

**PROFIDATA**

**MARKET RISK REPORT**

*Black Swan*

March 2020

# Executive summary

- **Volatilities were massively up.** Equity markets and Commodities volatility spiked.
- **Realized volatility** (of the Euro Stoxx 50 index over 30 days) **doubled from 14.6% to 28.0%** (high).
- **All the observed equity markets closed the month in a loss position.** Sector volatilities spanned a range of 7%-19% and were all high.
- **Sovereign bond** price moves were all up, but **Volatility** trends were mixed (Italy and Germany fell while US and Japan rose). **Volatility regimes** ended in a range of 2.5% to 5%.
- **FX moves against the EUR were mixed.** Euro gained 1.7% against the US Dollar, lost 0.9% against the Japanese Yen, lost 0.6% against the Swiss Franc and gained 2.9% against the British Pound. **FX volatility moves were all upwards.** FX Volatility is ranging between 4% and 10%, with Japanese Yen being the highest mover (€/Yen rose 5.7% to 10.1% - medium up to high).
- **Option** volatility spiked both in Europe (Vstox) and in the US (VIX).
- **Commodities'** price moves were mixed: Oil (Brent) lost 22.2%, Gold gained 5.7%, Copper gained 2.2%, Iron Ore gained 5.1%. **Volatilities were all up except for copper, regimes moved up to high except for copper which is back to low.**
- **Real Estate** (equity) price moves were all negative: Europe (-7.2%), US (-5.8%), Japan (-11.2%). **Volatility moves were significantly up**, ranging from 27% to 33%. **All observed markets ended in a high regime.**
- **PE Funds** lost 11.7% while the **Hedge Funds** slightly gained (+0.4%). Volatility for the average hedge fund rose from 2.4% to 4.7% (high) and changed from 11.1% to 23.0%(high) for the average PE fund.

The Profidata Team



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# Summary volatility matrix and outlook

So, here we go. Markets turned into crisis mode as the Corona virus and oil price turmoil's spurred fears of a global recession that sent markets south with a speed that we haven't seen in decades. (Un-) surprisingly weak European bank books popped up as another prevalent concern. On the geopolitical end, the unsolved refugee crisis and tensions between Russia and EU/NATO surfaced again.

The landslide losses are of course accompanied by huge jumps in volatilities, VIX and VSTOXX spiked to levels last seen during the Lehmann crisis. Yields of US and German Government bonds slumped to new record lows raising spreads to more indebted countries, notably Italy.

The FED reacted with a rate cut which has had little effect, other central banks don't really have much firepower left, anyways. Consequently governments around the world are tying packages to help dampen the impact of all the troubles. The black swan has come around, let's see how long it cares to stay.

ASSET CLASS	AREA	LATEST VOLATILITY	LATEST Z-SCORE	REGIME
EQUITIES	North America	33.9%	4.6	high
	Asia ex-Japan	18.0%	2.8	high
	Europe	26.3%	4.1	high
	Japan (Nikkei)	24.1%	3.5	high
	Energy	33.4%	4.4	high
	Consumer Staples	25.2%	5.8	high
	Financials	27.9%	4.5	high
	IT	37.0%	3.9	high
VOLATILITY OF VOLATILITY	Volatility of VIX	248%	2.6	high
	Volatility of VSTOXX	266%	3.7	high
GOVERNMENT BONDS	Germany	3.7%	-0.4	medium
	US	5.0%	0.5	high
	Japan	2.5%	1.3	high
	Italy	4.6%	-1.1	low
FX VS \$	€/€	7.7%	4.5	high
	€/Yen	10.1%	3.3	high
	€/CHF	3.6%	-0.1	medium
	€/£	9.6%	1.1	high
COMMODITIES	Oil (Brent)	45.6%	1.3	high
	Gold	23.4%	4.0	high
	Copper	14.0%	-0.8	low
	Iron Ore	26.5%	0.7	high
PROPERTY	US	32.6%	5.9	high
	Europe	27.1%	6.0	high
	Japan	26.5%	6.1	high
ALTERNATIVES	HFRX Global HF	4.7%	4.3	high
	Avg PE Fund	23.0%	5.3	high
KURTOSIS	ZCF 1% left (vs -2.33 for normal curve)	-2.92	0.5	low
CORRELATION	Average market correlation with euro equities	37%	0.9	high

