



**AR
KUS**
RISK BASED
GOVERNANCE

MARKET VOLATILITY RISK NEWSLETTER – July 2021

Paradigm Shift

Member of the Profidata Group

Executive Summary

- **Region volatility movements were all downwards.** Region volatility spanned a range that goes from 8.3%(North America) to 17.6% (Japan Nikkei), with all markets, but Japan (Nikkei)-medium-, closing in the low volatility regime.
- **Realized volatility** (of the Euro Stoxx 50 index over 30 days) decreased from 16.3% to 11.2% (Low).
- **Equity price sector results were mixed**, with IT increasing the most (+6.8%) and Financials losing the most (-3.5%). Sector **volatilities** spanned a range that goes from 8.1% (Consumer Staples) to 25.1% (Energy), with all sectors closing on the low volatility regime.
- **Sovereign bond price movements were mixed**, with Italy gaining the most (+2.8%) and only US having negative results (-0.3%). **Volatility** moves were mixed and spanned a range that goes from 1.1% (Japan) to 4.2% (Italy).
- **€ closed on the negative side against all the analysed currencies**, with the EUR losing the most against the US Dollar (-3.1%). **FX volatility results were mixed**; ended ranging between 2.6% (€/CHF) and 7.6% (€/£).
- **Options' implied volatility results were downward**, with the VIX decreasing from 16.8 to 15.8 and the VSTOXX from 19.1 to 18.2, with both observed markets remaining in the low volatility regime.
- **Commodities price changes were mixed**; with Oil (Brent) gaining the most (+8.4%) and Copper experiencing the biggest drop (-8.1%). **Volatility changes were mixed** and spanned a ranged between 15.4% (Oil Brent) to 32.3% (Iron Ore).
- **Real Estate (equity) prices were all upward**, with Japan increasing the most (+3.2%). **Volatility moves were mixed**, ranging between 10.5% (Europe) to 16.5% (US).
- **The average PE Funds** lost -0.6%, while the **average Hedge Fund** gained +0.3%. **Volatility** for the average hedge fund decreased from 2.5% to 1.9%, while for the average PE fund it went down from 17% to 10.2%.

The Arkus Risk Team



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Summary volatility matrix and outlook

As prices continue to rise the ECB moves away from its 2% target preparing the Eurozone for a paradigm shift regarding higher inflation, which ECB experts consider to only be temporary. Will the policy of emergency stimulus become the new normal?

This of course comes alongside endless fiscal support from European governments for which money is not an issue with a debt union coming up on the horizon.

The delta variant of the corona virus emerges and risks to come in the way of the fragile economic recovery and also people’s holiday plans as the portion of fully vaccinated individuals is still not sufficient in most countries to avoid further spreading. Wherever you stay or go this summer, be safe, also in the sun!

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	8.3%	-1.4	low
	Asia ex-Japan	8.8%	-1.6	low
	Europe	9.0%	-1.2	low
	Japan (Nikkei)	17.6%	0.1	medium
	Energy	25.1%	-0.4	low
	Consumer Staples	8.1%	-0.9	low
	Financials	13.8%	-0.6	low
	IT	11.7%	-1.6	low
VOLATILITY OF VOLATILITY	Volatility of VIX	104%	-0.4	medium
	Volatility of VSTOXX	117%	0.1	medium
GOVERNMENT BONDS	Germany	2.8%	-1.1	low
	US	3.9%	1.0	high
	Japan	1.1%	-0.0	medium
	Italy	4.2%	-0.4	medium
FX VS \$	€/\$	7.6%	2.2	high
	€/Yen	6.5%	0.8	high
	€/CHF	2.6%	-1.0	low
	€/£	3.9%	-1.5	low
COMMODITIES	Oil (Brent)	15.4%	-1.5	low
	Gold	18.3%	0.4	medium
	Copper	27.5%	1.0	high
	Iron Ore	32.3%	0.5	high
PROPERTY	US	16.5%	-0.6	low
	Europe	10.5%	-1.3	low
	Japan	15.5%	-0.1	medium
ALTERNATIVES	HFRX Global HF	1.9%	-1.1	low
	Avg PE Fund	10.2%	-1.5	low
KURTOSIS	ZCF 1% left (vs - 2.33 for normal curve)	-2.75	-0.4	medium
CORRELATION	Average market correlation with euro equities	26%	-0.4	medium

