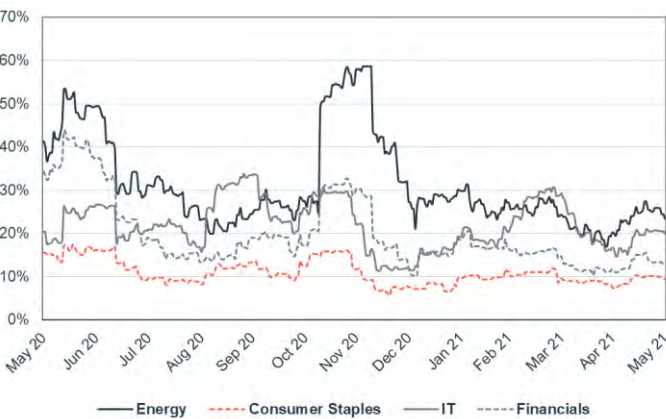
EQUITY VOLATILITY: REGIONS



13.6% EUROPE

Volatility results were all upward. North America rose from 10.7% to 13.2% (low), Asia ex-Japan rose from 10.4% to 13.5% (low), Europe rose from 9.1% to 13.6% (low up to medium), Japan (Nikkei) rose from 16.3% to 22.0% (medium up to high).

EQUITY VOLATILITY: SECTORS



Volatility results were all upward. Energy rose from 20.2% to 23.4% (low), Consumer Staples rose from 7.5% to 9.5% (low), Financials rose from 11.8% to 12.2% (low), IT rose from 16.8% to 20.0% (low up to medium).

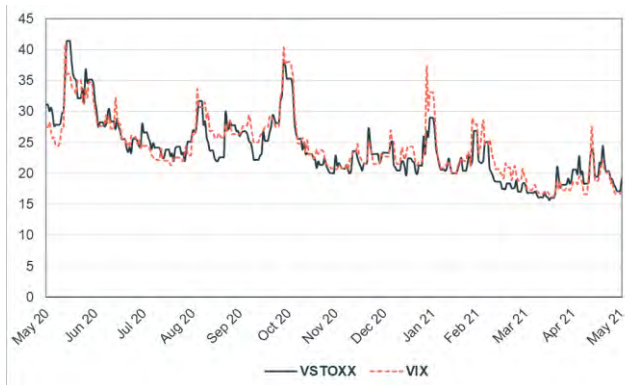
Equity Implied Volatility

Market-Implied Near Term Outlook

Implied Volatility

Implied volatility results were downwards. VIX fell from 18.6 to 16.8 (low), VSTOXX fell from 20.6 to 19.1 (low).

IMPLIED VOLATILITY



16.8% VIX

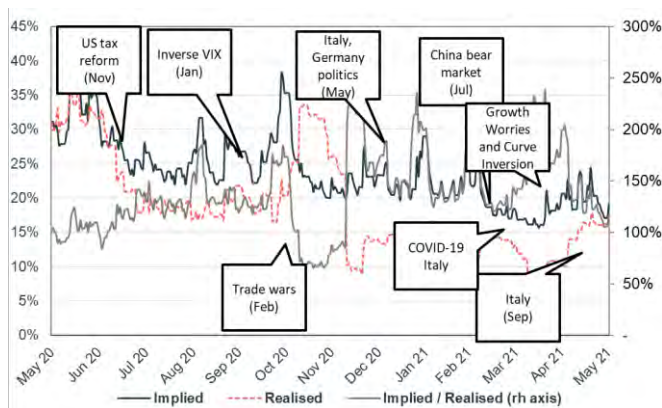
19.1% VSTOXX

Implied vs Realised Volatility

(European equity) implied volatility decreased from 20.6% to 19.1%. The realised volatility (of the Euro Stoxx 50 index over 30 days) increased from 10.4% to 16.3% bringing the ratio of implied/realised volatility to move down from 199% to 117%.