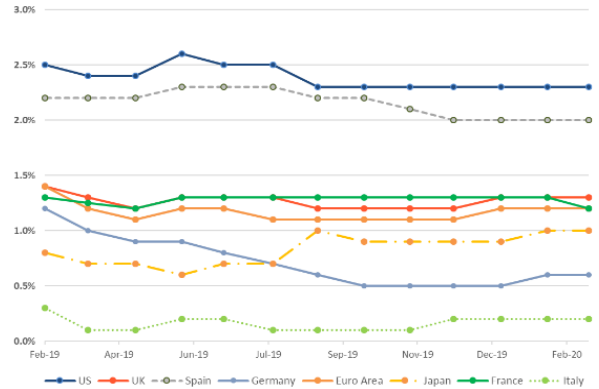
*Note: Throughout the text we refer to volatilities as being "low", "medium" or "High". We define this by defining three equal "sized" regimes over the last 12 months. i.e. "High" volatility implies that volatility is in the upper third of its statistical range over the last 12 months. The table shows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

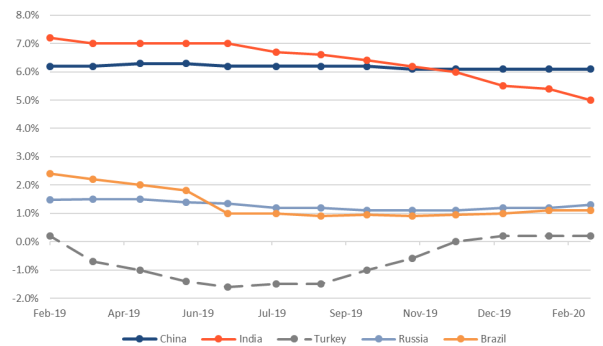
## Major Volatility-Driving Events

- ▶ World Economy under fear of impact of the Corona Virus which has spread to a worldwide epidemic. Concerns about the global economy have had huge effects on capital markets. Italy confining cities in the north of the country.
- ▶ S&P500 fell more than 10% from record high in the quickest slide in history. The FED's emergency rate cut led to US 10y yields below 1% for the first time, US 30y TIPS real yields turned negative also for the first time in history, 10y German Bunds at -0.66% yield.
- ▶ Saudi Arabia pulling out of the OPEC and Russia not agreeing with current decisions led to the breakdown of the OPEC. Oil prices lose more than 30%.
- ▶ Turkey requests support from NATO after conflict with Syria sparked again. President Erdogan raises pressure as he opens borders for refugees violating the agreement reached with the EU.
- ▶ Morgan Stanley to buy E\*TRADE in a \$13 bn take over which is the biggest deal by a US bank since the 2008 crisis. This will position the bank more firmly in the segment of retail investors.
- ▶ Thyssen-Krupp, German based steel company sells its elevator business to a consortium of investors for a reported value of \$17 bn.
- ▶ Economic activity jumps to six month high in the Eurozone. Services industry proving to be most resilient whereas factors are still impacted by the Corona Virus.
- ▶ Porsche plans to issue \$6.6 bn in green debt to finance the push of its electric fleet.
- ▶ Aeroports de Paris to take a stake of 49% in India's GMR Airports for \$1.5 bn enhancing its footprint dynamic in Asian markets.
- ▶ German insurance company Allianz posts record earnings of €11.9 bn and plans to buy back shares.