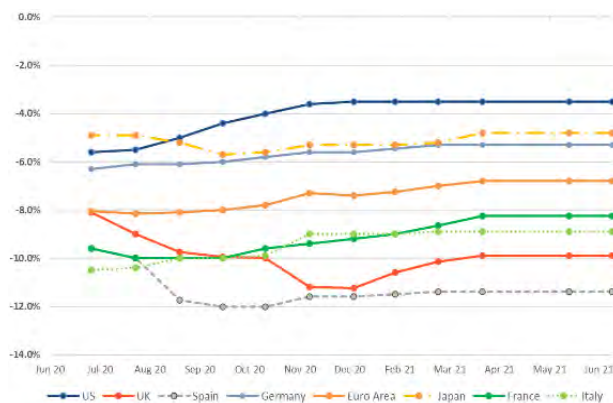
Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows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

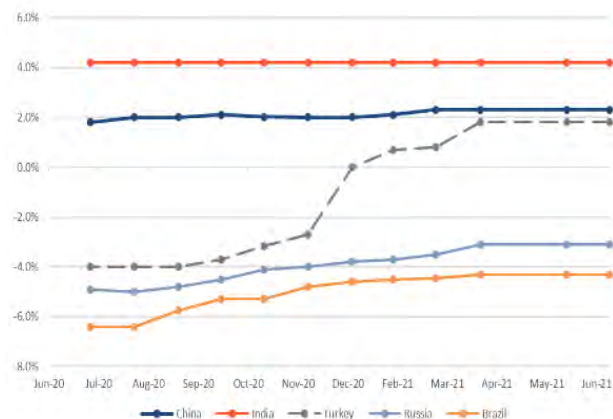
Major Volatility-Driving Events

- The private equity Fund sector has posted the busiest period in deal making since the beginning of record keeping for this industry. Deal volume reached \$513bn until June 30 this year.
- Drugmaker CureVac's shares collapse after fields studies fail to confirm high effectiveness of potential new vaccination against coronavirus.
- The ECB announced that it does not consider the 2% inflation limit as a limit as such, but more of target, so that temporary exceedances are allowed.
- Oil price continues to rise after global demand grows and OPEC members can't agree on higher output levels.
- Next crackdown on Chinese internet companies - trip broker Didi loses \$22bn in market cap after being banned from App Stores in China by the Chinese regulator just a couple of days after going public in the US. The reasons cited were security risks and illegal storing of sensitive data.
- The European Commission fines German carmakers Volkswagen and BMW € 875mln for colluding to coordinate the use of emissions cleaning technologies developed by them.
- Indonesian e-commerce company Bukalapak aiming to collect \$1.1bln from investors in the countries biggest IPO in a decade.

GDP ESTIMATES FOR 2021, DEVELOPED COUNTRIES



GDP ESTIMATES FOR 2021, DEVELOPING COUNTRIES



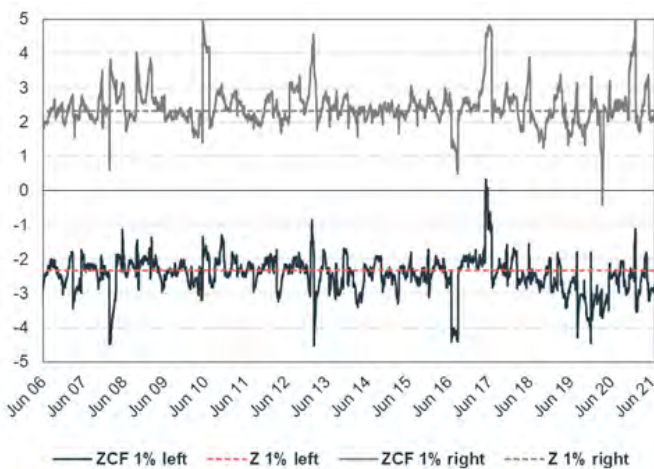
Kurtosis

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 -2.75 and the right ZCF 1% at +2.07 (both as of 30th of June).

