# Flows & Liquidity

## Policy shift?

- **One line of thought views yesterday's ECB meeting as a first step to a shift to a form of yield control with an implicit yield target perhaps close to current yield and spread levels in the Euro area.**
- **Although not our house view, this line of thought raises questions about comparisons to other central banks, i.e. the BoJ and Reserve Bank of Australia, which had introduced yield target frameworks in September 2016 and March 2020, respectively.**
- **While initially markets tested these regimes by inducing these two central banks to buy more bonds, eventually once markets perceived the central bank yield target as credible, the pace of bond purchases declined.**
- **A potentially reduced QE pace by the ECB in the future would imply a lower pace of liquidity creation in the global financial system and less support for asset prices going forward.**
- **With bitcoin failing to break out above $40k, the balance of risks is still skewed to the downside over the near term.**

- This week's ECB meeting generated a lot of debate regarding a potential policy shift. One line of thought views yesterday's ECB announcement as a hint towards tapering, i.e. reduction in the pace of QE bond purchases going forward. Another line of thought (our economists' view) views yesterday's ECB announcement as confirming greater emphasis towards financial conditions without entailing significant policy shift. A third line of thought views yesterday's ECB meeting as a form of yield control with an implicit yield target perhaps close to current yield and spread levels in the Euro area. This third line of thought is the most intriguing one and raises questions about comparisons to other central banks, i.e. the BoJ and Reserve Bank of Australia, which had introduced yield target frameworks in September 2016 and March 2020, respectively. In what follows, we focus on what the implications may be in terms of flows and liquidity creation in the risk scenario where this third line of thought materializes.

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**Global Markets Strategy**
**Global Quantitative & Derivatives Strategy**

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**Figure 1: Annualized monthly purchases of JGBs by the BoJ**
In ¥tr. Annualized 3-month moving average of net JGB purchases.


Source: BoJ, J.P. Morgan

**See page 25 for analyst certification and important disclosures.**

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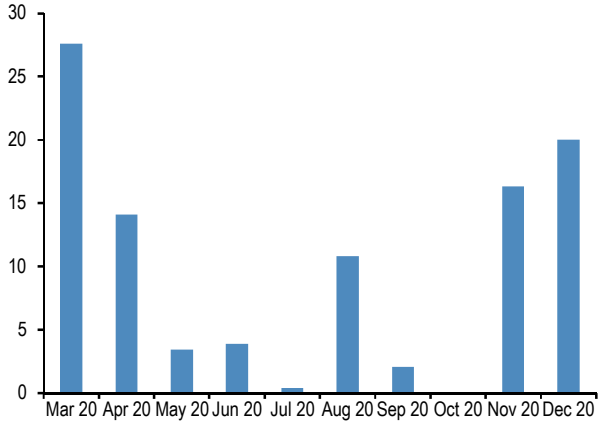
- To answer this question, we look at the BoJ and RBA experiences with their yield targeting frameworks. In a yield targeting framework, the role of quantities such as the monetary base is downgraded and becomes much less important than before. The central bank could reduce the pace of QE purchase in the future if it thinks it can achieve its yield target with fewer bond purchases, for example in a scenario where markets perceive the central bank's yield target as credible. Any potential reduction in bond purchases would be practically speaking equivalent to tapering in terms of its impact on liquidity conditions. Such policy shift means that of the two channels of its monetary policy framework, i.e. the price channel and the quantity channel, the latter could diminish over time. Indeed, the pace of QE purchases exhibited a steady decline after the BoJ introduced its yield targeting framework in September 2016 from an annualized pace close to its ¥80tr per year purchase target. For the RBA, it introduced its yield targeting framework in March 2020 and initially bought significant amounts of bonds, before the pace declined sharply until it introduced a more traditional QE program in November 2020. Thus, while initially markets tested these regimes by inducing these two central banks to buy more bonds, eventually once markets perceived the yield target as credible the pace of QE bond purchases declined (Figure 1 and Figure 2). In the case of the ECB, yield targeting is admittedly more challenging given the multitude of countries and credit instruments. As a result, the initial testing period by markets of an implicit yield target regime scenario could be more prolonged or more intense until markets perceive the new regime as credible.

**Figure 2: RBA bond purchases after the introduction of yield control**

In A$bn. Net purchases of Australian government and semi-government bonds since March 2020.



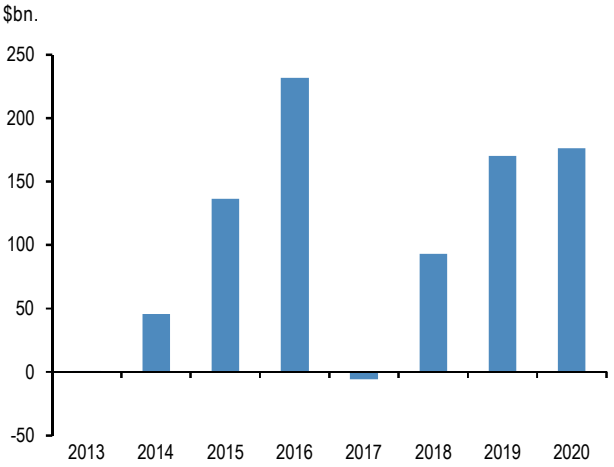

Source: RBA, J.P. Morgan.

- What is the quantity channel and how does it operate? The quantity channel has several facets, in our opinion.
- Firstly, the quantity channel works via an injection of reserves into the banking system. QE forces the banking system to hold more reserves, effectively a cash asset for banks. In theory, forcing banks to hold more cash assets could alter their behavior by inducing them to take more duration and credit risk on their remaining assets, e.g. by purchasing bonds or making loans, something that should ultimately help credit creation. If this reserve injection slows in the future, that could lead to less risk taking by banks and potential weaker credit creation. However, Eurozone banks are already flooded with so many reserves, so slower reserve accumulation from here will most likely only have a marginal impact on their risk taking and on credit creation going forward.
- In addition, QE tapering combined with yield targeting would make little difference if QE only entails banks replacing their bond holdings with reserves. This is not only because Eurozone banks are already flooded with a lot of reserves, but also because of the Euro area's overall flat yield curves shapes even if the multitude of jurisdictions and yield curves allow for provides some opportunities for yield pickup within the Euro area. The overall flat yield curve shapes, means that bonds and reserves are very similarly yielding assets, so changing the pace at which banks replace their bond holdings with reserves should make little difference also.
- But the ECB does not only buy bonds from banks. Indeed, in contrast to when the ECB first started its QE purchases and Euro area banks were net sellers of bonds, Euro area banks were net buyers of bonds in 2020. And QE's quantity channels become more important when the central bank buys bonds from non-bank investors, e.g. an asset manager or pension fund or insurance company. This is because in this case the central bank boosts money supply, i.e. it boosts the cash balances of non-bank investors, effectively injecting more liquidity into the financial system outside banks. When the central bank buys bonds from banks, there is no change in broad money supply. We have argued before that this broad liquidity channel is a lot more important than the narrow or banking liquidity channel, i.e. the reserve creation in the banking system. Reserve creation reverberates into bonds only, as banks trying to pass low-yielding reserves to other banks by purchasing bonds until reserves and bonds have roughly equal yields. The rise in broad money supply reverberates

into all other asset classes including equities and real estate as more cash is chasing assets globally.

- In the equity space, this broad liquidity effect takes mostly the form of equity price appreciation given limited net equity issuance globally. But in the bond space, this broad liquidity effect takes mostly the form of higher issuance and to a lesser extent the form of price appreciation. Therefore, in principle, QE boosts bond demand and increases the capacity of debt capital markets, helping to increase in issuance. In turn, higher issuance boosts credit creation. Admittedly in the case of Euro area, bond issuance has been boosted by both QE and TLTROs, so to the extent the latter continue the impact on issuance from a potential reduction in the QE pace should be less pronounced.
- So a potentially reduced QE pace by the ECB implies a lower pace of broad liquidity creation in the global financial system and less support for asset prices going forward. Over the year, since the virus crisis erupted, global liquidity, proxied by global M2 (ex. China), has risen by around $10.9tr to $67.1tr. This compares to a bond universe of $43.8tr held outside banks and an equity universe of $86.9tr. In other words, global M2 is roughly equal to the capitalization of global equities and significantly higher than the capitalization of bonds held by non-bank investors globally. If, going forward, global M2 rises at a reduced pace than in recent years, then the market cap of global equity and bond universe would have to rise by less also, again assuming investors maintain a stable cash allocation.
- Finally, there is another quantity channel that is likely to be affected if the ECB reduces the amount of bond purchases in the future. This channel is related to the purchases of foreign bonds by European investors. Selling Euro area government bonds to the ECB freed up balance sheet space across other Euro area resident investors such as European pension funds and insurance companies, inducing them to navigate into foreign bonds. Indeed, cumulatively net purchases of foreign bonds by Euro area residents since the ECB started QE purchases have amounted to over $2tr. In this way, the ECB's monetary policy became a global force via leaking out of the Euro area. A stealth tapering of QE purchases by the ECB would also likely translate to reduced purchases of foreign bonds by Euro area investors as there would be less balance sheet capacity to find its way into foreign assets. A potential slowing of this flow out of Euro area would surely have implications for non-Euro area fixed income markets.
- Indeed looking at the longer experience from the BoJ's yield targeting regime, Figure 3 shows that after the BoJ introduce its QQE programme in 2013 and subsequently increased its annual purchase target, these QE purchases began to leak globally as Japanese investors bought steadily larger amounts of foreign bonds. After the BoJ shifted to yield targeting in late 2016, these purchases effectively ground to a halt in 2017.
- In all, in a risk scenario where the ECB would gradually shift to an implicit yield/spread targeting, this could have significant implications for backdrop for liquidity creation in the Euro area and more globally.

**Figure 3: Annual net purchases of foreign bonds by Japanese residents**




Source: BoJ, J.P. Morgan.

## A review of the past year for bitcoin

- The virus crisis by boosting money supply as well as demand for an "alternative" currency supported both gold and bitcoin over the past year. The older cohorts preferred gold, while the younger cohorts preferred bitcoin as an "alternative" currency. Both gold and bitcoin investment vehicles have experienced strong inflows over the past year, as both cohorts saw the case for an "alternative" currency. This simultaneous flow support has caused a change in the correlation pattern between bitcoin and other asset classes, with a more positive correlation between bitcoin and gold but also between bitcoin and the dollar (Figure 4). In addition, the simultaneous buying of US equities and Bitcoin by Millennials has increased the correlation between bitcoin and S&P500 since last March, so it is more appropriate to characterise bitcoin as a "risk" asset rather than "safe" asset also, given its still very high 70% realized volatility. To some extent, this is

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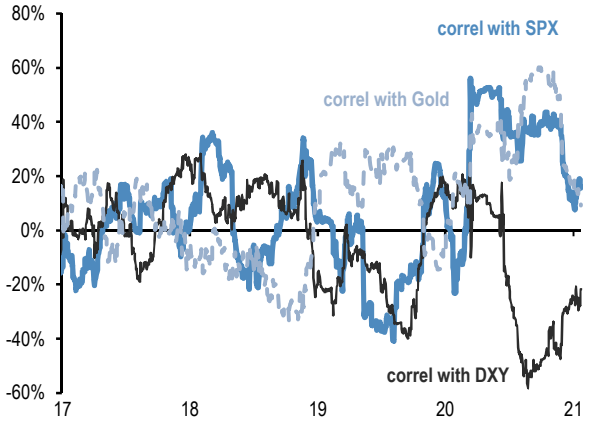
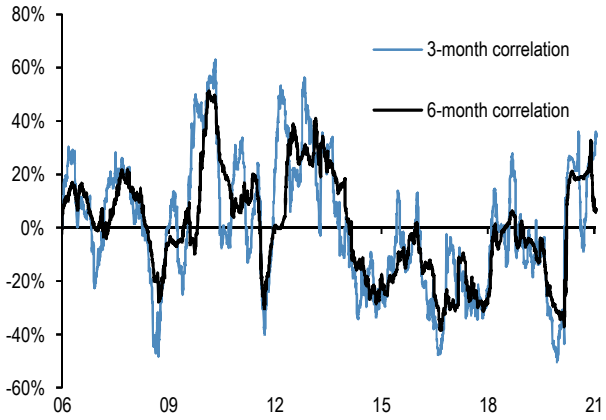
also true with gold. Gold's correlation with the S&P500 has been predominantly positive over the past year and its volatility at close to 20% is more similar to that of equities than to currencies or bonds (Figure 5). In other words, both bitcoin and gold could be more characterised as "risk" rather than "safe" assets based on their behavior over the past year and investors' preference for them is likely more of a reflection of a need for an "alternative" currency rather than a need for a "safe" asset or "hedge".

**Figure 4: Correlation between Bitcoin and other asset classes**
3-month rolling correlation of daily returns




Source: Bloomberg Finance L.P., J.P. Morgan.

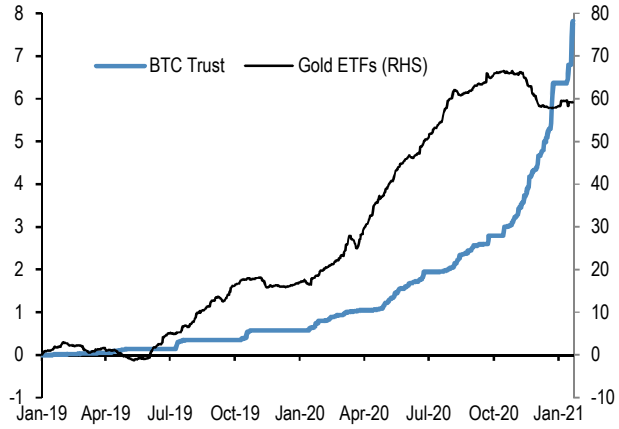
**Figure 5: Gold vs equity correlation**
3m and 6m rolling correlation between daily returns of Gold futures (GC1 Comdty) with S&P 500 Index.




Source: Bloomberg Finance L.P., J.P. Morgan

- In the second half of 2020, bitcoin started receiving more support via corporate adoption, initially with Square and MicroStrategy and last October with Paypal. Paypal's adoption of bitcoin was a big step toward corporate support for bitcoin, which in turn appears to have triggered demand for bitcoin by institutional investors such as family offices, hedge funds and even insurance companies such as MassMutual. Some of that institutional impulse into bitcoin likely came at the expense of gold based on the more than $4bn of inflows into the Grayscale Bitcoin Trust and the more than $7bn of outflows from Gold ETFs since mid-October (Figure 6). There is little doubt that this competition with gold as an "alternative" currency will continue over the coming years given that millennials will become over time a more important component of investors' universe and given their preference for "digital gold" over traditional gold. Considering how big the financial investment into gold is, any such crowding out of gold as an "alternative" currency implies big upside for bitcoin over the long term. As we had mentioned previously in the Oct 23rd F&L, "Bitcoin's competition with gold", private gold wealth is mostly stored via gold bars and coins the stock of which, excluding those held by central banks, amounts to 42,600 tonnes or $2.7tr including gold ETFs. Mechanically, the market cap of bitcoin at $600bn currently would have to rise by almost x4.5 from here, implying a theoretical bitcoin price of $146k, to match the total private sector investment in gold via ETFs or bars and coins.