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

IMPLIED VS. REALISED VOLATILITY



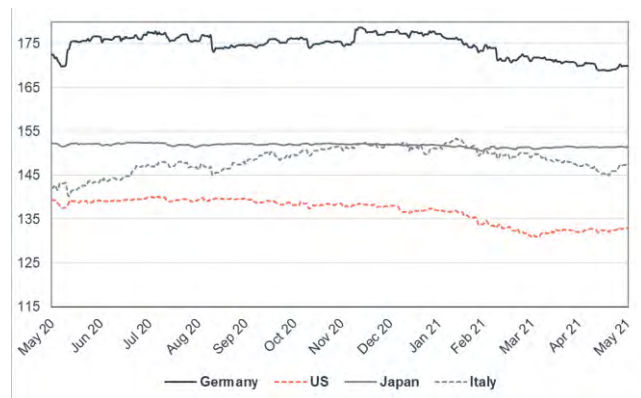
199% IMPLIED/REALISED VOLATILITY

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

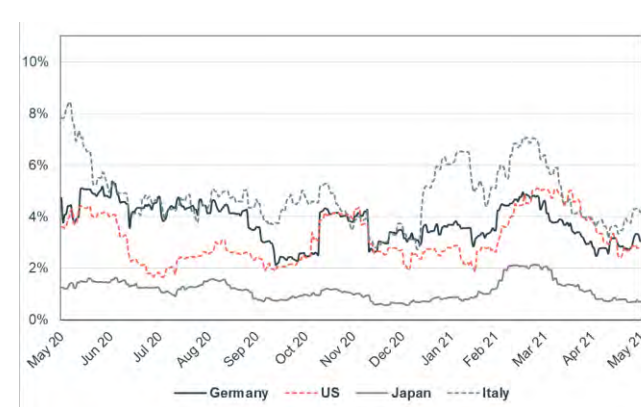
Government bond prices movements were mixed. Germany lost -0.035%, US gained +0.6%, Japan gained +0.1%, Italy gained +0.2%.

10 YEAR BOND SPREADS OVER GERMANY, %



Italian spreads over Germany decreased from 1.11% to 1.10%, while the Spanish spreads against Germany also decreased from 0.68% to 0.65%.

VOLATILITY OF 10Y BOND FUTURES



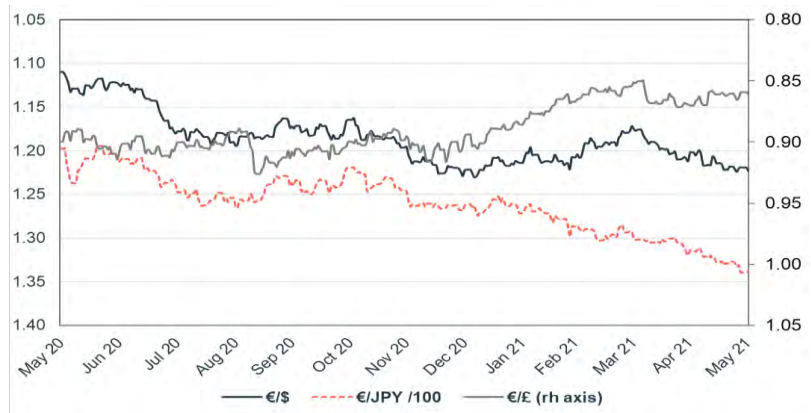
Volatility results were mixed. Germany rose from 2.8% to 3.1% (low), US fell from 3.8% to 2.8% (high down to medium), Japan fell from 1.0% to 0.7% (low), Italy rose from 3.9% to 4.2% (low).

Foreign Exchange

Prices

Euro results were mixed. Euro gained 1.7% against the US Dollar, Euro gained 1.9% against the Japanese Yen, Euro gained 0.1% against the Swiss Franc, and the Euro lost 1.1% against the British Pound.