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.

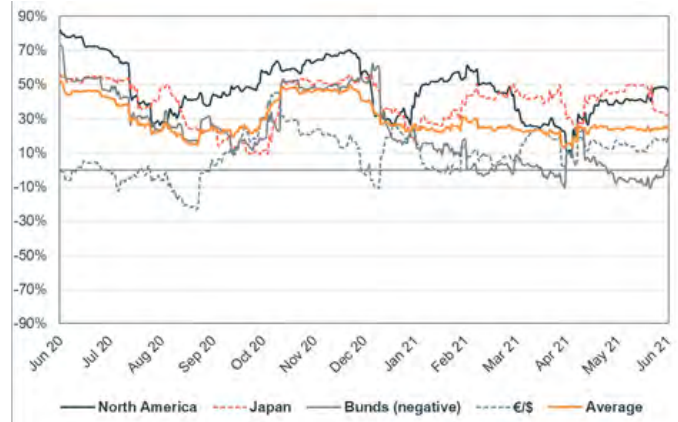
We plot on the chart the expected Z-scores for 1% left tail (i.e., a 99% VaR) and a 1% right tail assuming a normal distribution: ± 2.33 .

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.

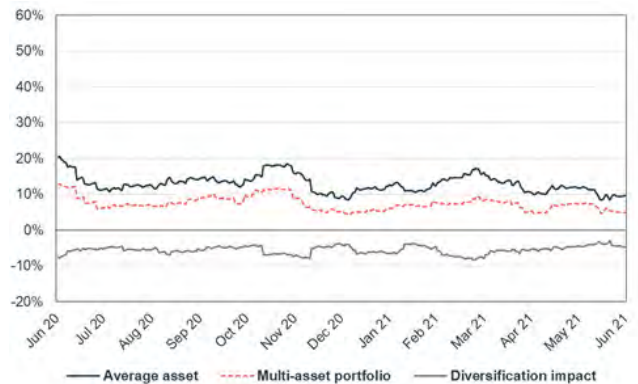
Inter-market correlations with EU equities

Inter-market correlations (with EU equities)



Correlation with euro equities increased during last month, leading our average correlation indicator to increase from 24% to 26% (low up to medium).

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 11.72% to 9.64%, while the benefit of multi-asset diversification increased slightly, moving from 4.6% to 4.8%.

In combination, multi-asset portfolio volatility decreased from 7.2% to 4.8%.

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.



26.0%

AVERAGE
CORRELATION



9.64%

AVERAGE
VOLATILITIES



4.8%

PORTFOLIO
VOLATILITY

Equities

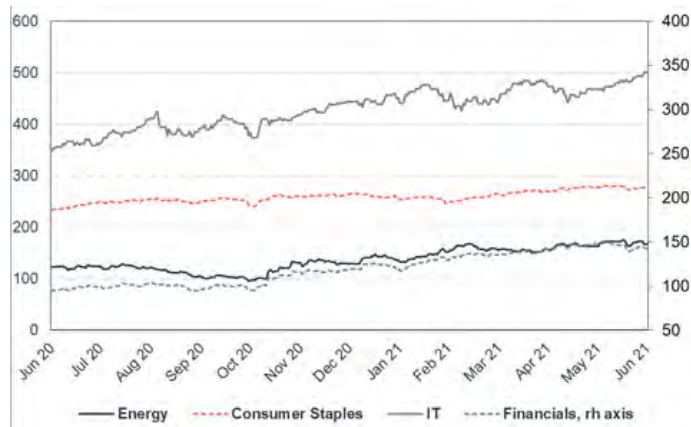
Stock price

STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)



Equity region price movements were mixed. North America gained +2.5%, Asia ex-Japan gained +0.4%, Europe gained +1.5%, Japan (Nikkei) lost -0.2%.

STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)



Equity sector results were mixed. Energy gained +2.8%, Consumer Staples lost -0.5%, Financials lost -3.5%, IT gained +6.8%.