**Figure 6: Cumulative Flows in Bitcoin Trust & Gold ETF holdings**
Both the y-axis in $bn



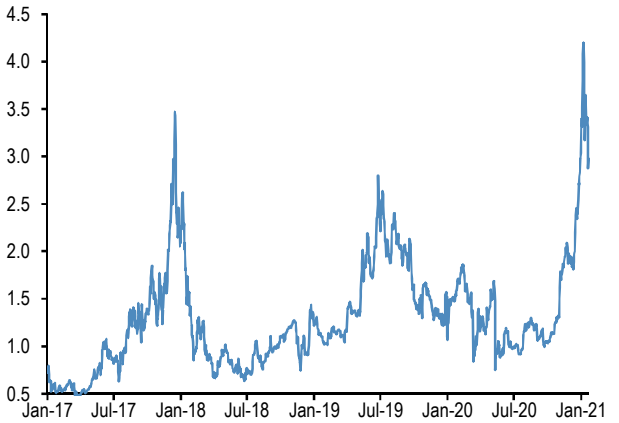

Source: Bloomberg Finance L.P., J.P. Morgan

- But we mentioned previously this long-term potential upside based on an equalization of the market cap of bitcoin to that of gold for investment purposes is conditional on the volatility of bitcoin converging to that of gold over the long term. The reason is that, for most institutional investors, the volatility of each class matters in terms of portfolio risk management and the higher the volatility of an asset class, the higher the risk capital consumed by this asset class. It is thus unrealistic to expect that the allocations to

bitcoin by institutional investors will match those of gold without a convergence in volatilities. A convergence in volatilities between bitcoin and gold is unlikely to happen quickly and is in our mind a multi-year process. This implies that the above $146k theoretical bitcoin price target should be considered as a long-term target, and thus an unsustainable price target for this year.

- In fact, an argument can be made that, in terms of risk capital, bitcoin has largely equalized with gold already (see Jan 4th F&L "Has bitcoin equalised with gold already?"). To see this, one could compare the volatilities of bitcoin and gold or the volatilities of the biggest bitcoin and gold funds given many institutional investors are only allowed or prefer to invest in fund format. The 3m realized vol for bitcoin currently stands at 72% vs. 19% for gold. In other words, the ratio of the two vols suggests that bitcoin currently consumes x3.8 more risk capital than gold. This ratio rises further if one looks at the biggest bitcoin and gold funds. The 3m realized vol for the Grayscale Bitcoin Trust stands at 103% vs. 19% for GLD, the largest gold ETF by AUM. i.e., the ratio of the two vols suggests that the Grayscale Bitcoin Trust currently consumes x5.4 more risk capital than gold. Taking the average of the x3.8 and x5.4 ratios, suggests that bitcoin and its biggest fund on average consume x4.6 more risk capital than gold and its biggest fund, almost equal to the x4.5 ratio needed to equalize the market cap of bitcoin to that of gold for investment purposes. In other words, bitcoin, at current market prices, has already almost equalized with gold in risk capital terms. In our opinion, unless bitcoin volatility subsides quickly from here, a price level of close to $35k should be considered as an upper bound of its fair value range at current levels of volatility. This challenges the idea that a price in the region of $50k-$100k region is a sustainable bitcoin target for 2021 in the absence of a significant decline in bitcoin volatility.
- What about the lower bound of its fair value range? In our opinion one way of thinking about the lower bound of its fair value is based on the mining cost or intrinsic value of bitcoin. The ratio of the bitcoin market price to its intrinsic value is shown in Figure 7. The current ratio is higher than its previous mid-2019 peak and matches its end-2017 peak, again raising concerns about valuations. This is not say that the mining cost is driving the market value. The opposite is likely true. In the early years, bitcoin's production cost had naturally stronger influence on the price because new coin generation was a higher percentage of existing stock or supply. Now that more than 18.6m bitcoins have been mined already (vs. max supply of 21m) and new coin generation is a smaller percentage of the existing supply, the influence of the production cost on the price has likely diminished. Thus, in the current conjuncture, the market price is likely driving the production cost rather than the other way round. However, this causality does not mean that the bitcoin price would be diverging from its mining cost on a sustained basis. Similar to gold, when the bitcoin market price is well above the production cost, mining activity and mining difficulty should increase pushing the cost of production up towards the market price, thus inducing some convergence. But similar to previous episodes, some of that convergence could happen with an adjustment in the market price also. We thus view the acute divergence of Figure 7 as another valuation challenge for bitcoin and the current mining cost of $11k as a lower bound of its fair value range.

**Figure 7: Ratio of Bitcoin market price to intrinsic value**
Intrinsic value estimated using the cost of production approach following Hayes (2018)

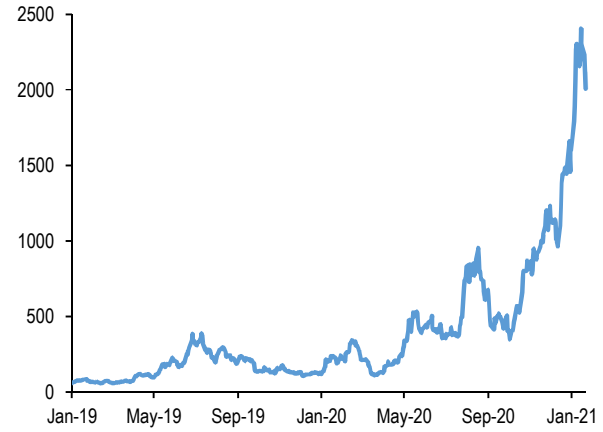



Source: Bitinfocharts.com, J.P. Morgan

- What about positioning? There is little doubt that the institutional flow impulse into bitcoin is what distinguishes 2020 from 2017. And there is no better metric to capture this institutional impulse than the flow trajectory of the Grayscale Bitcoin Trust in Figure 6. This is because many institutional investors are only allowed or prefer to invest in bitcoin in fund format for regulatory or other reasons. In fact, many of them are not even allowed to hold restricted shares of the Grayscale Bitcoin Trust via private placements given the 6-month lock up period, and are thus forced to pay a premium by buying these shares in the secondary market.
- It is, however, wrong to view all these institutional flows of last year as entirely driven by long-term

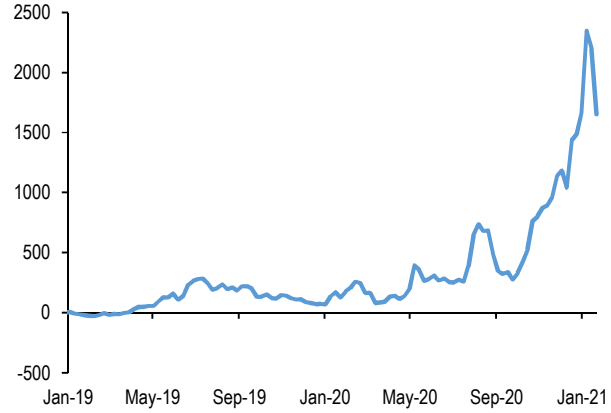
investors. We believe that a significant component of last year's institutional flows into bitcoin reflect speculative investors seeking to front run other more real-money institutional investors. The frothy positioning in CME bitcoin futures is one manifestation of this speculative institutional flow which encompasses momentum traders such as CTAs and quantitative crypto funds. Indeed, bitcoin futures, the preferred vehicle of speculative investors, saw a sharp increase in open interest in recent months (Figure 8) pointing to intense buildup of futures positions. This is also true with our more carefully calculated bitcoin futures position proxy shown in Figure 9, which experienced a similarly steep ascent in recent months to unprecedented territory. As a reminder to our readers, to infer positioning in bitcoin futures, we use our open interest position proxy methodology that we also apply to other futures contracts, where we look at the cumulative weekly absolute changes in the open interest multiplied by the sign of the futures price change every week. The rationale behind this position proxy is that when there is a price increase, the net long position of spec investors increases also with the magnitude of the increase determined by the absolute change in the open interest. It does not matter whether the open interest rises or falls, as the net long position can increase either via fresh longs (increase in open interest) or a reduction of previous shorts (reduction in open interest). And vice versa. When there is a price decrease, the net long position of spec investors decreases also, with the magnitude of the decrease determined by the absolute change in the open interest. It does not matter whether the open interest rises or falls, as the net long position can decrease either via fresh shorts (increase in open interest) or reduction of previous longs (reduction in open interest). Looking at Figure 8 and Figure 9 it is difficult to not have been concerned about a buildup of institutional speculative long futures positions in bitcoin up until the beginning of this year.

**Figure 8: Open interest in CME Bitcoin futures contracts**
$mn. Last obs. for 21st Jan 2021.




Source: CME, J.P. Morgan.

**Figure 9: Our Bitcoin position proxy based on open interest in CME Bitcoin futures contracts**
$mn Last obs. for 21st Jan 2021.




Source: J.P. Morgan

- How much vulnerability do these momentum traders pose for bitcoin at the moment? Clearly, the price surge to above $40k had shifted our bitcoin momentum signals to even higher territory. This is shown in Figure 10 which depicts our short and long lookback period momentum signals for bitcoin. Figure 10 shows that the short lookback period momentum signal rose above 3.5 stdevs in early January, and the long lookback period to above 2.5 stdevs, i.e. to even higher levels than the previous peaks of mid-2019. Both are well above our 1.5stdev threshold typically associated with overbought conditions and a high risk of mean reversion. As we mentioned in our publication last week, the current challenge for bitcoin is that, if its price fails to break out above $40k soon, the momentum signals would keep decaying till the end of March, given a lookback

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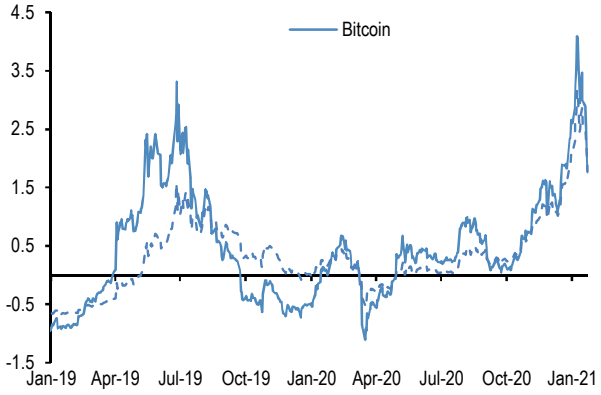
period of around 2-3 months for our short lookback period momentum signal. Bitcoin faced a similar challenge at the end of November when its price was hovering just below $20k. At the time, we had argued that if the bitcoin price had failed to break out above $20k, the momentum signals would have naturally decayed until the end of January creating negative dynamics for bitcoin. Luckily, at the time the institutional flow impulse behind the Grayscale Bitcoin Trust was so strong that bitcoin managed to break out above $20k inducing further position build up rather than position unwinding by momentum traders in December. At the moment, the institutional flow impulse behind the Grayscale Bitcoin Trust is not strong enough for bitcoin to break out above $40k as the 4-week pace of the flow into GBTC (Figure 11) appears to have peaked. Thus the risk is that momentum traders will continue to unwind bitcoin futures positions even after the large almost 30% decline in our position proxy of Figure 9 since its peak on January 7th.

**Figure 10: Momentum signals for Bitcoin**

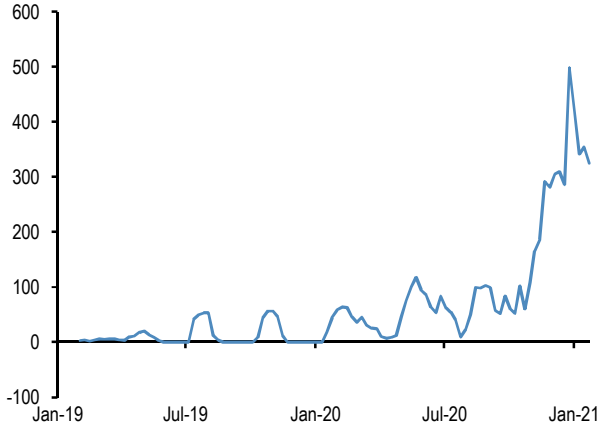
z-score of the momentum signal in our Trend Following Strategy framework shown in Tables A5 and A6 in the Appendix. Solid lines are for the shorter term and dotted lines for longer-term momentum.




Source: Bloomberg Finance L.P., J.P. Morgan

**Figure 11: Grayscale Bitcoin Trust flow**

$mm, 4-week rolling average flows

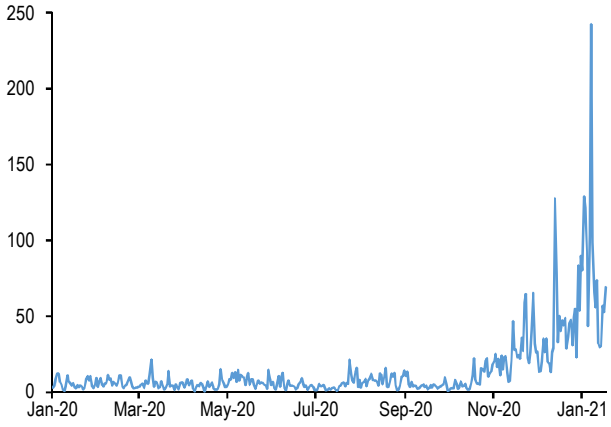



Source: Bloomberg Finance L.P., J.P. Morgan

- What about retail investors? The speculative mania by retail investors characterized the bitcoin surge during 2017. Unfortunately, there are some signs that retail interest has also increased sharply in recent months. For example, as we had argued previously the broadening of corporate support for bitcoin, e.g. via Paypal and Square, has been facilitating and enhancing over time the usage of bitcoin by Millennials. And while we do not yet have data for 4Q volumes, one way to gauge the impact from retail purchases via Paypal is to look at volumes on itBit. These volumes (Figure 12) had increased markedly since Oct 21st when Paypal announced the launch of services to enable trading and holding of cryptocurrencies. Admittedly volumes have slowed over the past two weeks pointing to some slowing in the retail impulse via Paypal.

**Figure 12: Daily volume on itBit**

In $mm per day




Source: cryptocompare.com, J.P. Morgan

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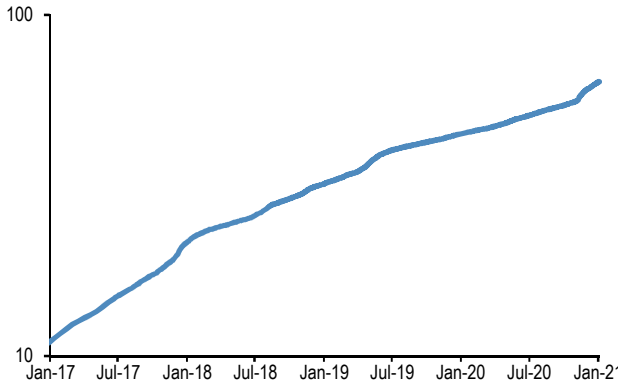
- Another proxy suggesting increased retail participation is new account openings on 'traditional' cryptocurrency exchanges. Figure 13 below shows unique cryptocurrency wallet accounts on blockchain.com. While the number of accounts clearly has an increasing trend over time, there are sharp pickups in new wallet accounts during the retail-driven price spikes in end-2017 as well as mid-2019. Since the start of November 2020, there has been a proportionally similar rise in new wallet accounts to those two previous episodes.

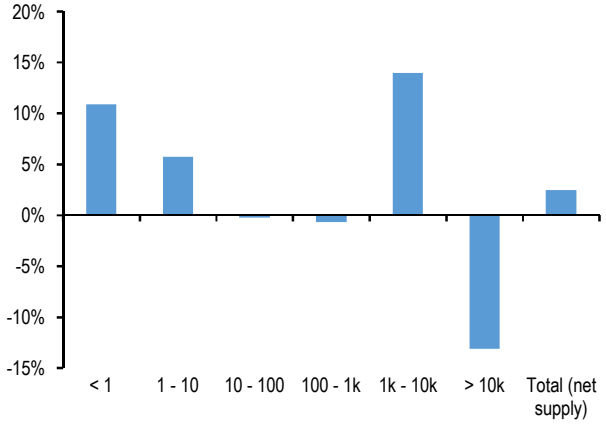
**Figure 13: Unique wallet accounts on blockchain.com**
# of accounts, log scale.