**GDP ESTIMATES FOR 2020, DEVELOPED COUNTRIES**



**GDP ESTIMATES FOR 2020, DEVELOPING COUNTRIES**

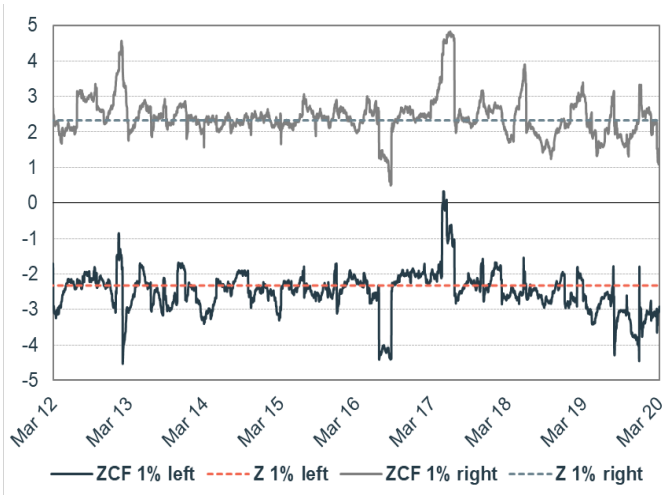


# Kurtosis

## Correlation in the equity markets

The distribution of risks in European equity market display skewness with the ZCF 1% left at -2.92 and the right ZCF 1% at +1.13 (both as of 6<sup>th</sup> of march).

### *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 Eurostoxx 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.

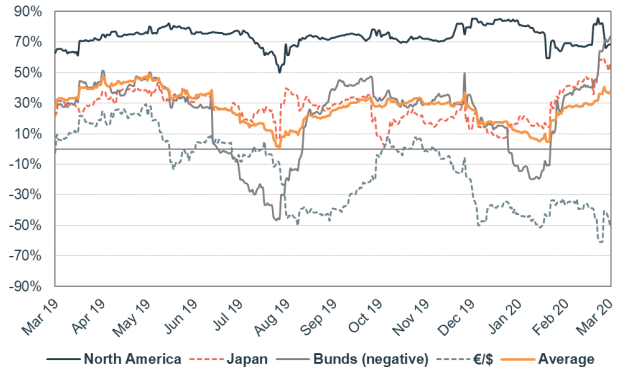
We also show the Cornish-Fischer expansion result for the same market. This indicates how far from a normal distribution each tail was.

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. The biggest variations from +/-2.33 came in 2008, 2010 and 2016.

# Inter-market correlations with EU equities

↗ 37.1% AVERAGE CORRELATION

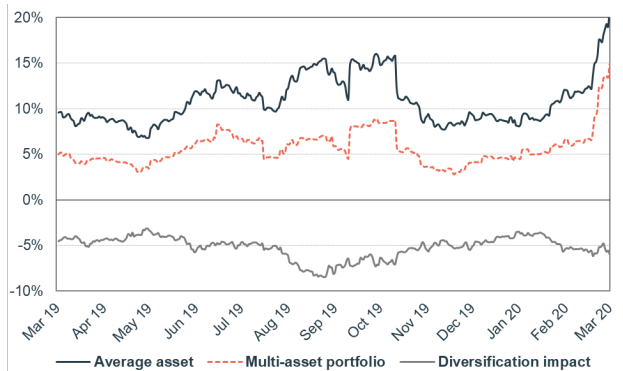
Inter-market correlations (with EU equities)



Correlation increased during January, leading our average correlation indicator to change from 24.2% to 37.1%.

↗ 20.8% AVERAGE VOLATILITIES

Multi-asset portfolio volatility



↗ 14.9% PORTFOLIO VOLATILITY

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

The average asset volatility doubled moving from 10.8% to 20.8% and the benefit of multi-asset diversification improved, increasing from 4.8% to 6.0%.

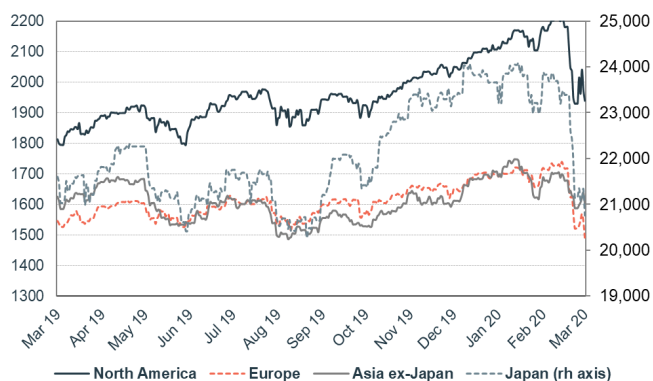
In combination, multi-asset portfolio volatility increased from 6.0% to 14.9%.