+1.5%
Europe

-3.5%
FINANCIALS

+6.8% IT

+2.8%
ENERGY

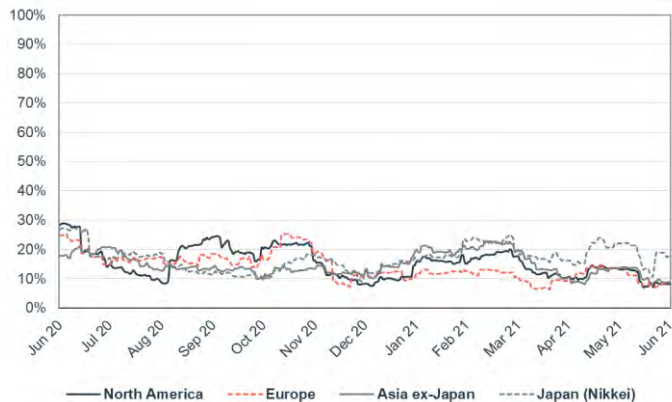
-0.5%
CONSUMER
STAPLES

Equities

Volatility

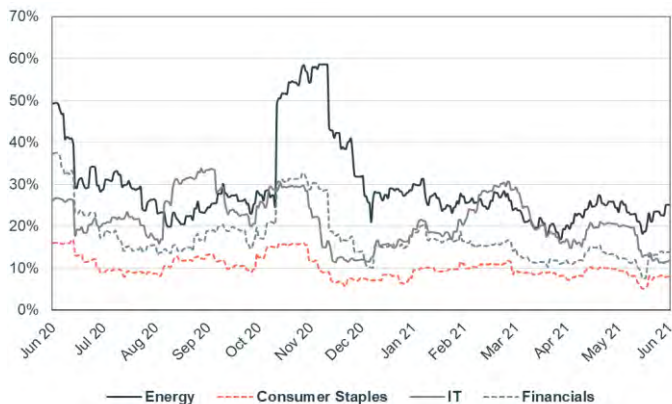
9.0% EUROPE

EQUITY VOLATILITY: REGIONS



Volatility results were all downwards. North America fell from 13.2% to 8.3% (low), Asia ex-Japan fell from 13.5% to 8.8% (low), Europe fell from 13.6% to 9.0% (medium down to low), Japan (Nikkei) fell from 22.0% to 17.6% (high down to medium).

EQUITY VOLATILITY: SECTORS



Volatility results were mixed. Energy rose from 23.4% to 25.1% (low), Consumer Staples fell from 9.5% to 8.1% (low), Financials rose from 12.2% to 13.8% (low), IT fell from 20.0% to 11.7% (medium down to low).

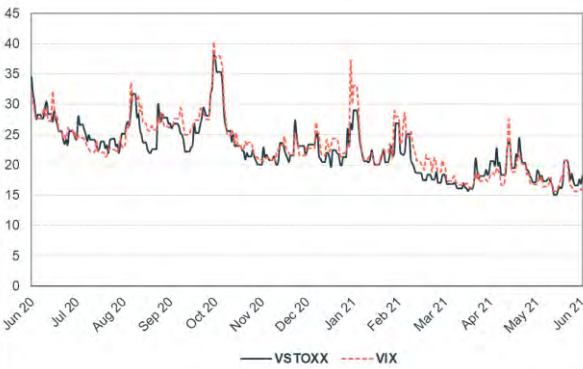
Equity Implied Volatility

Market-Implied Near Term Outlook

Implied Volatility

Implied volatility results were downwards. VIX fell from 16.8 to 15.8 (low), VSTOXX fell from 19.1 to 18.2 (low).

IMPLIED VOLATILITY



15.8% VIX

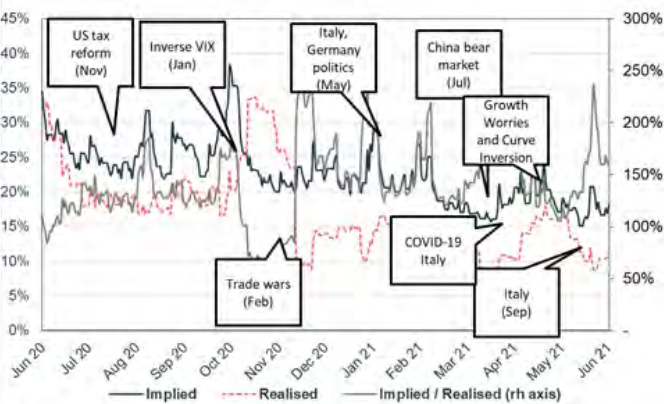
18.2% VSTOXX

Implied vs Realised Volatility

(European equity) implied volatility decreased from 19.1 to 18.2. The realised volatility (of the Euro Stoxx 50 index over 30 days) decreased from 16.3% to 11.2% bringing the ratio of implied/realised volatility to move up from 117% to 162%.