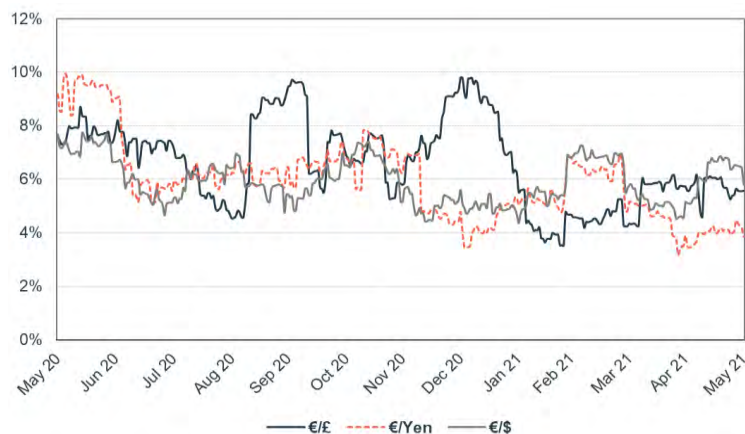
FX RATES VS. €



Volatility

FX volatility moves were also mixed. €/£ rose from 5.2% to 5.8% (low up to medium), €/Yen fell from 3.9% to 3.88% (low), €/CHF rose from 3.0% to 3.1% (low), €/£ fell from 5.7% to 5.6% (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 increased in both US and Europe. Volatility of VSTOXX rose from 106.3% to 153.8% (medium up to high), and the Volatility of VIX rose from 74.5% to 162.0% (low up to high).

VOLATILITY OF VOLATILITY



162%

US

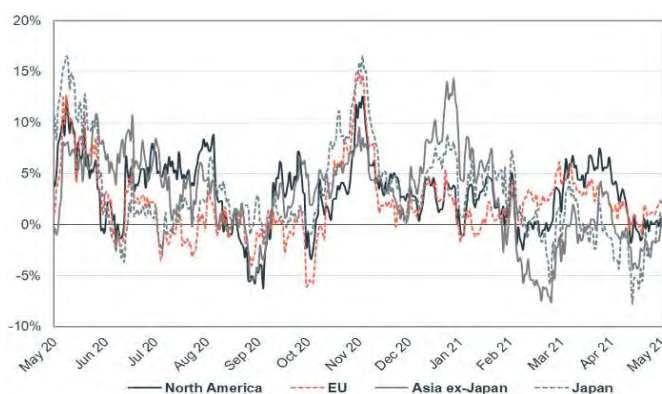
153.8%

EUROPE

Major (Regional Equity) price moves

All regions price movements were upward trending. North America gained +0.6%, Asia ex-Japan gained +0.5%, Europe gained +1.9%, 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.

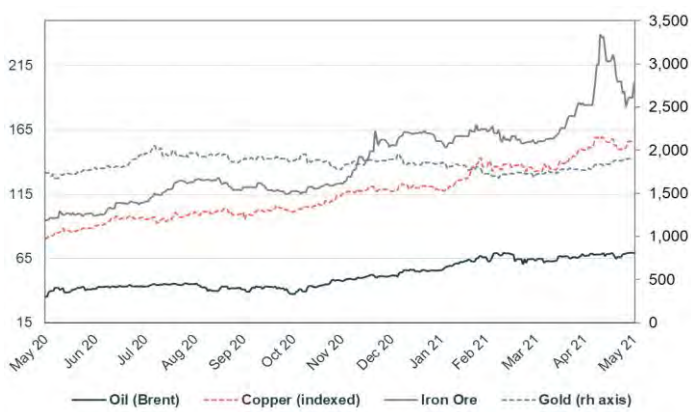
Note on Convertibles: Convertibles are in effect a combination of a bond and a call option, with the bond portion usually making little contribution to the instrument volatility unless the option is significantly out of the money. As such, convertible portfolios' volatilities will tend to behave similarly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

Commodities

Prices

All analysed commodity prices increased during May. Oil (Brent) gained +3.1%, Gold gained +7.6%, Copper gained +4.4%, Iron Ore gained +9.1%.

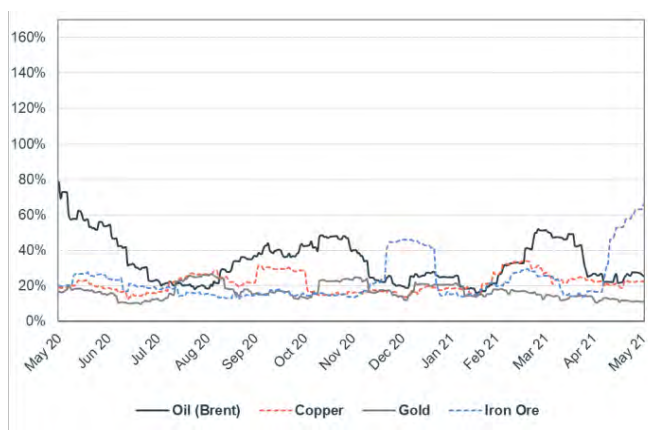
COMMODITIES PRICES, \$



Volatility

Volatility movements for Commodities were mixed. On this regard, we have that Oil (Brent) fell from 27.0% to 25.5% (low), Gold fell from 12.1% to 11.1% (low), Copper rose from 22.3% to 22.4% (medium), and Iron Ore rose from 16.8% to 65.9% (low up to high).