*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

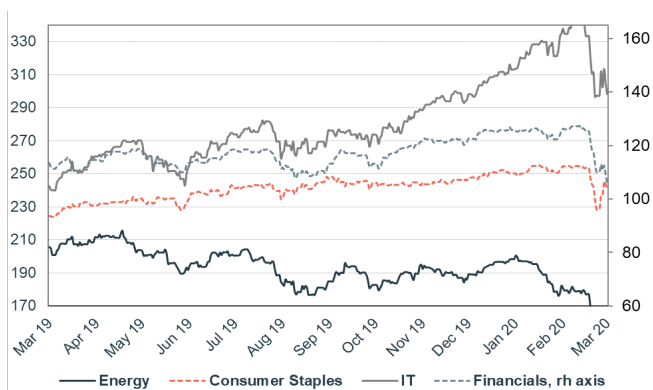
**STOCK PRICE PERFORMANCE: REGIONS (LOG SCALES)**



**-10.2%**  
Europe

The equity markets realized losses. North America was neutral -7.9%, Asia ex-Japan lost -1.2%, Europe lost -10.2%, Japan (Nikkei) lost -10.6%.

**STOCK PRICE PERFORMANCE: SECTORS (LOG SCALES)**



**-13.5%**  
FINANCIALS

**-7.2%** IT

**-18.7%**  
ENERGY

**- 4.1%**  
CONSUMER  
STAPLES

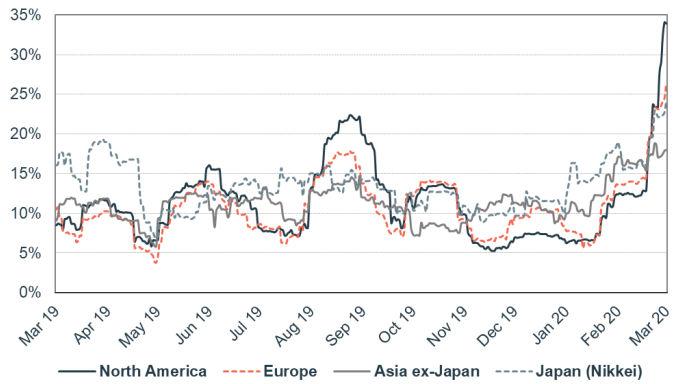
Sectors movements were also negative and ended up with Energy losing the most.

Energy lost -18.7%, Consumer Staples lost -4.1%, Financials lost -13.5%, IT lost 7.2%.



# Equities Volatility

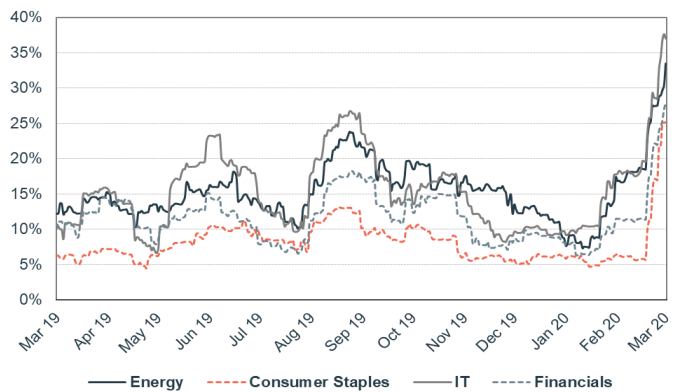
**EQUITY VOLATILITY: REGIONS**



**26.3%** EUROPE

All regional volatilities spiked, settling in a high regime. North America rose from 11.2% to 33.9% (medium up to high) Asia ex-Japan rose from 14.9% to 18.0% (high) Europe rose from 12.2% to 26.3% (high) Japan (Nikkei) rose from 17.7% to 24.1% (high).

**EQUITY VOLATILITY: SECTORS**



Sector volatilities experienced massive spikes as well, all settling in a high regime.

Energy rose from 13.6% to 33.4% (medium up to high), Consumer Staples rose from 5.8% to 25.2% (low up to high), Financials rose from 10.3% to 27.9% (medium up to high), IT rose from 16.7% to 37.0% (medium up to high).

# Equity Implied Volatility

## Market-Implied Near Term Outlook

### Implied Volatility

Implied volatility for both US and EU Markets skyrocketed. VIX rose from 18.8 to 41.9 (low up to high), VSTOXX rose from 17.2 to 43.0 (medium up to high).