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

IMPLIED VS. REALISED VOLATILITY



162% 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

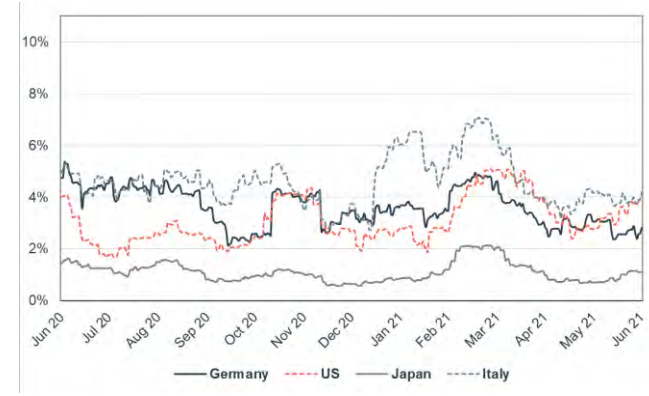
Government bond prices movements were mixed. Germany gained +1.6%, US lost -0.3%, Japan gained +0.2%, Italy gained +2.8%.

10 YEAR BOND SPREADS OVER GERMANY, %



Italian spreads over Germany decreased from 1.10% to 1.03%, while the Spanish spreads against Germany decreased slightly from 0.65% to 0.62%.

VOLATILITY OF 10Y BOND FUTURES



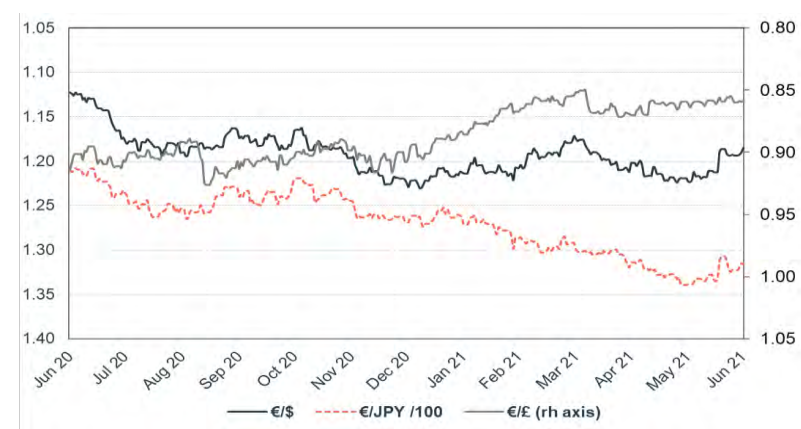
Volatility results were also mixed. Germany fell from 3.1% to 2.8% (low), US rose from 2.8% to 3.9% (medium up to high), Japan rose from 0.7% to 1.1% (low up to medium), Italy rose from 4.17% to 4.19%.

Foreign Exchange

Prices

Euro results were downwards against all the analysed currencies. Euro lost 3.1% against the US Dollar, Euro lost 1.7% against the Japanese Yen, Euro lost 0.2% against the Swiss Franc, Euro lost 0.3% against the British Pound.