Source: Blockchain.com

- Moreover, data on the distribution of bitcoin balances held in wallet accounts is also suggestive of retail participation. Figure 14 shows percentage change in total bitcoin held in wallet accounts by bucket of bitcoin balance, e.g. < 1 shows the % change in bitcoin held in wallet accounts with a balance of less than one bitcoin. It shows that between the start of 2020 and 2021 accounts with less than one bitcoin or between one and ten bitcoin have seen a marked increase in holdings that is more likely to be retail driven. Similarly, there has been a significant increase in balances held in accounts between 1,000 and 10,000 bitcoin, which is more likely to be institutionally driven. By contrast, balances held in accounts with more than 10,000 bitcoin have declined significantly, suggesting early investors and miners have been selling bitcoin to facilitate the increase of new entrants.

**Figure 14: % increase in bitcoin held in wallet accounts by bucket of wallet balance**
In %




Source: Bitinfocharts.com, J.P. Morgan

- In all, while bitcoin is currently trading within our fair value range of between $11k and $35k (at current levels of bitcoin volatility), the apparent peaking of the flow pace into the Grayscale Bitcoin Trust and a mechanically decay of our momentum signal till the end of March, both imply that the near term balance of risks is still skewed to the downside. In the long term, our theoretical price target of $146k is conditional on bitcoin vol converging to that of gold, which is not only likely to be multi-year process but would also depend on bitcoin ownership becoming more institutional and less retail over the coming years.

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## Table A1: Weekly flow monitor

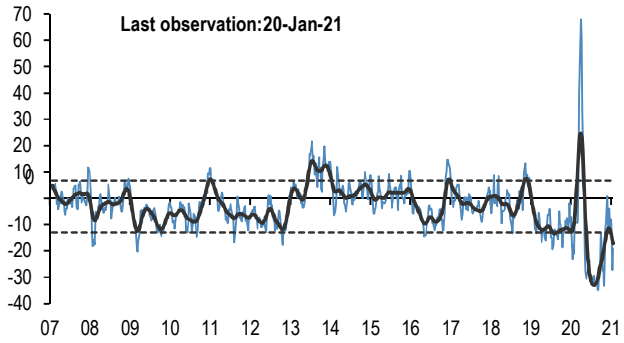
$bn, Includes Global Mutual Fund flows from EPFR and globally domiciled ETF flows from Bloomberg Finance L.P.. US Equities includes US Domiciled MFs from ICI and ETF flows from Bloomberg Finance L.P.

| MF & ETF Flows | 20-Jan | 4 wk avg | 13 wk avg | 2021 avg |
|---|---|---|---|---|
| All Equity | 21.59 | 18.6 | 19.5 | 19.9 |
| All Bond | 17.39 | 15.7 | 10.1 | 15.3 |
| US Equity | -0.33 | -10.7 | -7.6 | -13.3 |
| Intl. Equity | 21.92 | 24.1 | 21.2 | 26.80 |
| Taxable Bonds | 6.80 | 14.1 | 11.4 | 14.2 |
| Municipal Bonds | 0.00 | 2.5 | 2.0 | 2.3 |

Source: EPFR, Bloomberg Finance L.P., ICI, J.P. Morgan.

## Chart A1: Fund flow indicator

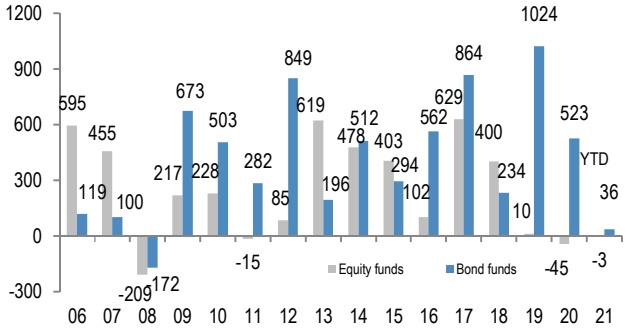
**Difference between flows into Equity and Bond funds**: $bn per week. Flow includes US domiciled Mutual Fund and globally domiciled ETF flows. We exclude China On-shore funds from our analysis. The thin blue line shows the 4-week average of difference between Equity and Bond fund flows. Dotted lines depict ±1 StDev of the blue line. The thick black line shows a smoothed version of the same series. The smoothing is done using a Hodrick-Prescott filter with a Lambda parameter of 100.




Source: Bloomberg Finance L.P., ICI, J.P. Morgan.

## Chart A2: Global equity & bond fund flows

$bn per year of Net Sales, i.e. includes net new sales + reinvested dividends for MF and ETFs. Flows are from ICI (worldwide data up to Q2'20). Data since then are a combination of monthly and weekly data from ICI, EPFR and ETF flows from Bloomberg Finance L.P.




Source: ICI, EPFR, EFAMA, Bloomberg Finance L.P. J.P. Morgan.

## Table A2: Equity and Bond issuance

$bn, Equity supply and corporate announcements are based on announced deals, not completed. M&A is announced deal value and Buybacks are announced transactions. Y/Y change is change in YTD announcements over the same period last year. More details on net bond issuances in Chart A40.

| Equity Supply | 22-Jan | 4 wk avg | 13 wk avg | y/y chng |
|---|---|---|---|---|
| Global IPOs | 2.5 | 7.0 | 9.0 | 193% |
| Secondary Offerings | 11.5 | 9.8 | 13.2 | 59% |
| **Corporate announcements** | | | | |
| M&A - Global | 62.2 | 57.2 | 98.0 | 48% |
| - US Target | 20.0 | 26.5 | 45.5 | 116% |
| - Non-US Target | 42.2 | 30.7 | 52.5 | 10% |
| **Net bond issuance** | **Sep-20** | **3 mth avg** | **YTD avg** | **y/y chng** |
| USD | 78 | 115 | 63 | 28% |
| Non-USD | 25 | 9 | 33 | 4% |

Source: Bloomberg Finance L.P., Dealogic, Thomson Reuters, J.P. Morgan.

## Table A3: Trading turnover monitor

Volumes are monthly and Turnover ratio is annualized (monthly trading volume annualised divided by the amount outstanding). UST Cash are primary dealer transactions in all US government securities. UST futures are from Bloomberg Finance L.P. JGBs are OTC volumes in all Japanese government securities. Bunds, Gold, Oil and Copper are futures. Gold includes Gold ETFs. Min-Max chart is based on Turnover ratio. For Bunds and Commodities, futures trading volumes are used while the outstanding amount is proxied by open interest. The diamond reflects the latest turnover observation. The thin blue line marks the distance between the min and max for the complete time series since Jan-2005 onwards. Y/Y change is change in YTD notional volumes over the same period last year.

| As of Dec-20 | MIN | MAX | Turnover ratio | Vol (tr) | y/y chng |
|---|---|---|---|---|---|
| **Equities** | | | | | |
| EM Equity* | | | 1.3 | $1.1 | 82% |
| DM Equity* | | | 1.4 | $7.7 | 39% |
| **Govt Bonds** | | | | | |
| UST cash | | | 12.1 | $12.6 | 4% |
| UST futures | | | 0.5 | $7.8 | -23% |
| JGBs* | | | 20.5 | ¥1,736 | 13% |
| Bund futures | | | 1.2 | €5.3 | -3% |
| **Credit** | | | | | |
| US HG | | | 0.5 | $0.4 | 10% |
| US HY | | | 0.8 | $0.1 | 16% |
| US Convertibles | | | 1.7 | $0.0 | 25% |
| **Commodities** | | | | | |
| Gold | | | 29.9 | $0.8 | 14% |
| Oil | | | 55.0 | $1.1 | -43% |
| Copper | | | 2.5 | $0.5 | -20% |

* Data with one month lag

Source: Bloomberg Finance L.P., Federal Reserve, Trace, Japan Securities Dealer Association, WFE, J.P. Morgan. * Data with one month lag.

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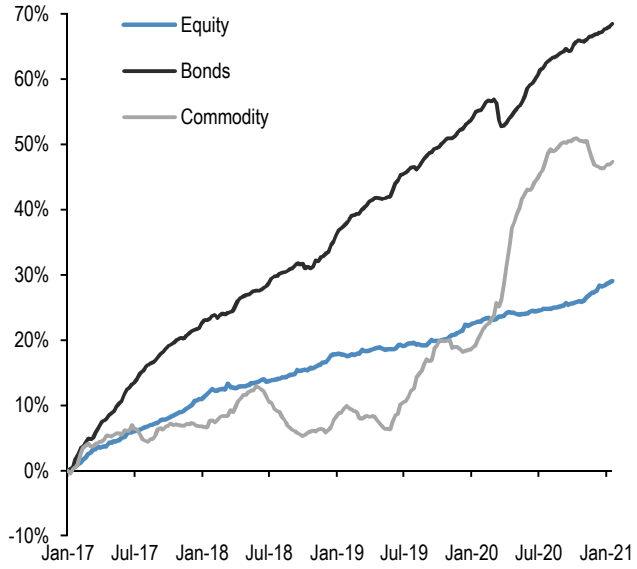
# ETF Flow Monitor (as of Jan 20th)

## Chart A3: Global Cross Asset ETF Flows

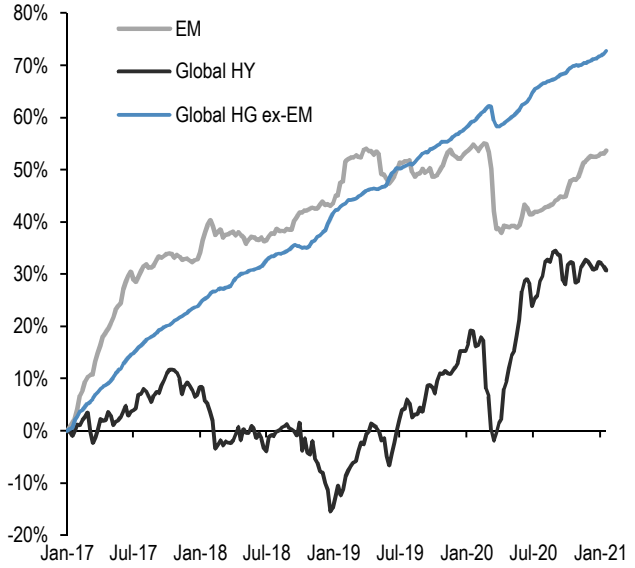
Cumulative flow into ETFs as a % of AUM




Source: J.P. Morgan. Bloomberg Finance L.P.

## Chart A4: Bond ETF Flows

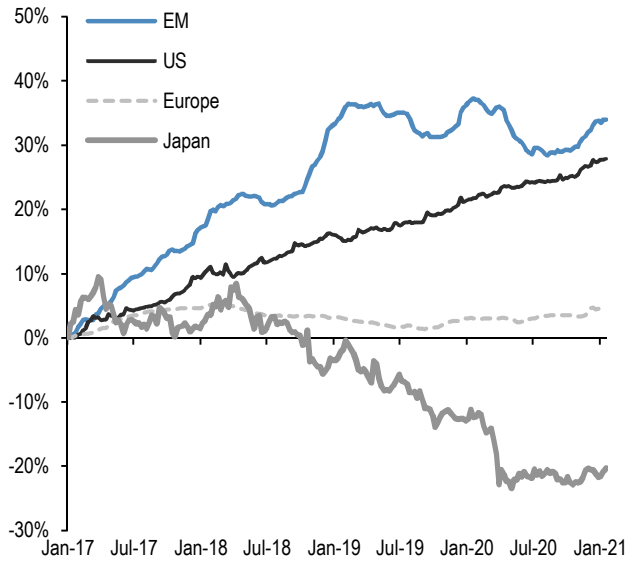
Cumulative flow into bond ETFs as a % of AUM




Source: J.P. Morgan. Bloomberg Finance L.P.

## Chart A5: Global Equity ETF Flows

Cumulative flow into global equity ETFs as a % of AUM

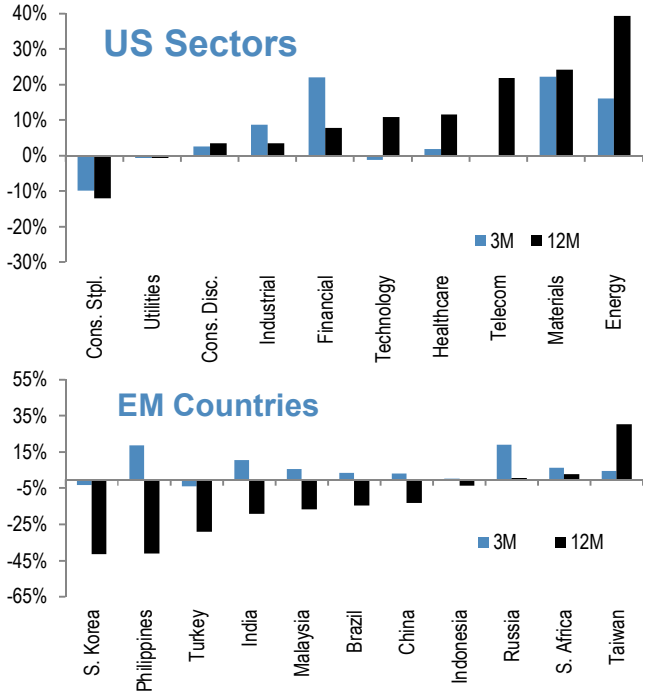



Source: J.P. Morgan. Bloomberg Finance L.P.

Note: We include ETFs with AUM > $200mn in all the flow monitor charts. Chart A5 exclude China On-shore (A-share) ETFs from EM and in Japan we subtract the BoJ buying of ETFs.

## Chart A6: Equity Sectoral and Regional ETF Flows

Rolling 3-month and 12-month change in cumulative flows as a % of AUM. Both sorted by 12-month change




Source: J.P. Morgan. Bloomberg Finance L.P.

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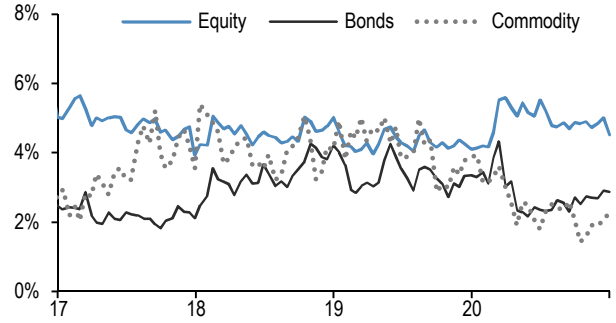
# ETF Short Interest Monitor (as of Dec 31)

## Chart A7: Cross Asset ETF Short Interest

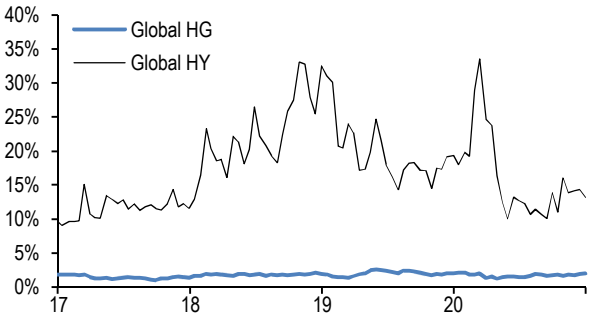
Short interest as a % of outstanding shares. Short interest is for US Domiciled ETFs and is available bi-monthly from Bloomberg Finance L.P. Short interest is weighted by AUM




Source: J.P. Morgan. Bloomberg Finance L.P.