IMPLIED VOLATILITY



41.9% VIX

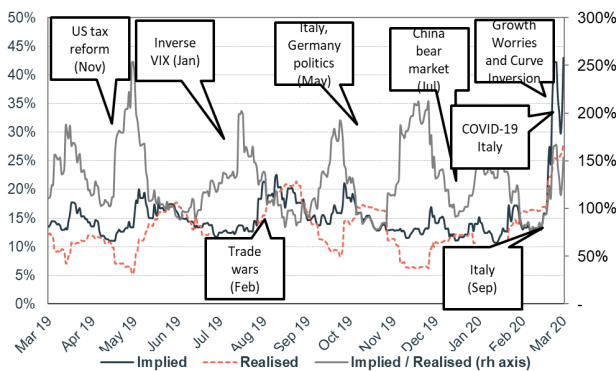
43.0% VSTOXX

### Implied vs Realised Volatility

(European equity) implied volatility spiked. The realised volatility of the Euro Stoxx 50 index over 30 days moved upwards from 14.6% to 28.0% (high) bringing the ratio of implied/realised volatility to move up from 117% to 153%.

This ratio is now suggesting that the market is expecting volatility-inducing news over the next 30 days compared to the last 30 days.

IMPLIED VS. REALISED VOLATILITY



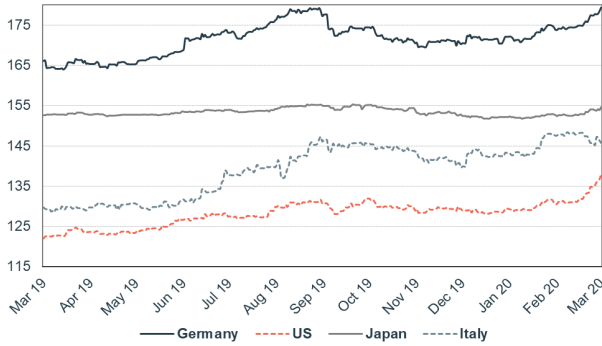
153% IMPLIED/REALISED VOLATILITY

**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**

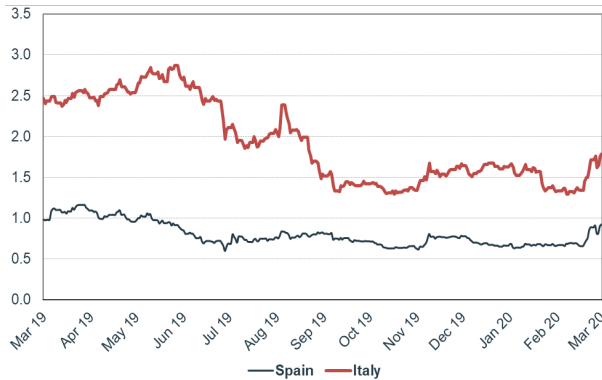


### Prices

Government bond prices were all directed upwards as yields decreased.

Germany gained +2.5%, US gained +4.9%, Japan gained +1.2%, Italy stayed neutral at +0.0%.

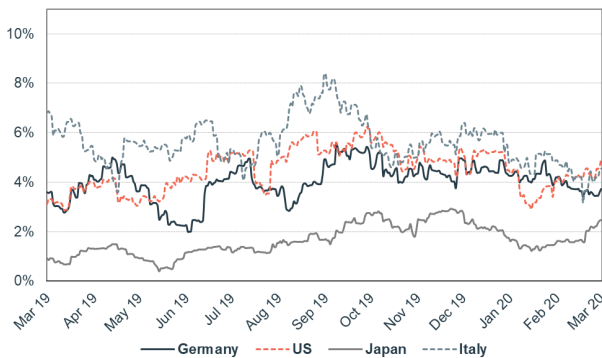
**10 YEAR BOND SPREADS OVER GERMANY, %**



Italian spreads over Germany increased to 1.78%.

Spanish spreads increased to 0.92%.

**VOLATILITY OF 10Y BOND FUTURES**



Volatility moves were mixed, triggering a regime switch for all observed markets except for Italy.