COMMODITIES VOLATILITY

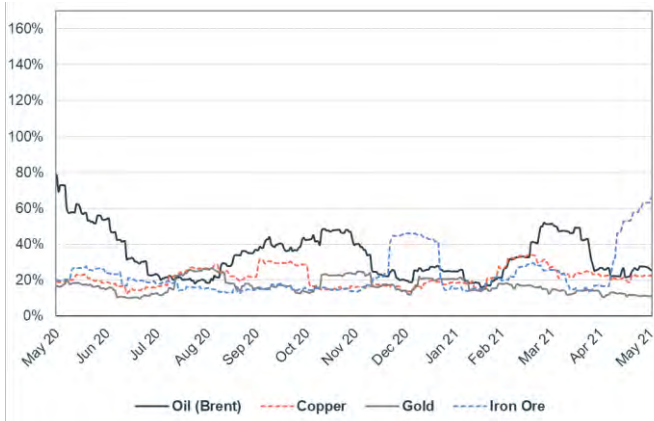


Note: all prices refer to near futures rather than spot with the exception of iron ore which is a spot price.

Real Estate and Alternatives

(Real Estate Share Prices)

REAL ESTATE (REIT) PRICES



All real state prices were upward trending. US gained +0.6%, Europe gained +3.7%, Japan gained +1.0%.

+ 3.7% EUROPE

+ 0.6% US

+ 1.0% JAPAN

REAL ESTATE (REIT) VOLATILITY



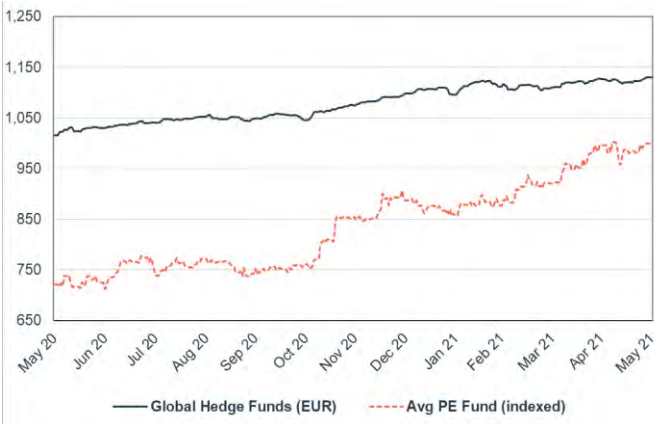
Volatility moves were mixed. We have that US rose from 12.3% to 16.1% (low), Europe rose from 11.3% to 12.9% (low), Japan fell from 11.6% to 11.0% (low).

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.

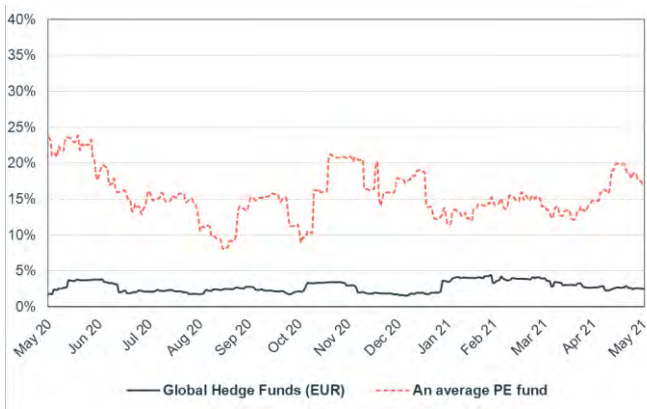
Alternatives

ALTERNATIVES PRICES



The average hedge fund gained +0.3%, while an average PE fund gained +0.5%.

AI VOLATILITY



Volatility results for Alternative Investments were mixed. We have that the average hedge fund fell from 2.7% to 2.5% (medium), An average PE fund rose from 14.8% to 17.0% (medium).



2.5%

HFRX
Volatility



17%

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 31st May 2021, and news and events are included up to that date. The commentary was written on or before June 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.

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