## Chart A8: Bond ETF Short Interest

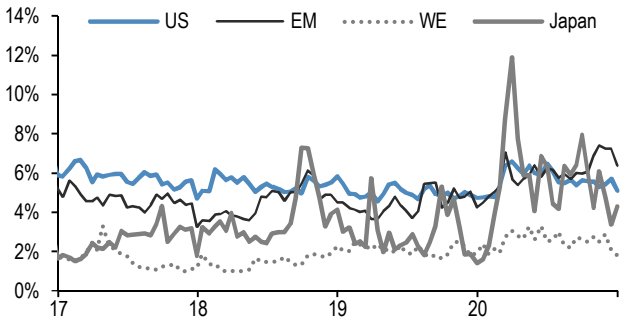
Short interest as a % of outstanding shares. Short interest is for US Domiciled ETFs and is available bi-monthly from Bloomberg Finance L.P. Short interest is weighted by AUM




Source: J.P. Morgan. Bloomberg Finance L.P.

## Chart A9: Equity ETF Short Interest

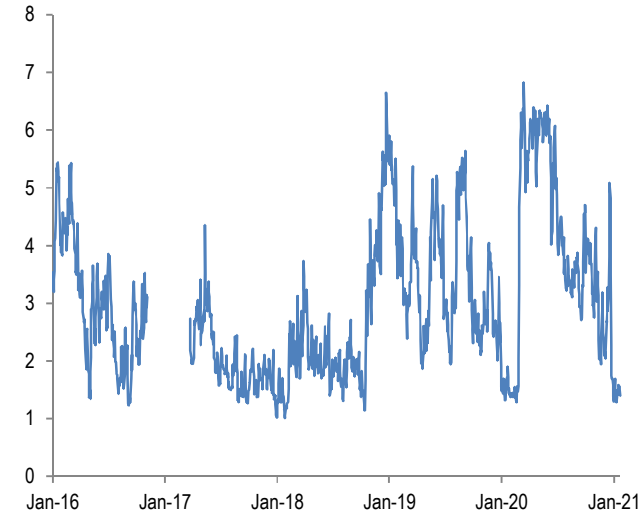
Short interest as a % of outstanding shares. Short interest is for US Domiciled ETFs and is available bi-monthly from Bloomberg Finance L.P. Short interest is weighted by AUM




Source: J.P. Morgan, Bloomberg Finance L.P.

## Chart A10a: Quantity-On-Loan on the SPY US ETF

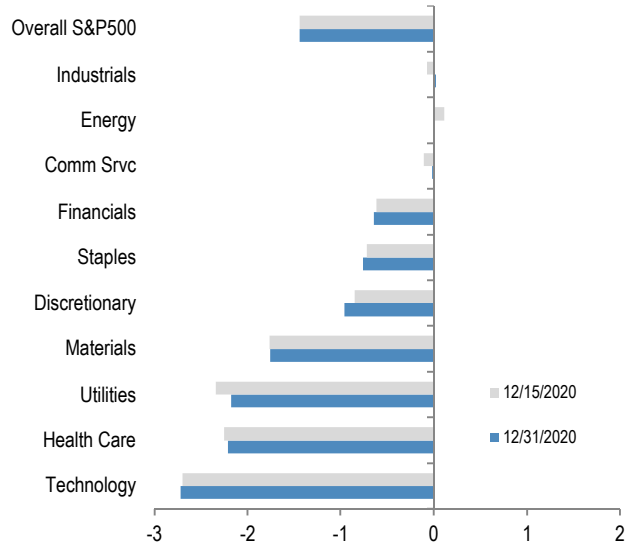
On loan quantity as a % share of share outstanding. Last obs is for 20th Jan 2021.




Source: Datalend, J.P. Morgan

## Chart A10b: S&P500 sector short interest

Short interest as a % of shares outstanding based on z-scores. A strategy which overweight's the S&P500 sectors with the highest short interest z-score (as % of shares o/s) vs. those with the lowest, produced an information ratio of 0.7 with a success rate of 56% (see F&L, Jun 28, 2013 for more details)




Source: NYSE, J.P. Morgan.

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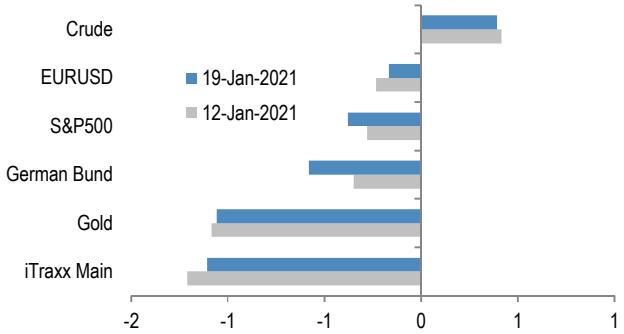
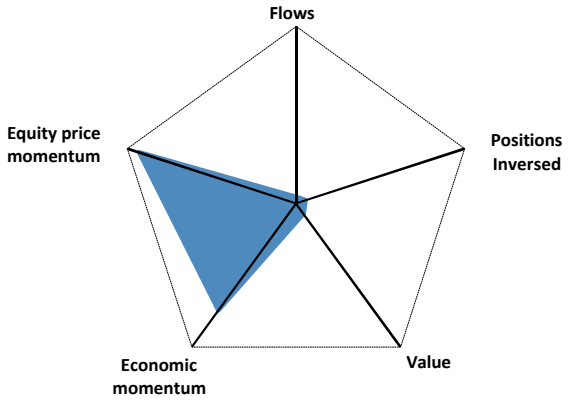
## Chart A11: Option skew monitors

Skew is the difference between the implied volatility of out-of-the-money (OTM) call options and put options. A positive skew implies more demand for calls than puts and a negative skew, higher demand for puts than calls. It can therefore be seen as an indicator of risk perception in that a highly negative skew in equities is indicative of a bearish view. The chart shows z-score of the skew, i.e. the skew minus a rolling 2-year avg skew divided by a rolling two-year standard deviation of the skew. A negative skew on iTraxx Main means investors favor buying protection, i.e. a short risk position. A positive skew for the Bund reflects a long duration view, also a short risk position.




Source: Bloomberg Finance L.P., J.P. Morgan

## Chart A12: Market health map




## Trading signal for S&P500 and 10Y UST using Artificial Intelligence

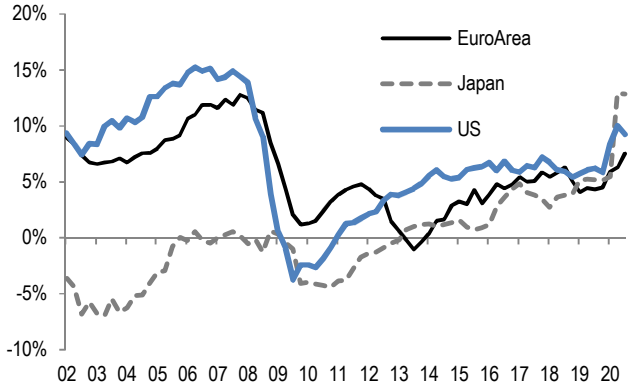
| | 1 Month | 2 Month | 3 Month | 6 Month |
|---|---|---|---|---|
| S&P 500 Index | Down | Down | Up | Up |
| 10Y UST Yield | Up | Up | Up | Up |

**Explanation of Market health map:** Each of the five axes corresponds to a key indicator for markets. The position of the blue line on each axis shows how far the current observation is from the extremes at either end of the scale. The dotted line shows the same but at the beginning of 2012 for comparison. For example, a reading at the centre for value would mean that risky assets are the most expensive they have ever been while a reading at the other end of the axis would mean they are the cheapest they have ever been. Overall, the larger the blue area within the pentagon, the better for the risky markets. All variables are expressed as the percentile of the distribution that the observation falls into. I.e. a reading in the middle of the axis means that the observation falls exactly at the median of all historical observations. **Value:** The slope of the risk-return tradeoff line calculated across USTs, US HG and HY corporate bonds and US equities (see GMOS p. 6, Loeys et al, Jul 6 2011 for more details). **Positions:** Difference between net spec positions on US equities and intermediate sector UST. See Chart A18. **Flow momentum:** The difference between flows into equity funds (incl. ETFs) and flows into bond funds. Chart A1. We then smooth this using a Hodrick-Prescott filter with a lambda parameter of 100. We then take the weekly change in this smoothed series as shown in Chart A1. **Economic momentum:** The 2-month change in the global manufacturing PMI. (See *REVISITING: Using the Global PMI as trading signal*, Nikolaos Panigirtzoglou, Jan 2012). **Equity price momentum:** The 6-month change in the S&P500 equity index.

# Credit growth

## Chart A13: Credit creation in the US, Japan and Euro area

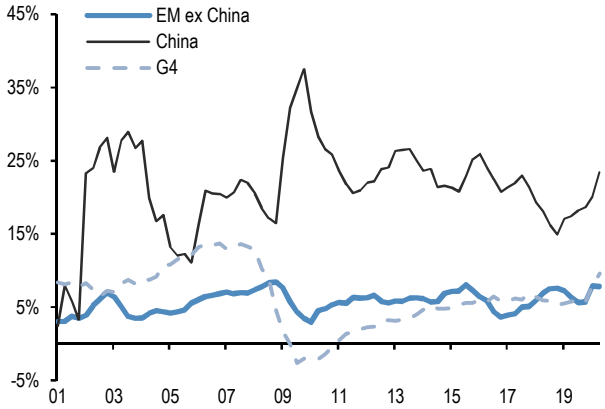
Rolling sum of 4 quarter credit creation as % of GDP. Credit creation includes both bank loans as well as net debt issuance by non-financial corporations and households. Last obs. is for Q2'20.




Source: Fed, ECB, BoJ, Bloomberg Finance L.P. and J.P. Morgan calculations.

## Chart A14: Credit creation in EM

Rolling sum of 4 quarter credit creation as % of GDP. Credit creation includes both bank loans as well as net debt issuance by non-financial corporations and households. Last obs. is for Q2'20.




Source: G4 Central banks FoF, BIS, ICI, Barcap, Bloomberg Finance L.P., IMF and J.P. Morgan calculations.

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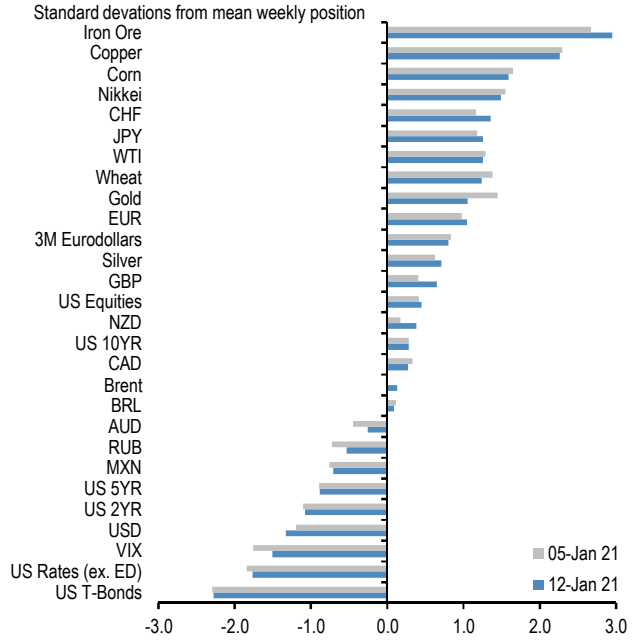
# Spec position monitors

## Chart A15: Weekly Spec Position Monitor

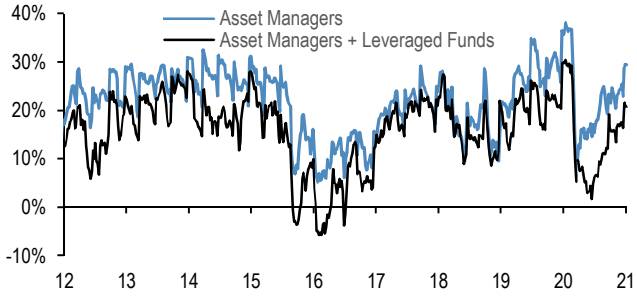
Net spec positions are proxied by the number of long contracts minus the number of short contracts using the speculative category of the Commitments of Traders reports (as reported by CFTC). To proxy for speculative investors for equity futures positions we use Asset managers (see Chart A16), whereas for other assets we use the legacy Non-Commercial category. This net position is then converted to a dollar amount by multiplying by the contract size and then the corresponding futures price. We then scale the net positions by open interest. The chart shows the z-score of these net positions. US rates is a duration-weighted composite of the individual UST futures contracts excluding the Eurodollar contract. The sample starts in Jun 2006 for all futures contracts apart from Brent which starts in Jan-2011.




Source: Bloomberg Finance L.P., CFTC, J.P. Morgan

## Chart A16: Positions in US equity futures by Asset managers and Leveraged funds

CFTC positions in US equity futures by Leveraged funds and Asset managers (as a % of open interest). It is an aggregate of the S&P500, Dow Jones, NASDAQ and their Mini futures contracts.

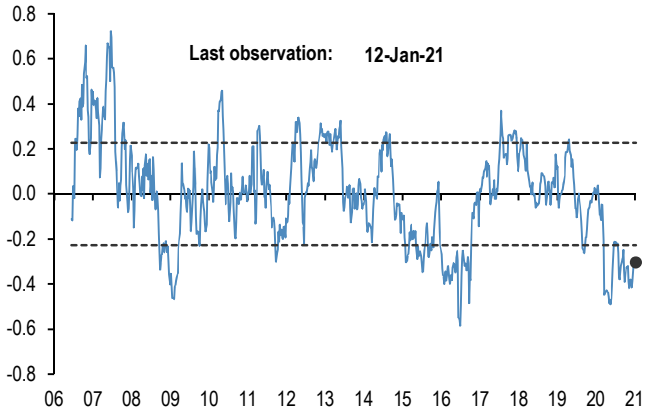



Source: CFTC, Bloomberg Finance L.P. and J.P. Morgan

## Chart A17: Spec position indicator on Risky vs. Safe currencies

**Difference between net spec positions on risky & safe currencies**

Net spec position is calculated in USD across 5 "risky" and 3 "safe" currencies (safe currencies also include Gold). These positions are then scaled by open interest and we take an average of "risky" and "safe" assets to create two series. The chart is then simply the difference between the "risky" and "safe" series. The final series shown in the chart below is demeaned using data since 2006. The risky currencies are: AUD, NZD, CAD, RUB, MXN and BRL. The safe currencies are: JPY, CHF and Gold.

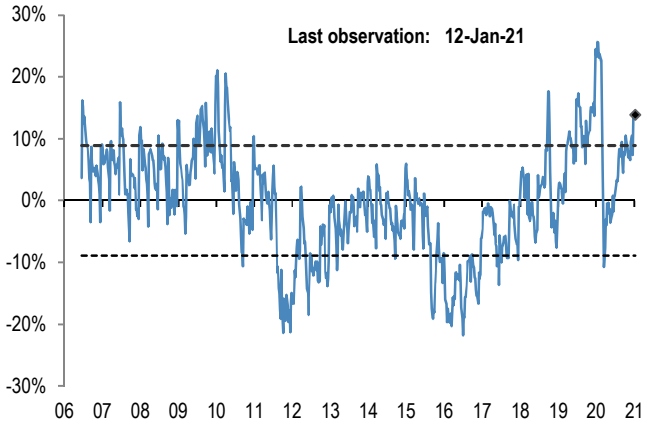



Source: CFTC, J.P. Morgan

## Chart A18: Spec position indicator on US equity futures vs. intermediate sector UST futures

**Difference between net spec positions on US equity futures vs. intermediate sector UST futures**

This indicator is derived by the difference between total CFTC positions in US equity futures by Asset managers (Chart A16) scaled by open interest minus the non-commercial category spec position on intermediate sector UST futures (i.e. all UST futures duration weighted ex ED and ex 2Y UST futures) also scaled by open interest.