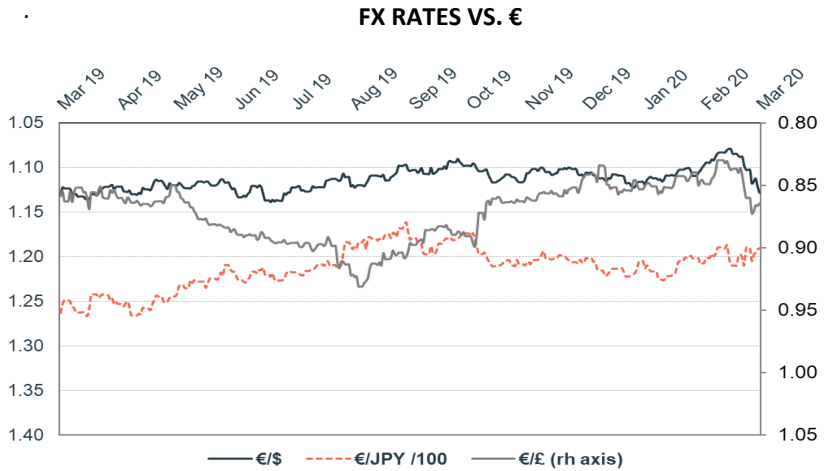
Germany fell from 4.3% to 3.7% (high down to medium), US rose from 3.9% to 5.0% (low up to high), Japan rose from 1.5% to 2.5% (medium up to high), Italy fell from 5.1% to 4.6% (low).

# Foreign Exchange

## Prices

Currency moves were mixed for the Euro.

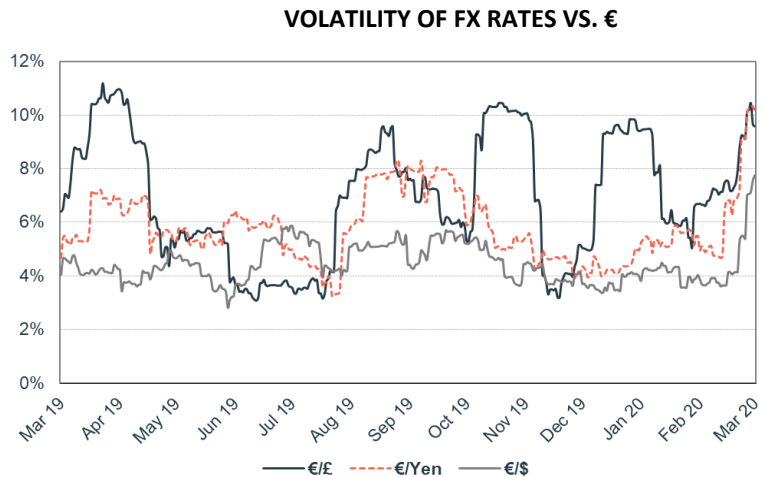
Euro gained 1.7% against the US Dollar, Euro lost 0.9% against the Japanese Yen, Euro lost 0.6% against the Swiss Franc, Euro gained 2.9% against the British Pound.



## Volatility

FX volatility moves were all upwards and regime switches can be observed.

€/\$ rose from 4.0% to 7.7% (low up to high), €/Yen rose from 5.7% to 10.1% (medium up to high), €/CHF rose from 2.6% to 3.6% (low up to medium), €/£ rose from 5.4% to 9.6% (low up to high).



↗ 7.7%

€ vs. \$

↗ 9.6%

€ vs. £

↗ 10.1%

€ 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

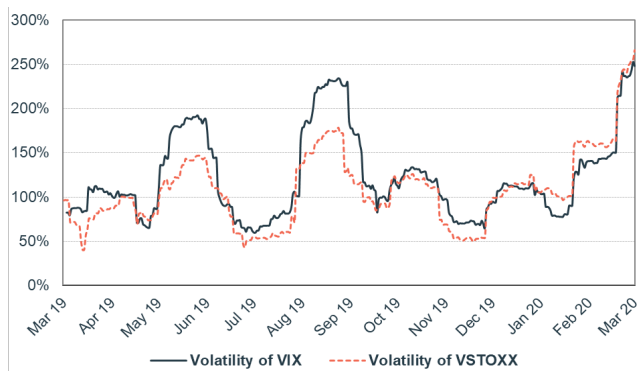
Option volatility is mainly driven by the volatility of volatility and moves in prices of the underlying instruments affecting options' deltas.

## Implied volatility

Volatility of implied volatility increased dramatically and is now considered very high.

Volatility of VIX rose from 141.9% to 248.1% (high), Volatility of VSTOXX rose from 162.4% to 266.1% (high).