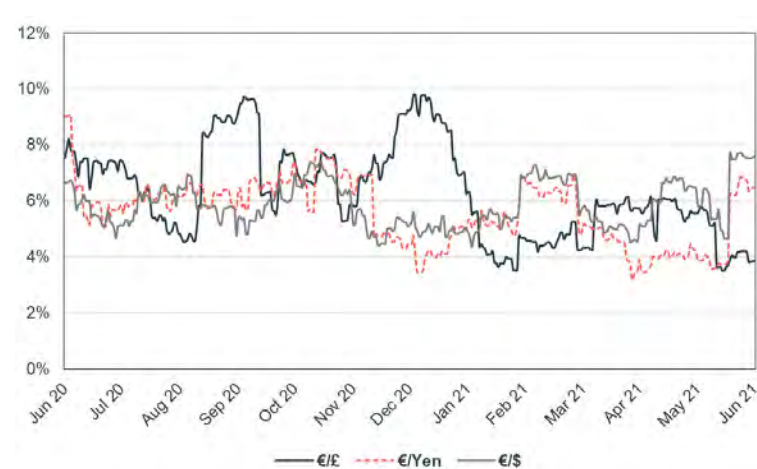
FX RATES VS. €



Volatility

FX volatility moves were mixed. €/£ rose from 5.8% to 7.6% (medium up to high), €/Yen rose from 3.9% to 6.5% (low up to high), €/CHF fell from 3.1% to 2.6% (low), €/£ fell from 5.6% to 3.9% (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 153.8% to 116.6% (high down to medium) Volatility of VIX fell from 162.0% to 103.6% (high down to medium).

VOLATILITY OF VOLATILITY



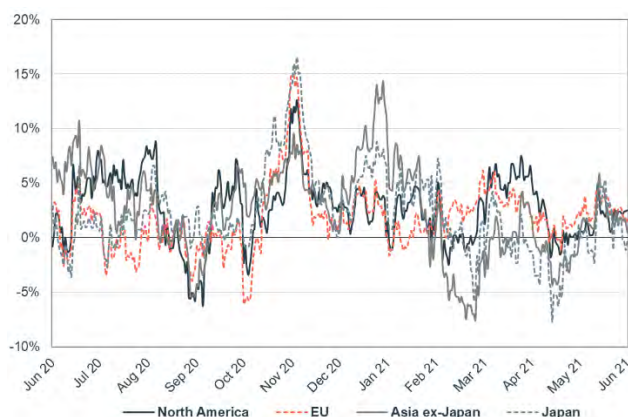
103.6% US

116.6% EUROPE

Major (Regional Equity) price moves

Regions price movements were mixed. North America gained +2.5%, Asia ex-Japan gained +0.4%, Europe gained +1.5%, Japan (Nikkei) lost -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

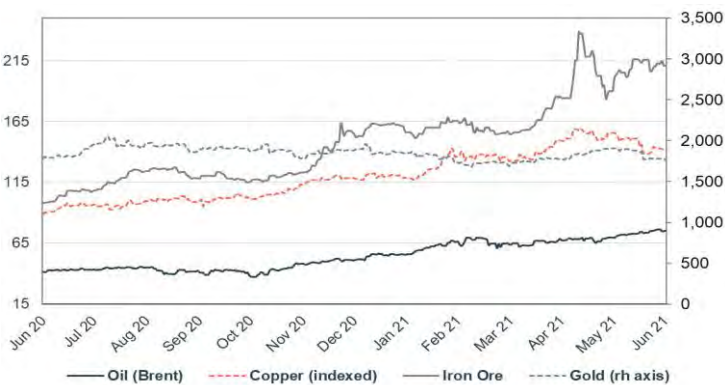
Commodities price movements were mixed during June. Oil (Brent) gained +8.4%, Gold lost -6.9%, Copper lost -8.1%, Iron Ore gained +5.1%.

+8.4% OIL

- 6.9% GOLD

- 8.1% COPPER

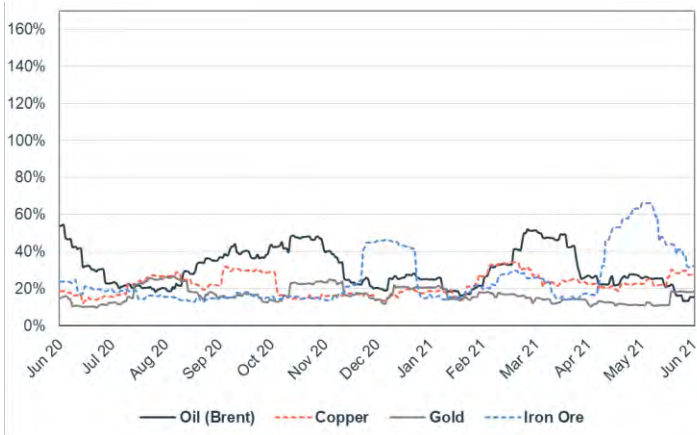
COMMODITIES PRICES, \$



Volatility

Volatility movements for Commodities were also mixed. On this regard, we have that Oil (Brent) fell from 25.5% to 15.4% (low), Gold rose from 11.1% to 18.3% (low up to medium), Copper rose from 22.4% to 27.5% (medium up to high), Iron Ore fell from 65.9% to 32.3% (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