Source: CFTC, Bloomberg Finance L.P. and J.P. Morgan

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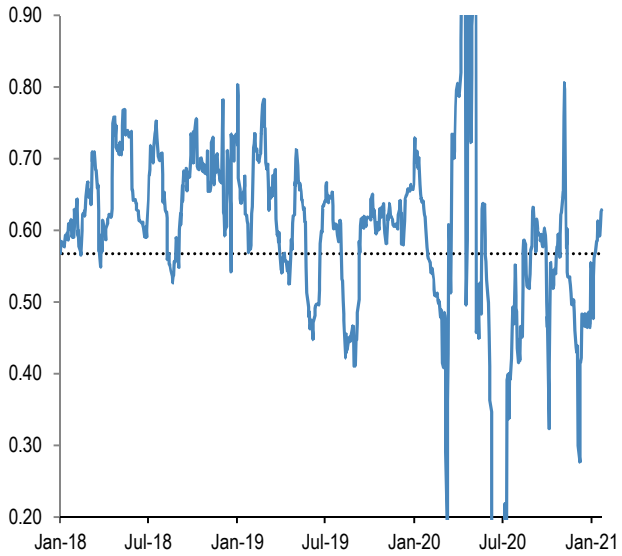
# Mutual fund and hedge fund betas

## Chart A19: 21-day rolling beta of 20 biggest active US bond mutual fund managers with respect to the US Agg bond index

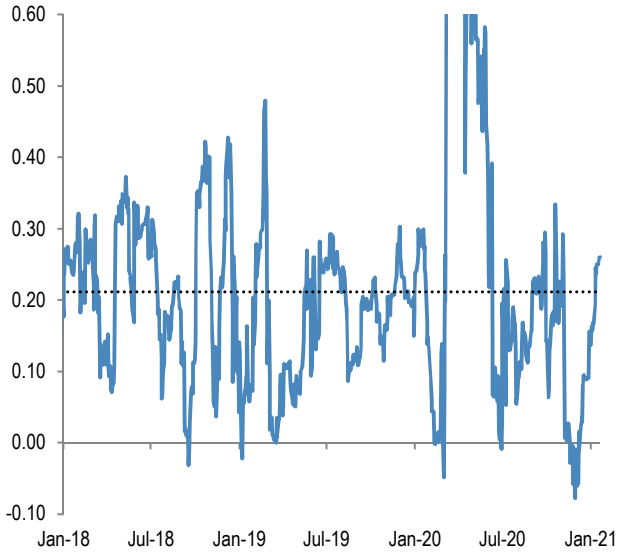
The dotted line shows the average beta since 2013.




Source: Bloomberg Finance L.P., J.P. Morgan

## Chart A20: 21-day rolling beta of 20 biggest active Euro bond mutual fund managers with respect to the Euro Agg bond index

The dotted line shows the average beta since 2013.




Source: Bloomberg Finance L.P., J.P. Morgan.

## Chart A21: Performance of various type of investors

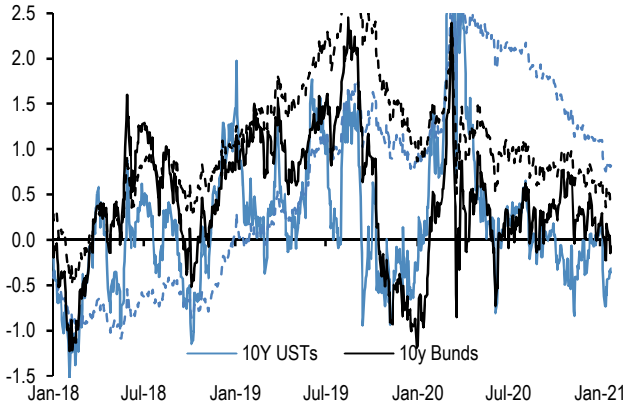
The table depicts the performance of various types of investors in % as of 20th Jan 2021.

| Date | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|
| **Investors** | | | | | | |
| Equity L/S | 2.2% | 11.8% | -5.9% | 12.8% | 8.7% | 1.4% |
| Macro ex-CTAs | 2.8% | 5.6% | 9.8% | 2.9% | 7.8% | 1.0% |
| CTAs | -6.1% | 2.2% | -8.1% | 9.2% | 6.3% | 1.8% |
| Risk Parity Funds | 10.0% | 13.5% | -6.5% | 18.4% | 3.5% | 1.2% |
| US Balanced MFs | 8.4% | 14.0% | -4.9% | 20.1% | 13.2% | 2.4% |
| **Benchmark** | | | | | | |
| MSCI AC World | 7.9% | 24.0% | -9.4% | 26.6% | 16.3% | 3.5% |
| Barclays Global Agg | 3.9% | 3.0% | 1.8% | 8.2% | 5.6% | -0.4% |
| 60 US Equity : 40 US Bonds | 8.8% | 14.3% | -1.9% | 22.2% | 13.3% | 1.4% |
| S&P Riskparity Vol 10 | 12.8% | 10.4% | -4.3% | 22.8% | 11.5% | 1.7% |

Source: Bloomberg Finance L.P., HFR, SG CTA Index, J.P. Morgan.

## Chart A22: Momentum signals for 10Y UST and 10Y Bunds

z-score of the momentum signal in our Trend Following Strategy framework shown in Tables A5 and A6 in the Appendix. Solid lines are for the shorter term and dotted lines for longer-term momentum.




Source: Bloomberg Finance L.P., J.P. Morgan.

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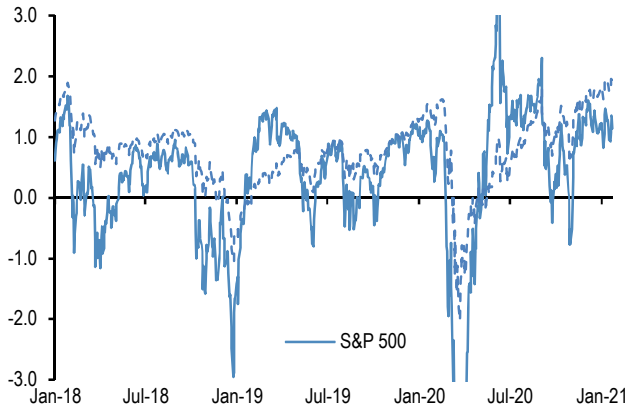
## Chart A23: Momentum signals for S&P 500

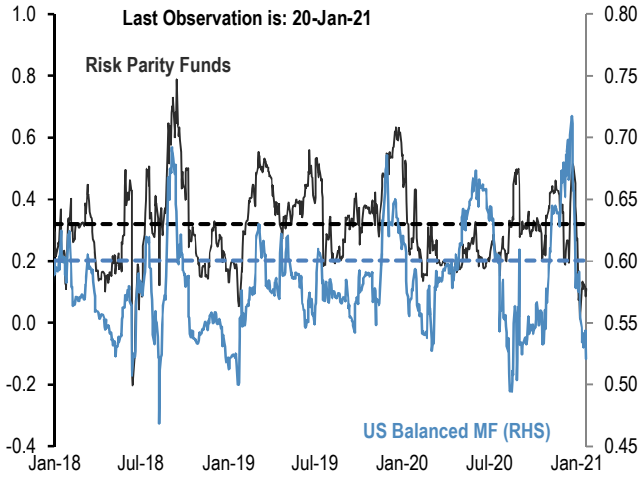
z-score of the momentum signal in our Trend Following Strategy framework shown in Tables A5 and A6 in the Appendix. Solid lines are for the shorter term and dotted lines for longer-term momentum.




Source: Bloomberg Finance L.P., J.P. Morgan.

## Chart A24: Equity beta of US Balanced Mutual funds and Risk Parity funds

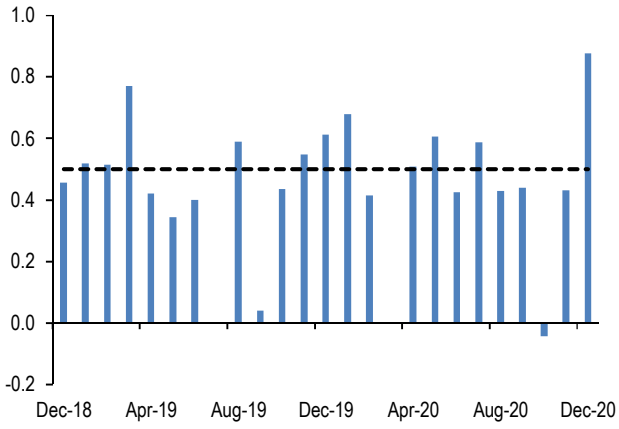
Rolling 21-day equity beta based on a bivariate regression of the daily returns of our Balanced Mutual fund and Risk Parity fund return indices to the daily returns of the S&P 500 and Barcap US Agg indices. Given that these funds invest in both equities and bonds we believe that the bivariate regression will be more suitable for these funds. Our risk parity index consists of 25 daily reporting Risk Parity funds. Our Balanced Mutual fund index includes the top 20 US-based active funds by assets and that have existed since 2006. Our Balanced Mutual fund index has a total AUM of $700bn which is around half of the total AUM of $1.5tr of US based Balanced funds which we believe to be a good proxy of the overall industry It excludes tracker funds and funds with a low tracking error. Dotted lines are average since 2015.




Source: Bloomberg Finance L.P., J.P. Morgan.

## Chart A25: Equity beta of monthly reporting Equity Long/Short hedge funds

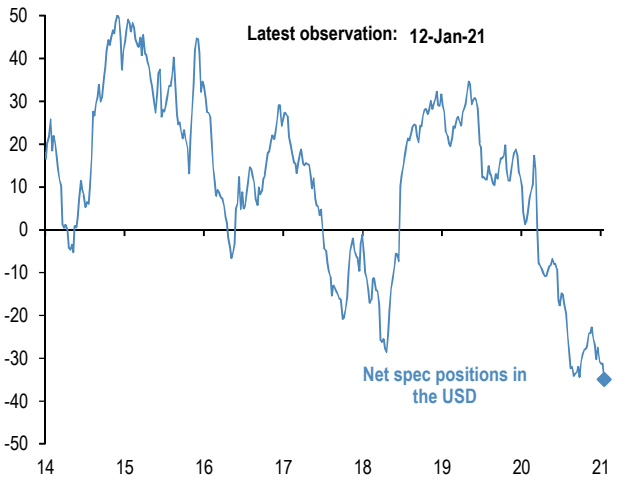
Proxied by the ratio of the monthly performance of HFRI Asset-Weighted Equity Hedge fund index divided by the monthly performance of MSCI AC World index




Source: Bloomberg Finance L.P., HFR, J.P. Morgan

## Chart A26: USD exposure of currency hedge funds

The net spec position in the USD as reported by the CFTC. Spec is the non-commercial category from the CFTC.




Source: CFTC, Barclay, Datastream, Bloomberg Finance L.P., J.P. Morgan

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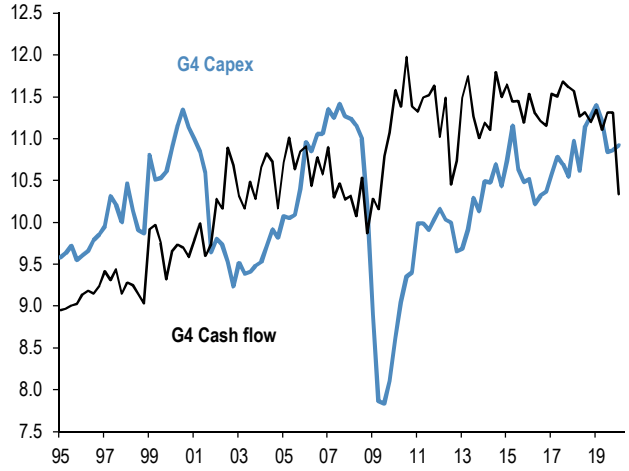
# Corporate activity

## Chart A27: G4 non-financial corporate capex and cash flow as % of GDP

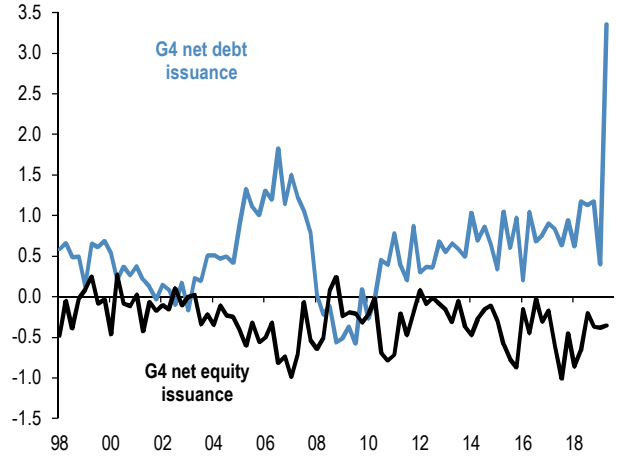
% of GDP, G4 includes the US, the UK, the Euro area and Japan. Last observation as of Q1 2020.




Source: ECB, BOJ, BOE, Federal Reserve flow of funds.

## Chart A28: G4 non-financial corporate sector net debt and equity issuance

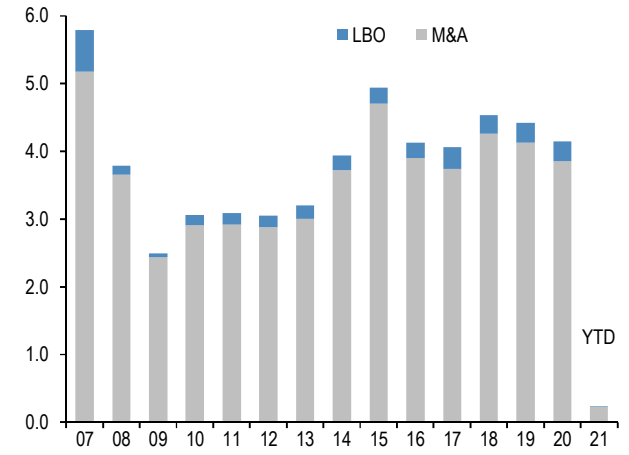
$tr per quarter, G4 includes the US, the UK, the Euro area and Japan. Last observation as of Q1 2020.




Source: ECB, BOJ, BOE, Federal Reserve flow of funds.

## Chart A29: Global M&A and LBO

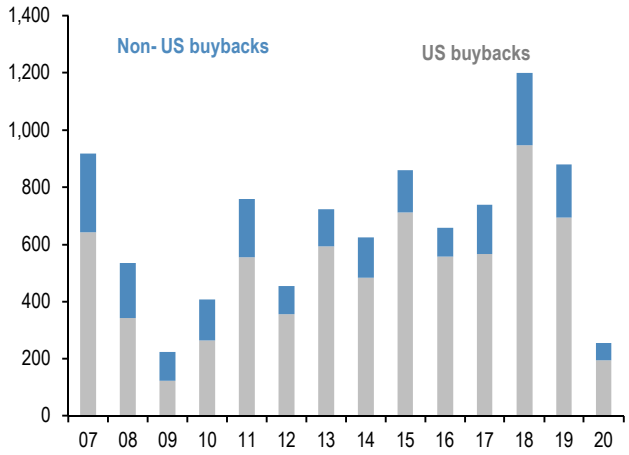
$tr. YTD 2020 as of Jan 20. M&A and LBOs are announced.




Source: Dealogic, J.P. Morgan.

## Chart A30: US and non-US share buyback

$bn, 2020 are as of May'20. Buybacks are announced.