**VOLATILITY OF VOLATILITY**



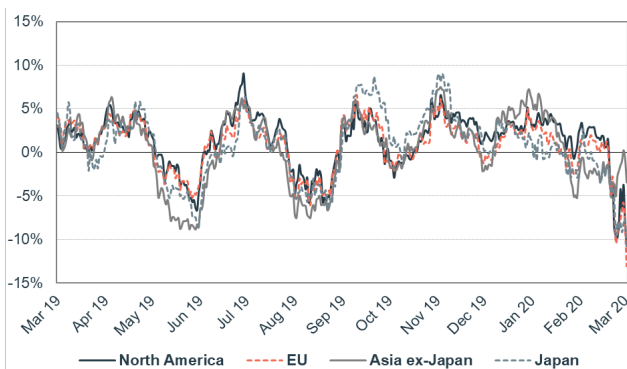
248.1% US

266.1% EUROPE

## Major (Regional Equity) price moves

(Equity) price moves were extremely more volatile compared to recent history, ending the month with a loss position. Price moves are likely to have had a visible impact on option volatility.

**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

- 22.2% OIL

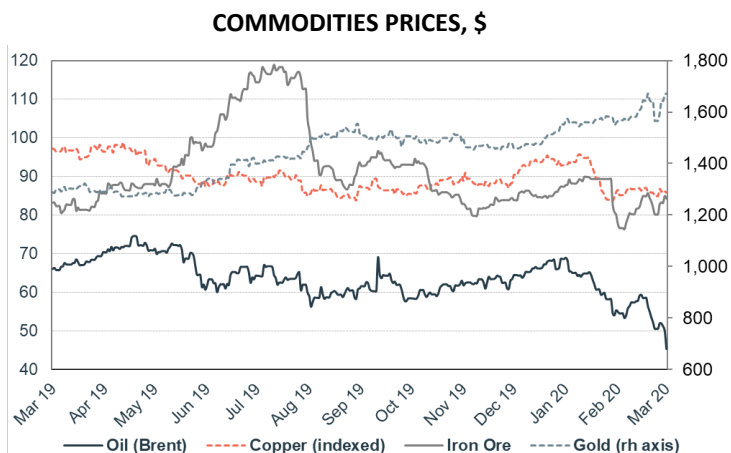
+ 5.7% GOLD

+ 2.2% COPPER

## Prices

Commodities price moves were mixed.

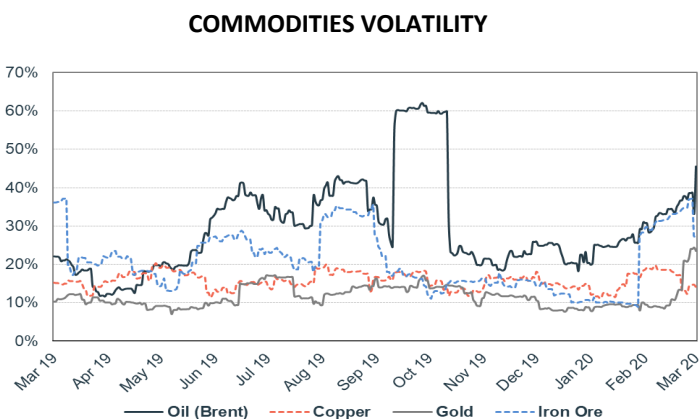
Oil (Brent) lost -22.2%, Gold gained +5.7%, Copper gained +2.2%, Iron Ore gained +5.1%.



## Volatility

Commodity volatility moves were mixed, determining mixed regime switches as well.

Oil (Brent) rose from 25.7% to 45.6% (medium up to high), Gold rose from 9.4% to 23.4% (low up to high), Copper fell from 17.5% to 14.0% (high down to low), Iron Ore rose from 9.3% to 26.5% (low up to high).