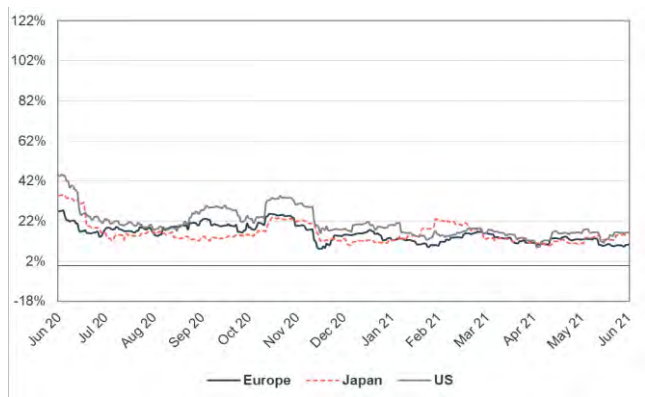
All real state prices were upward trending. US gained +1.6%, Europe gained +0.2%, Japan gained +3.2%.

+ 0.2% EUROPE

+ 1.6% US

+ 3.2% JAPAN

REAL ESTATE (REIT) VOLATILITY



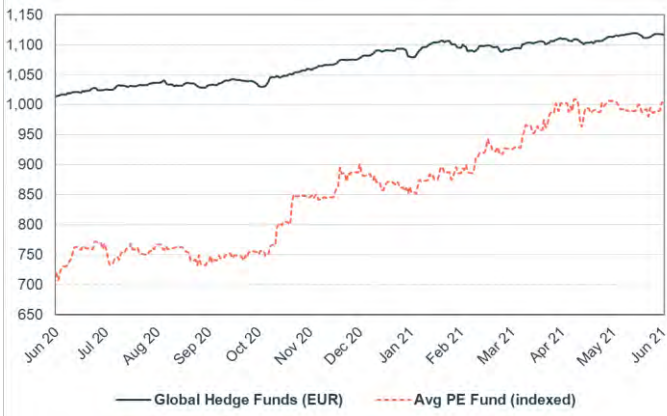
Volatility moves were mixed. We have that US rose from 16.1% to 16.5% (low), Europe fell from 12.9% to 10.5% (low), Japan rose from 11.0% to 15.5% (low up to medium).

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.

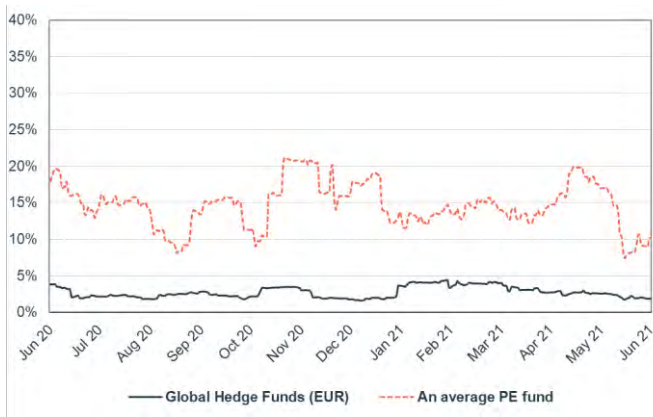
Alternatives

ALTERNATIVES PRICES



The average hedge fund gained +0.3%, while an average PE fund lost -0.6%.

AI VOLATILITY



Volatility results for Alternative Investments decreased during June. We have that the average hedge fund fell from 2.5% to 1.9% (medium down to low), An average PE fund fell from 17.0% to 10.2% (medium down to low).



1.9%

HFRX
Volatility



10.2%

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