Source: Bloomberg Finance L.P., Thomson Reuters, J.P. Morgan

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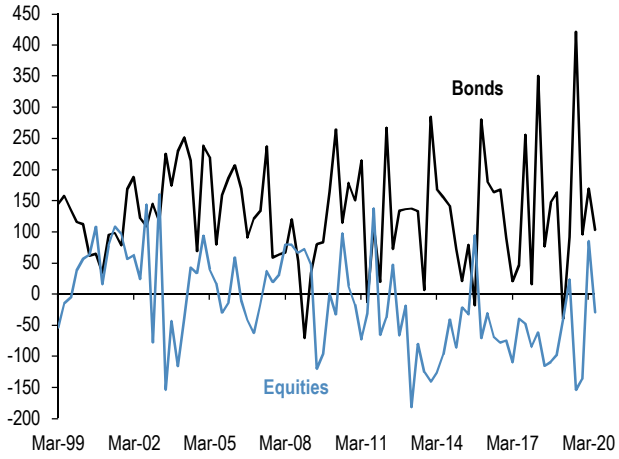
# Pension fund and insurance company flows

## Chart A31: G4 pension funds and insurance companies equity and bond flows

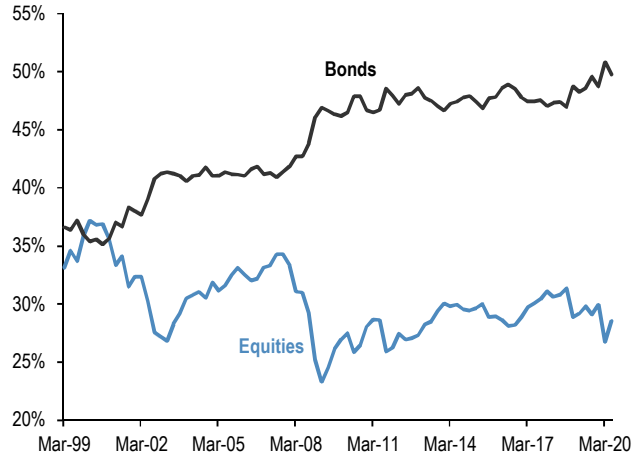
Equity and bond buying in $bn per quarter. G4 includes the US, the UK, Euro area and Japan. Last observation is Q2 2020




Source: ECB, BOJ, BOE, Federal Reserve flow of funds.

## Chart A32: G4 pension funds and insurance companies equity and bond levels

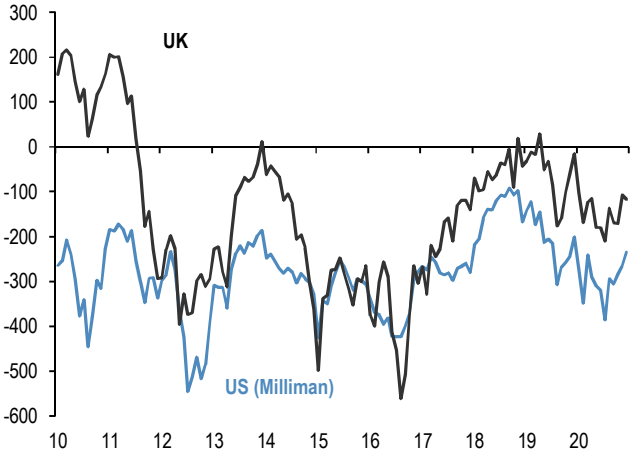
Equity and bond as % of total assets per quarter. G4 includes the US, the UK, Euro area and Japan. Last observation is Q2 2020.




Source: ECB, BOJ, BOE, Federal Reserve flow of funds

## Chart A33: Pension fund deficits

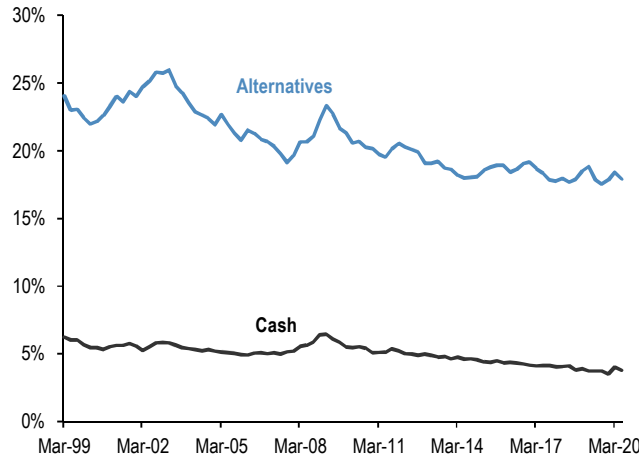
US$bn. For US, funded status of the 100 largest corporate defined benefit pension plans, from Milliman. For UK, funded status of the defined benefit schemes eligible for entry to the Pension Protection Fund, converted to US$ at today's exchange rates. Last obs. is Dec'20.




Source: Milliman, UK Pension Protection Fund, J.P. Morgan

## Chart A34: G4 pension funds and insurance companies cash and alternatives levels

Cash and alternative investments as % of total assets per quarter. G4 includes the US, the UK, Euro area and Japan. Last observation is Q2 2020.




Source: ECB, BOJ, BOE, Federal Reserve flow of funds

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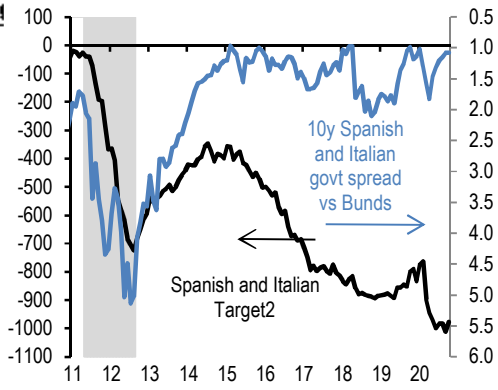
# Funding market monitor

## Table A4: Bank deposits and ECB reliance

Deposits are non-seasonally adjusted Euro area non-bank, non-government deposits as of October 2020. We take total deposits (item 2.2.3. in MFI balance sheets minus "deposits from other financial institutions", which includes deposits from securitized vehicles and financial holding corporations among others. We also subtract repos (item 2.2.3.4) from the total figures to give a cleaner picture of deposits outside interbank borrowing. ECB borrowing and Target 2 balances are latest available. ECB borrowing is gross borrowing from regular MROs and LTROs. The Chart shows the evolution of Target 2 balance for Spain and Italy along with government bond spreads. The shaded area denotes the period between May 2011 and Aug 2012 when convertibility risk premia were elevated due to Greece exit fears.

| €bn | Target 2 bal. | Target 6m chng | ECB borrowing | Depo 3m chng | Depo 12m chng |
|---|---|---|---|---|---|
| Austria | -37 | 9 | 67 | 1.3% | 7.8% |
| Belgium | -32 | 47 | 78 | 0.7% | 6.7% |
| Cyprus | 8 | -1 | 0 | 0.9% | -0.9% |
| Finland | 58 | -15 | 22 | 0.4% | 14.9% |
| France | 62 | 130 | 195 | 0.3% | 14.3% |
| Germany | 1047 | 129 | 335 | 1.2% | 5.2% |
| Greece | -74 | -27 | 39 | 2.5% | 10.1% |
| Ireland | 22 | -26 | 7 | 2.7% | 13.9% |
| Italy | -520 | -7 | 367 | 4.0% | 11.0% |
| Luxembourg | 235 | 9 | 16 | 0.0% | 7.8% |
| Netherlands | 55 | -26 | 144 | 0.0% | 8.6% |
| Portugal | -82 | -12 | 32 | 0.5% | 8.4% |
| Spain | -457 | -26 | 261 | 0.4% | 8.7% |

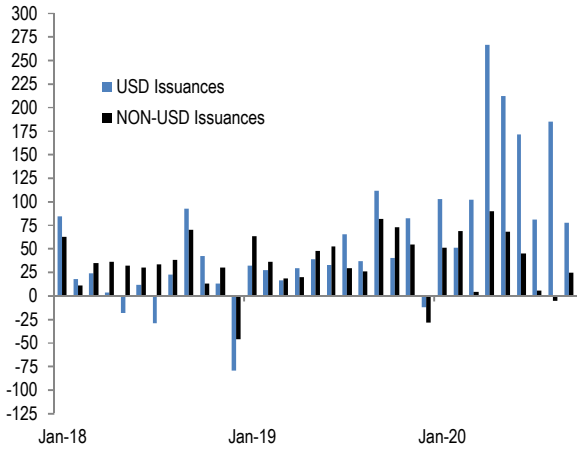
Source: Bloomberg Finance L.P., ECB, National Central Banks, J.P. Morgan




Source: Bloomberg Finance L.P., National Central Banks, J.P. Morgan

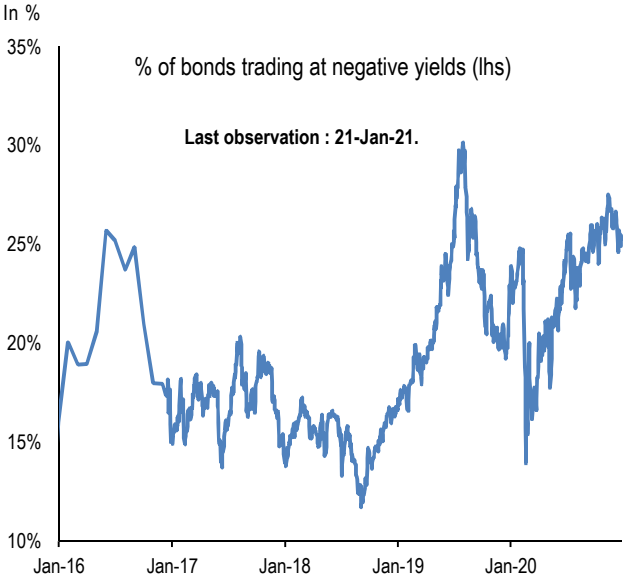
## Chart A35: USD and Non-USD net bond issuances

Gross issuance minus redemptions in $bn per month. Non-USD issuance includes bonds issued in EUR, GBP and JPY. Non-USD bond issuance is converted to USD at today's exchange rate through the full historical period. In this way net bond issuance fluctuations are unaffected by currency changes. Our bond issuance figures include only Non-Government bonds issued globally, excluding short-term debt (maturity less than 1-year) and self-funded issuance (where the issuing bank is the only book runner).Last observation is Sep 2020.




Source: Dealogic, J.P. Morgan

## Chart A36: Market value of negative yield bonds as a % of total outstanding in Bloomberg Barclays Global Agg Index




Source: J.P. Morgan

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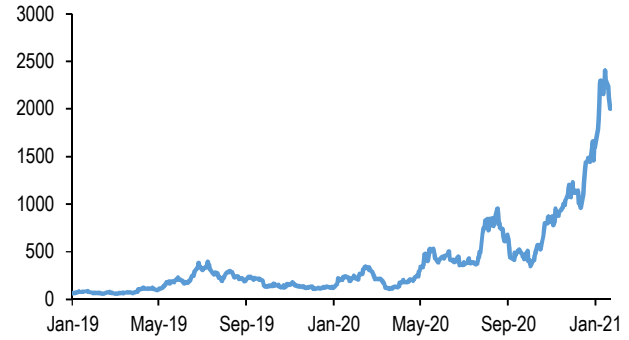
# Bitcoin monitor

## Chart A37: Open interest in CME Bitcoin futures contracts

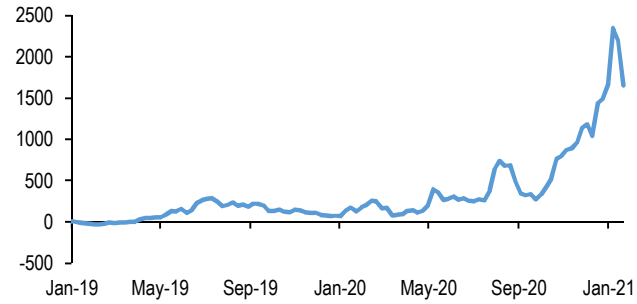
$mn. Last obs. for 21st Jan 2021.




Source: CME, J.P. Morgan.

## Chart A38: Our Bitcoin position proxy based on open interest in CME Bitcoin futures contracts

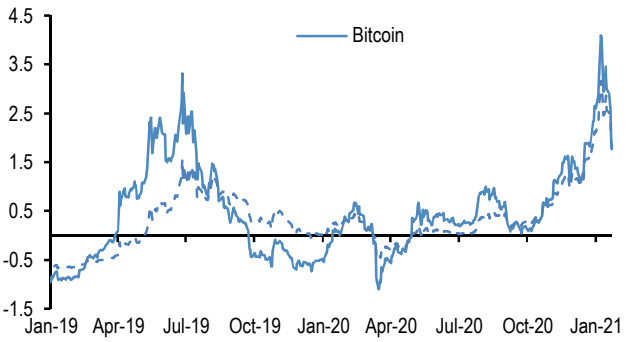
$mn. Last obs. for 21st Jan 2021.




Source: J.P. Morgan

## Chart A39: Momentum signals for Bitcoin

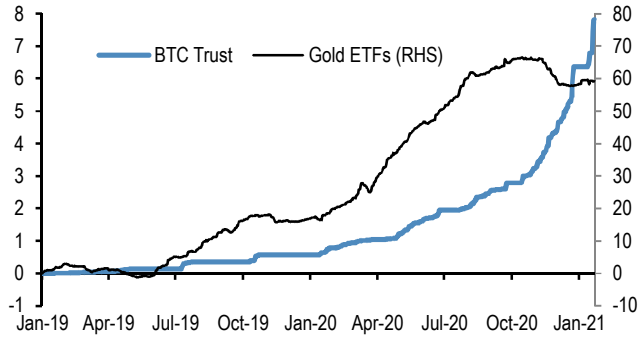
z-score of the momentum signal in our Trend Following Strategy framework shown in Tables A5 and A6 in the Appendix. Solid lines are for the shorter term and dotted lines for longer-term momentum.




Source: Bloomberg Finance L.P., J.P. Morgan.

## Chart A40: Cumulative Flows in Bitcoin Trust and Gold ETF holdings

Both the y-axis in $bn




Source: Bloomberg Finance L.P., J.P. Morgan.

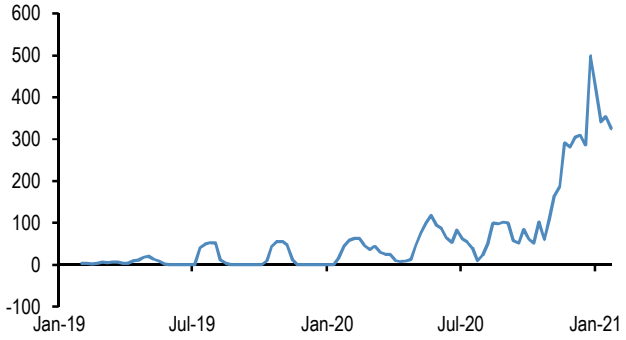
## Chart A41: Ratio of Bitcoin market price to intrinsic value

Intrinsic value estimated using the cost of production approach following Hayes (2018).