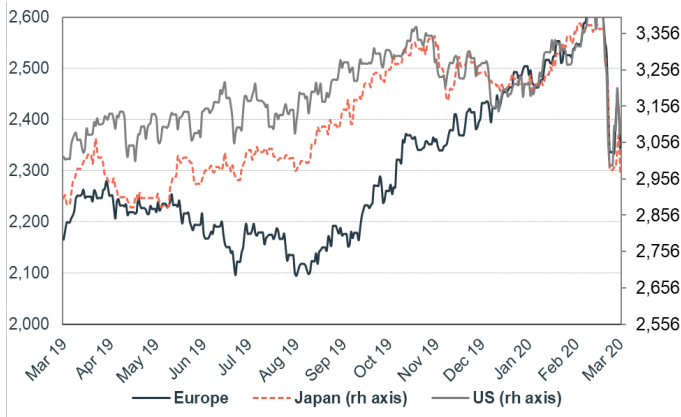


*Note: all prices refer to near futures rather than spot with the exception of iron ore which is a spot price.*

# Real Estate and Alternatives

## (Real Estate Share Prices)

REAL ESTATE (REIT) PRICES



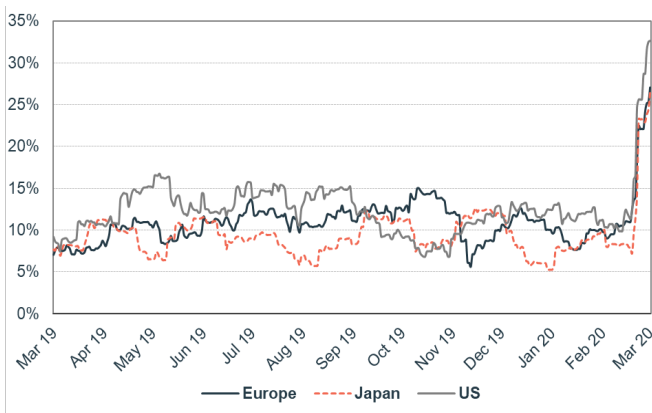
- 7.2% EUROPE

- 5.8% US

- 11.2% JAPAN

Real estate prices showed a general drop: US lost -5.8%, Europe lost -7.2%, Japan lost -11.2%.

REAL ESTATE (REIT) VOLATILITY



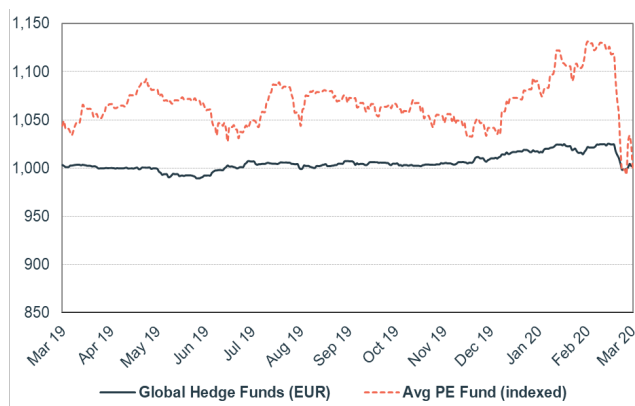
Volatility moves were up, the overall regime is considered now high for all observed markets. US rose from 12.7% to 32.6% (medium up to high), Europe rose from 10.1% to 27.1% (medium up to high), Japan rose from 9.2% to 26.5% (medium up to high).

*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.*

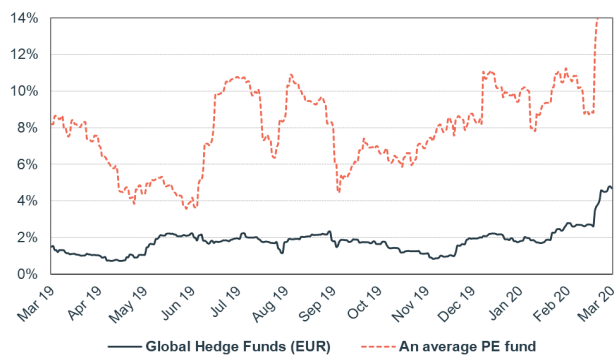
# Alternatives

ALTERNATIVES PRICES



The average hedge fund gained +0.4%, an average PE fund lost -11.7%.

AI VOLATILITY



The average hedge fund rose from 2.4% to 4.7% (high), an average PE fund rose from 11.1% to 23.0% (high).

↗ 4.7% HFRX volatility

↗ 23.0% 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 until 09<sup>th</sup> March 2020, and news and events are included up to that date. The commentary was written on or before 09<sup>th</sup> March 2020.

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