Source: Bitinfocharts.com, J.P. Morgan

## Chart A42: Grayscale Bitcoin Trust flow

$mm, 4-week rolling average flows




Source: Bloomberg Finance L.P., J.P. Morgan

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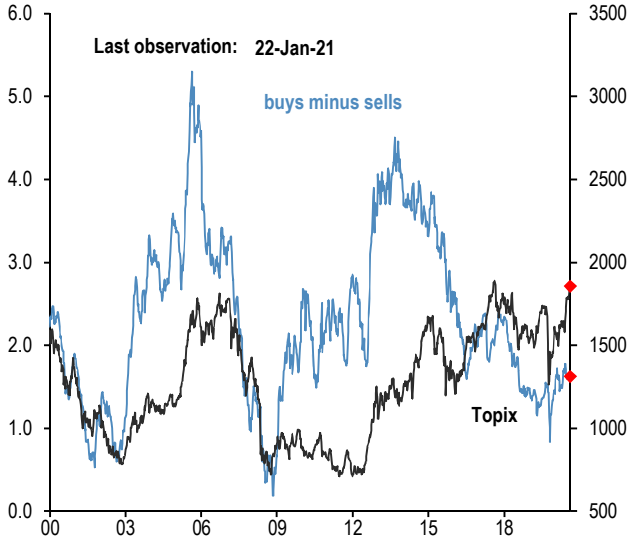
# Japanese flows and positions

## Chart A43: Tokyo Stock Exchange margin trading: total buys minus total sells

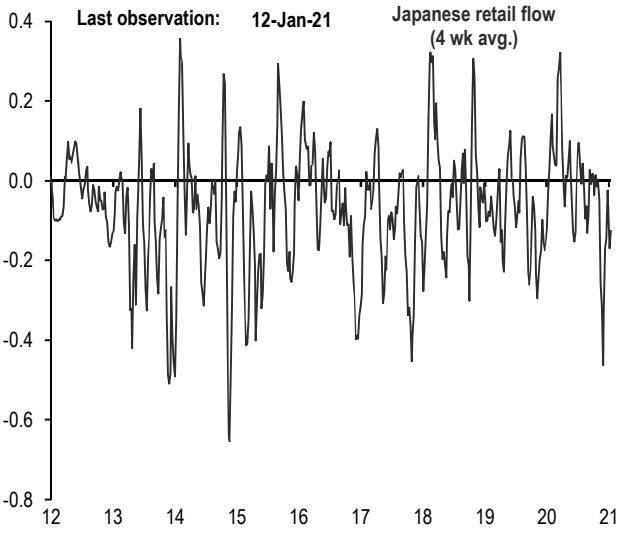
In bn of shares. Topix on right axis.




Source: Tokyo Stock Exchange, J.P. Morgan.

## Chart A44: Domestic retail flows

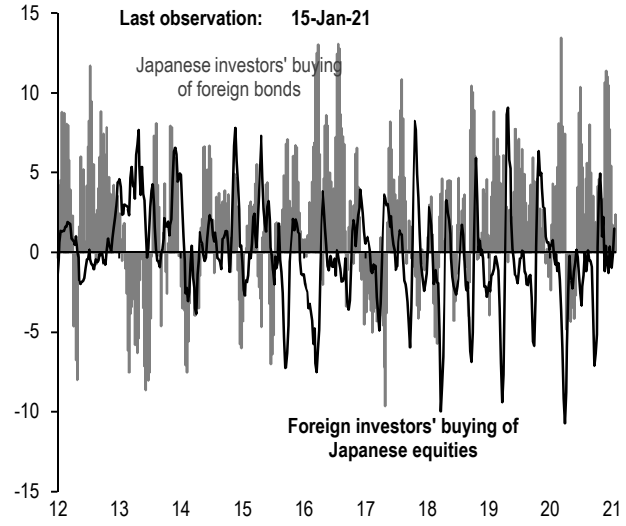
In JPY tr. Retail flows are from Tokyo stock exchange.




Source: TSE, J.P. Morgan calculations.

## Chart A45: Japanese equity buying by foreign investors. Japanese investors' buying of foreign bonds

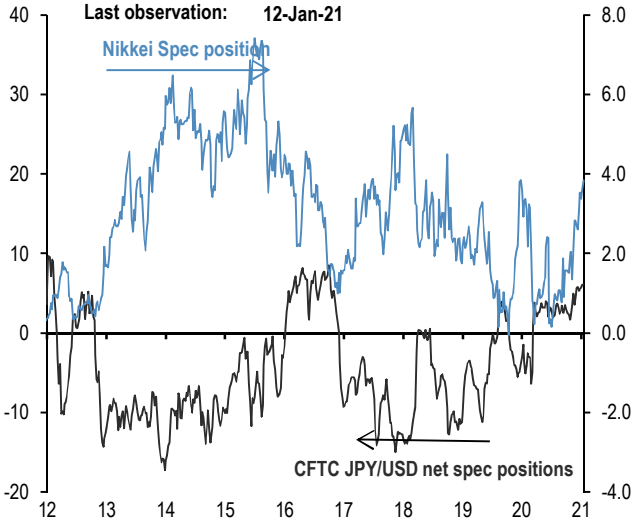
$bn, 4 week moving average.




Source: Japan MoF, J.P. Morgan.

## Chart A46: Overseas CFTC spec positions

CFTC spec positions are in $bn. For Nikkei we use CFTC positions in Nikkei futures (USD & JPY) by Leveraged funds and Asset managers.




Source: Bloomberg Finance L.P., CFTC, J.P. Morgan calculations.

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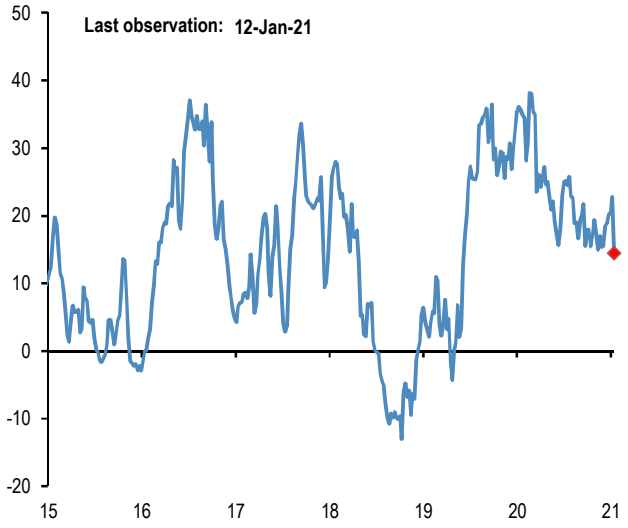
# Commodity flows and positions

## Chart A47: Gold spec positions

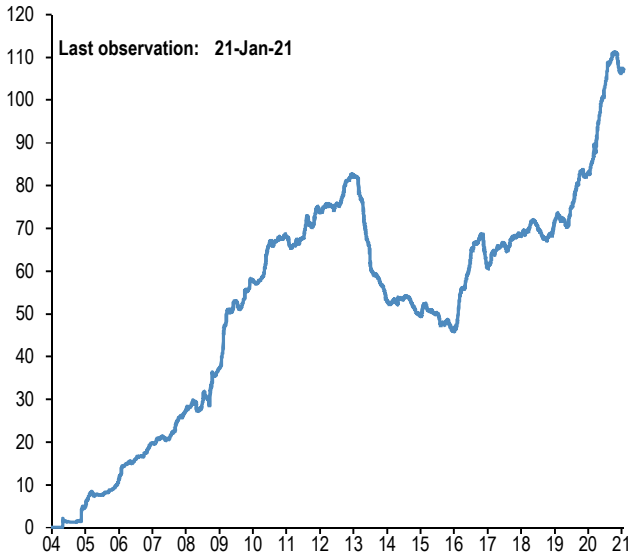
$bn. CFTC net long minus short position in futures for the Managed Money category.




Source: CFTC, Bloomberg Finance L.P., J.P. Morgan.

## Chart A48: Gold ETFs

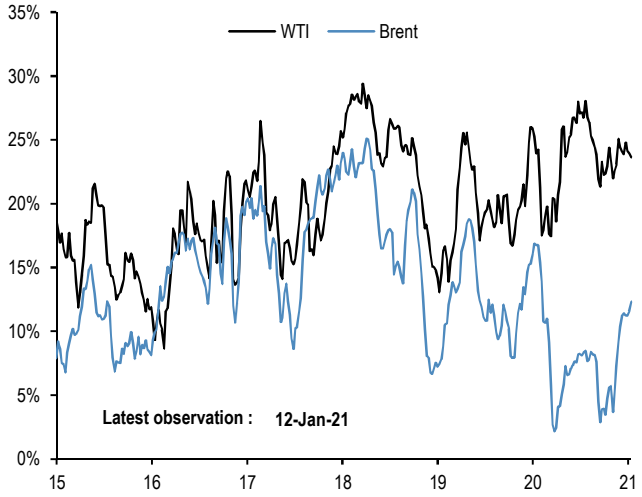
Mn troy oz. Physical gold held by all gold ETFs globally.




Source: Bloomberg Finance L.P., J.P. Morgan.

## Chart A49: Oil spec positions

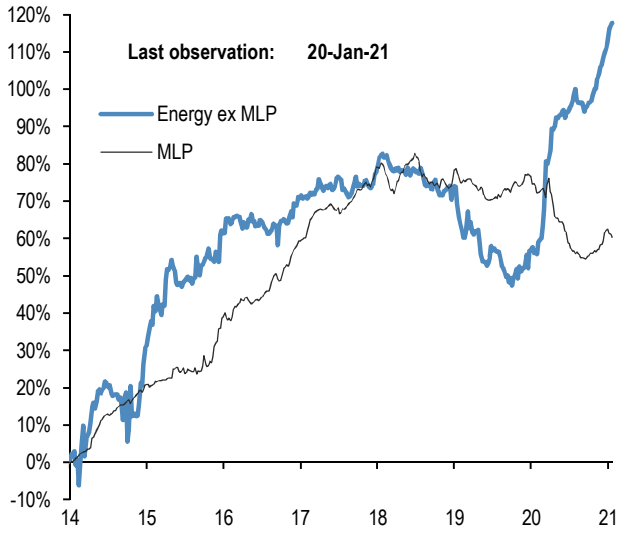
Net spec positions divided by open interest. CFTC futures positions for WTI and Brent are net long minus short for the Managed Money category.




Source: CFTC, Bloomberg Finance L.P., J.P. Morgan.

## Chart A50: Energy ETF flows

Cumulative energy ETFs flow as a % of AUM. MLP refers to the Alerian MLP ETF.




Source: CFTC, Bloomberg Finance L.P., J.P. Morgan

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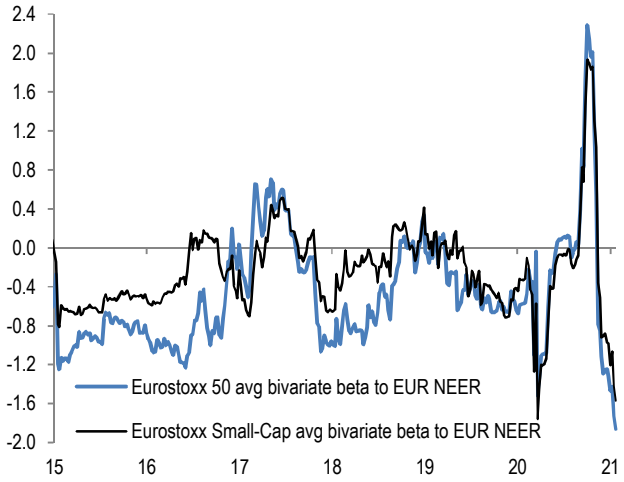
# Corporate FX hedging proxies

## Chart A51: Average beta of Eurostoxx 50 companies and Eurostoxx Small-Cap to trade weighted EUR

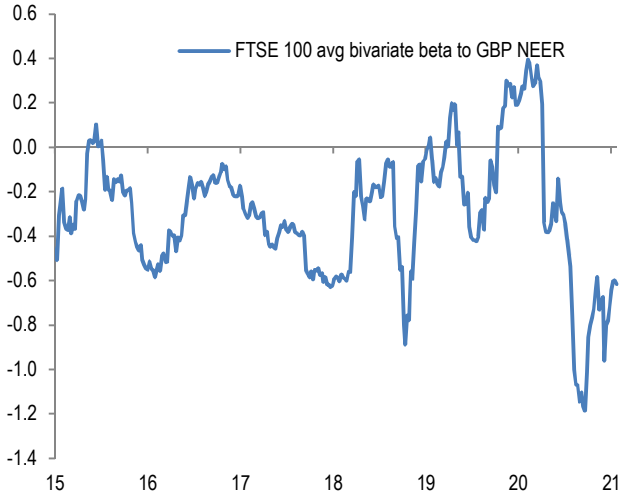
Rolling 26 weeks average betas based on a bivariate regression of the weekly returns of individual stocks in the Eurostoxx 50 index to the weekly returns of the MSCI AC World and JPM EUR Nominal broad effective exchange rate (NEER).




Source: Bloomberg Finance L.P., J.P. Morgan

## Chart A52: Average beta of FTSE 100 companies to trade weighted GBP

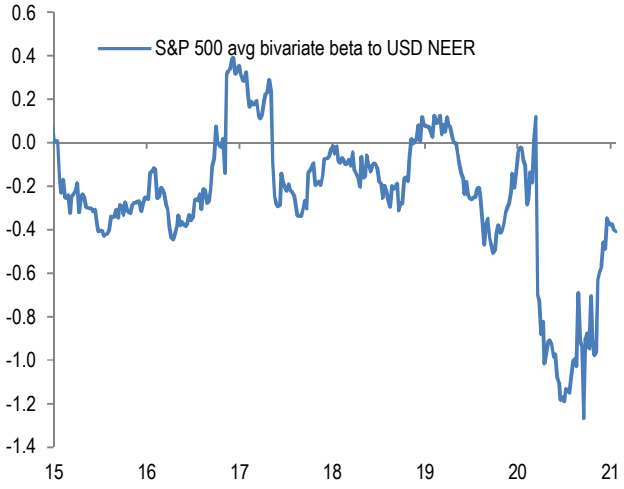
Rolling 26 weeks average betas based on a bivariate regression of the weekly returns of individual stocks in the FTSE 100 index to the weekly returns of the MSCI AC World and JPM GBP Nominal broad effective exchange rate (NEER).




Source: Bloomberg Finance L.P., J.P. Morgan

## Chart A53: Average beta of S&P500 companies to trade weighted US dollar

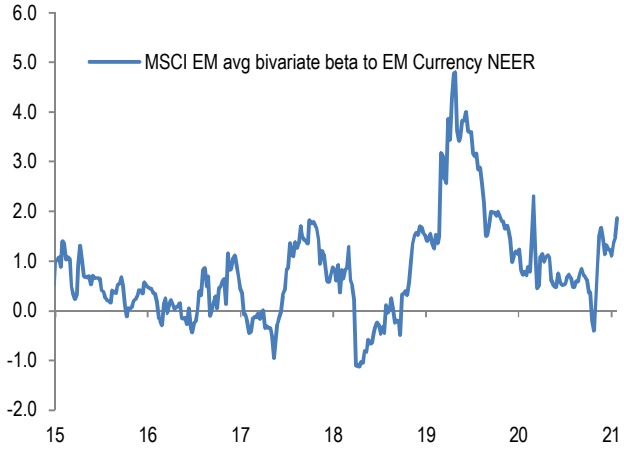
Rolling 26 weeks average betas based on a bivariate regression of the weekly returns of stocks in the S&P500 index to the weekly returns of the MSCI AC World and JPM USD Nominal broad effective exchange rate (NEER).




Source: Bloomberg Finance L.P., J.P. Morgan

## Chart A54: Average beta of MSCI EM companies to the trade weighted EM currency index

Rolling 26 weeks average betas based on a bivariate regression of the weekly returns of individual stocks in the MSCI EM index to the weekly returns of the MSCI AC World and JPM EM Nominal broad effective exchange rate (NEER).




Source: Bloomberg Finance L.P., J.P. Morgan.

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# CTAs - Trend following investors' momentum indicators

## Table A5: Simple return momentum trading rules across various commodities

Optimal lookback period of each momentum strategy combined with a mean reversion indicator that turns signal neutral when momentum z-score more than 1.5 standard deviations above or below mean, and a filter that turns neutral when the z-score is low (below 0.05 and above -0.05) to avoid excessive trading. Lookbacks, current signals and z-scores are shown for shorter-term and longer-term momentum separately, along with performance of a combined signal. Annualized return, volatility and information ratio of the signal; current signal; and z-score of the current return over the relevant lookback period; data from 1999 onward.

| | | Lookback (moving avg, days) | Annualized return (%) | Vol (%) | IR | Current signal | Time since last change (days) | Z-score | % Change of return index from its moving average |
|---|---|---|---|---|---|---|---|---|---|
| WTI | short | 21 | 10.2 | 22.4 | 0.46 | 1 | 12 | 0.8 | 5.0% |
| | long | 504 | | | | -1 | 21 | -1.2 | -35.1% |
| Brent | short | 105 | 7.1 | 21.8 | 0.33 | 0 | 2 | 1.5 | 20.6% |
| | long | 504 | | | | -1 | 167 | -0.2 | -5.8% |
| Unleaded gas | short | 105 | 4.9 | 23.9 | 0.20 | 0 | 11 | 1.8 | 24.7% |
| | long | 462 | | | | 1 | 11 | 0.3 | 7.7% |
| Heat Oil | short | 63 | 6.2 | 21.3 | 0.29 | 0 | 12 | 1.5 | 14.9% |
| | long | 483 | | | | -1 | 56 | -0.4 | -10.0% |
| Gasoil | short | 63 | 11.2 | 19.9 | 0.56 | 1 | 0 | 1.4 | 14.2% |
| | long | 504 | | | | -1 | 57 | -0.6 | -17.9% |
| Nat gas | short | 147 | 19.4 | 34.9 | 0.56 | -1 | 57 | -0.9 | -17.9% |
| | long | 294 | | | | -1 | 130 | -1.0 | -26.6% |
| Gold | short | 21 | 3.9 | 10.7 | 0.36 | -1 | 9 | -0.2 | -0.6% |
| | long | 504 | | | | 1 | 11 | 1.0 | 12.6% |
| Silver | short | 10 | 6.3 | 19.0 | 0.33 | 1 | 1 | 0.4 | 1.3% |
| | long | 462 | | | | 1 | 9 | 1.4 | 31.1% |
| Palladium | short | 42 | 15.4 | 20.6 | 0.75 | 0 | 0 | 0.0 | 0.0% |
| | long | 273 | | | | 1 | 149 | 0.3 | 7.5% |
| Platinum | short | 105 | 8.5 | 17.3 | 0.49 | 0 | 2 | 1.9 | 17.0% |
| | long | 273 | | | | 0 | 0 | 1.6 | 23.2% |
| Aluminium | short | 21 | 5.1 | 13.6 | 0.38 | -1 | 9 | -0.2 | -0.8% |
| | long | 378 | | | | 1 | 75 | 0.7 | 9.9% |
| Copper | short | 147 | 10.4 | 17.8 | 0.58 | 1 | 9 | 1.1 | 15.0% |
| | long | 399 | | | | 1 | 147 | 1.3 | 29.5% |
| Lead | short | 126 | 5.6 | 20.3 | 0.28 | 1 | 51 | 0.4 | 4.7% |
| | long | 357 | | | | 1 | 7 | 0.2 | 5.0% |
| Nickel | short | 42 | 13.6 | 22.8 | 0.60 | 1 | 74 | 0.9 | 7.4% |
| | long | 336 | | | | 1 | 79 | 1.0 | 27.7% |
| Zinc | short | 126 | 10.3 | 19.8 | 0.52 | 1 | 43 | 0.3 | 3.8% |
| | long | 399 | | | | 1 | 75 | 0.6 | 14.6% |
| Wheat | short | 168 | 2.8 | 22.6 | 0.12 | 1 | 2 | 1.3 | 14.9% |
| | long | 294 | | | | 1 | 91 | 1.0 | 15.8% |
| Kansas wheat | short | 147 | 8.6 | 20.3 | 0.42 | 0 | 7 | 1.8 | 21.2% |
| | long | 504 | | | | 1 | 78 | 1.3 | 25.5% |
| Corn | short | 63 | 7.3 | 16.4 | 0.45 | 0 | 16 | 2.1 | 17.0% |
| | long | 399 | | | | 0 | 7 | 1.7 | 29.0% |
| Soybeans | short | 42 | 6.9 | 14.8 | 0.46 | 1 | 0 | 1.5 | 8.1% |
| | long | 231 | | | | 0 | 52 | 2.8 | 36.9% |
| Cotton | short | 168 | 4.8 | 18.2 | 0.27 | 1 | 125 | 1.4 | 19.4% |
| | long | 483 | | | | 1 | 73 | 0.9 | 21.3% |
| Sugar | short | 63 | 8.3 | 22.3 | 0.37 | 1 | 21 | 0.7 | 6.5% |
| | long | 252 | | | | 1 | 82 | 1.0 | 19.4% |
| Coffee | short | 63 | 5.1 | 23.0 | 0.22 | 1 | 40 | 0.7 | 5.7% |
| | long | 315 | | | | 1 | 30 | 0.3 | 5.7% |
| Cocoa* | | 10 | 4.5 | 28.5 | 0.16 | 1 | 4 | 0.3 | 0.9% |

* For cocoa, uses only short-term momentum and a z-score threshold of 3 rather than 1.5 as for other contracts.

Source: Bloomberg Finance L.P., J.P. Morgan calculations

## Table A6: Simple return momentum trading rules across international equity indices, bond futures and FX

Optimal lookback period of each momentum strategy combined with a mean reversion indicator that turns signal neutral when momentum z-score more than 1.5 standard deviations above or below mean, and a filter that turns neutral when the z-score is low (below 0.05 and above -0.05) to avoid excessive trading. Lookbacks, current signals and z-scores are shown for shorter-term and longer-term momentum separately, along with performance of a combined signal. Annualized return, volatility and information ratio of the signal; current signal; and z-score of the current return over the relevant lookback period; data from 1999 onward.

| | | Lookback (moving avg, days) | Annualized return (%) | Vol (%) | IR | Current signal | Time since last change (days) | Z-score | % Change of return index from its moving average |
|---|---|---|---|---|---|---|---|---|---|
| S&P 500 | short | 63 | 6.8 | 11.9 | 0.57 | 1 | 31 | 1.3 | 6.0% |
| | long | 357 | | | | 0 | 42 | 2.0 | 21.4% |
| Nasdaq 100 | short | 84 | 7.9 | 14.6 | 0.54 | 1 | 56 | 1.2 | 10.2% |
| | long | 462 | | | | 0 | 56 | 2.2 | 43.6% |
| Nikkei | short | 63 | 5.9 | 13.9 | 0.42 | 0 | 0 | 1.5 | 9.3% |
| | long | 420 | | | | 0 | 10 | 1.8 | 28.6% |
| FTSE 100 | short | 147 | 4.3 | 12.4 | 0.35 | 1 | 0 | 1.5 | 9.2% |
| | long | 462 | | | | 1 | 12 | 0.2 | 2.8% |
| Eurostoxx 50 | short | 21 | 3.3 | 13.3 | 0.25 | 1 | 21 | 0.3 | 0.9% |
| | long | 357 | | | | 1 | 53 | 0.7 | 8.7% |
| MSCI EM | short | 42 | 14.4 | 11.4 | 1.26 | 0 | 2 | 1.8 | 9.5% |
| | long | 357 | | | | 0 | 13 | 2.0 | 33.3% |
| 2Y USTs | short | 252 | 0.8 | 0.9 | 0.86 | 1 | 178 | 0.2 | 0.2% |
| | long | 483 | | | | 1 | 217 | 0.7 | 1.1% |
| 5Y USTs | short | 252 | 1.8 | 2.8 | 0.65 | 1 | 6 | 0.1 | 0.2% |
| | long | 378 | | | | 1 | 109 | 0.6 | 1.7% |
| 10Y USTs | short | 42 | 2.1 | 3.5 | 0.60 | -1 | 11 | -0.4 | -0.5% |
| | long | 504 | | | | 1 | 67 | 0.8 | 3.4% |
| 2Y Schatz | short | 252 | 0.3 | 0.8 | 0.40 | -1 | 26 | -0.2 | -0.1% |
| | long | 441 | | | | -1 | 27 | -0.2 | -0.2% |
| 5y Bobl | short | 84 | 1.6 | 1.8 | 0.92 | -1 | 3 | -0.2 | -0.2% |
| | long | 483 | | | | 1 | 219 | 0.1 | 0.3% |
| 10y Bund | short | 105 | 2.6 | 3.2 | 0.82 | -1 | 0 | -0.1 | -0.3% |
| | long | 462 | | | | 1 | 223 | 0.4 | 1.4% |
| 10Y JGB | short | 168 | 1.0 | 2.2 | 0.43 | 0 | 2 | 0.0 | 0.0% |
| | long | 273 | | | | -1 | 20 | -0.1 | -0.1% |
| 10Y Gilts | short | 105 | 1.4 | 3.8 | 0.36 | -1 | 10 | -0.3 | -0.6% |
| | long | 504 | | | | 1 | 117 | 0.5 | 2.3% |
| Euro | short | 42 | 3.1 | 6.4 | 0.49 | 0 | 0 | 0.0 | 0.0% |
| | long | 273 | | | | 1 | 153 | 0.9 | 5.5% |
| Yen | short | 21 | 1.8 | 6.2 | 0.29 | 0 | 1 | 0.0 | 0.0% |
| | long | 399 | | | | 1 | 129 | 0.4 | 2.7% |
| Sterling | short | 168 | 2.3 | 7.3 | 0.32 | 1 | 132 | 1.2 | 5.1% |
| | long | 294 | | | | 1 | 83 | 1.1 | 6.3% |
| AUD | short | 42 | 5.1 | 7.7 | 0.66 | 1 | 24 | 0.8 | 2.4% |
| | long | 378 | | | | 1 | 146 | 1.3 | 12.0% |
| CAD | short | 252 | 0.9 | 6.4 | 0.15 | 1 | 122 | 1.3 | 6.0% |
| | long | 504 | | | | 1 | 58 | 0.8 | 5.3% |

Source: Bloomberg Finance L.P. and J.P. Morgan

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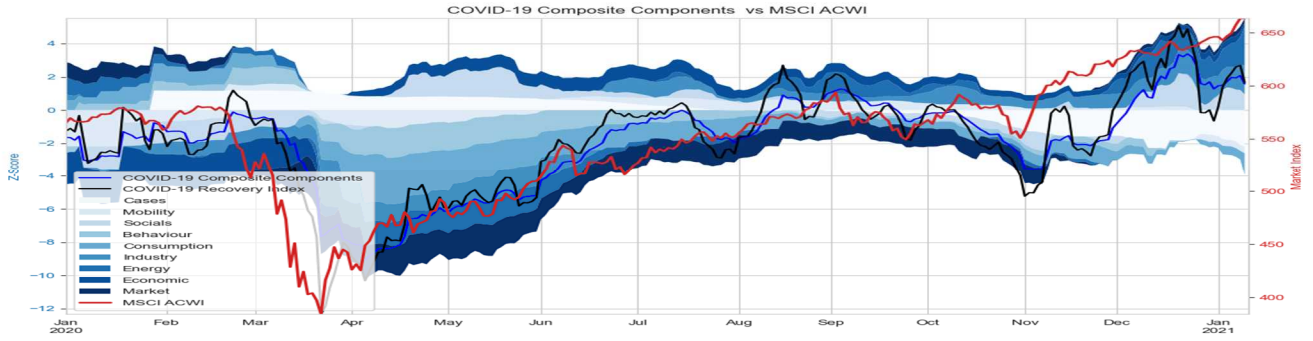
# Gauging the Economic Normalization

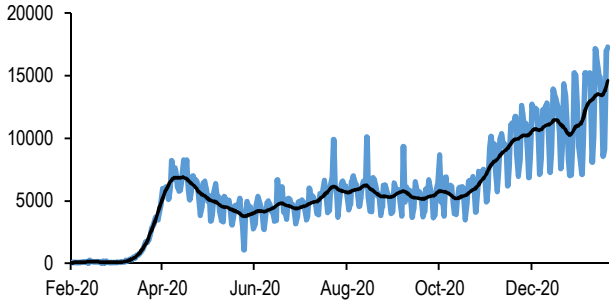
## Chart A55: COVID-19 Composite showing the individual components' contributions YTD 2020




Source: J.P. Morgan.

## Chart A56: Daily change in number of COVID-19 Deaths smoothed by HP filter

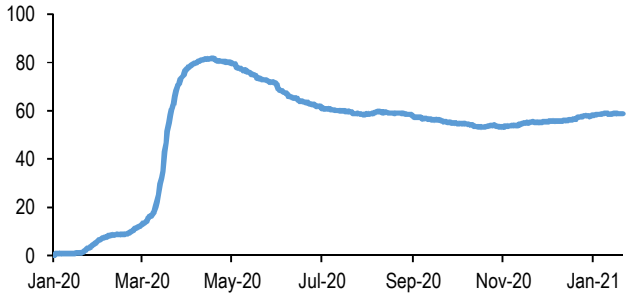
Number of deaths per day. HP filter uses lambda of 50. Last obs. is 20 Jan 2021.




Source: Worldometer, J.P. Morgan.

## Chart A57: Average score of lockdown stringency Index across 147 countries as compiled by Oxford University

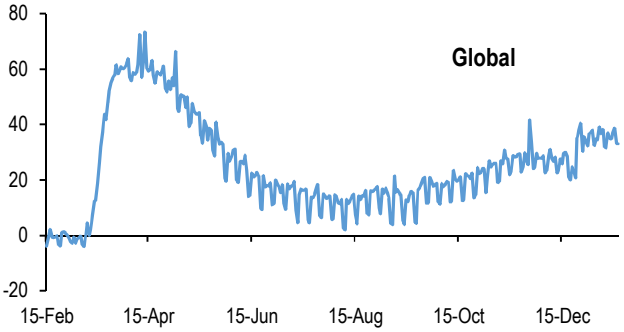
Last obs. is 21 Jan 2021




Source: Oxford University Research, J.P. Morgan

## Chart A58: Google mobility data – Visits and length of stays at Residential areas minus Other areas

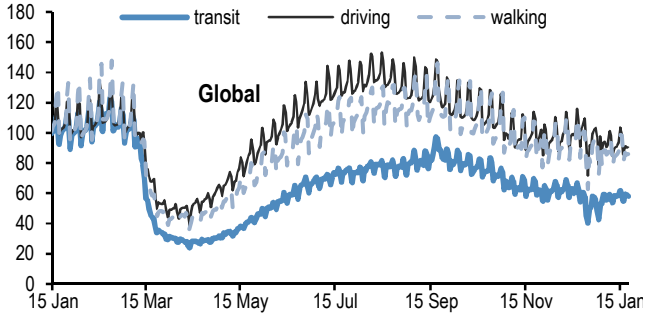
Other areas include Workplace, Transit station, Parks, Grocery & Pharmacy and Retail & Recreational places. Data is aggregated for 125 countries and are weighted based on their GDP. Baseline is defined as median volume between 3rd Jan – 6th Feb. Last obs. is 17 Jan 2021.




Source: Google mobility data, J.P. Morgan

## Chart A59: Apple mobility data – Volume of requests for directions for transit, driving and walking activity as compared to baseline

Data are aggregated for 63 countries and weighted based on their GDP. Baseline is defined as volume on 13th Jan 2020. Last obs. is 20 Jan 2021.




Source: Apple mobility data, J.P. Morgan

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