VOLATILITY AND CORRELATION ASSUMPTIONS

Stable forecast in a dislocated world: Risk outlook little changed, uncertainty rising

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IN BRIEF

- The atypical market conditions created by central banks' rescue interventions may increase the likelihood of extreme events and create sharp, short-term reversals in asset class correlations, adding greater uncertainty to our forecasts.

- Other than greater uncertainty, and greater risk of volatility spikes, our baseline volatility and correlation forecasts are broadly unchanged.

- Negative stock-bond correlations have been the norm over the past 20 years, and while we forecast a modestly negative correlation, we see less stability in this relationship, making it ever more important to consider other dimensions of portfolio risk – and to reduce reliance on fixed income as a portfolio hedge.

- This year, we explore an improved approach to forecasting private market volatility, an area in which proper measurement has long been controversial and subject to private markets' lack of timely data, among other difficulties. We find that an approach that considers optionality offers insights and points to a partial solution.

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RISK FORECAST REMAINS LITTLE CHANGED FOR NOW; UNCERTAINTY RISES AROUND VOLATILITY FORECASTS

As economies make progress in healing, central banks' and policymakers' strong interventions to protect the global economy continue to affect our risk outlook by creating more uncertainty around what are otherwise broadly unchanged volatility and correlation forecasts.

Central bank interventions have stabilized current monetary conditions, but the long-term impacts of their actions lurk beneath the surface in two ways:

1. POTENTIALLY INCREASING THE FREQUENCY OF EXTREME EVENTS: Volatility – which captures movements around the average – is only one of many measures of risk. It does not capture other aspects of risk, such as extreme (or "tail") events, in which markets or assets move up or down 2 or more standard deviations.[1] We expect atypical market conditions over our forecast period to increase the likelihood of tail events rather than necessarily increasing our volatility forecasts.

For example, U.S. Treasury bond volatility has been relatively stable over a long horizon, at around 4.5% annually. The bond sell-off of early 2021 was an outsize event in an otherwise well-behaved market. Such sudden, sharp sell-offs have been rare historically, but their frequency has risen recently (**EXHIBIT 1**). The lasting imprint of extraordinary policies suggests that such extreme events may become more common. It has long been recognized that normal distribution assumptions fail to fully capture observations of extreme tails.

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[1] A tail is the tapering at the far ends of a distribution curve representing least likely outcomes; in a left- (right-) tail occurrence, an asset or portfolio value moves more than 2 standard deviations below (above) its mean, or average.

The likelihood of large moves may be edging slightly higher

EXHIBIT 1: CHANGES IN RETURN DISTRIBUTION OF U.S. TREASURY BONDS, 2006–19 VS. 2020–21

■ Increased frequency ■ Decreased frequency

Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021. Chart compares the difference between the probability distributions of 2006–19 and 2020–21. SD: standard deviation.

2. POTENTIALLY RAISING STOCK-BOND CORRELATIONS AND CHANGING CORRELATION DYNAMICS WITH OTHER ASSET CLASSES: Treasuries are a relatively low risk source of yield for many investors and also serve as potential hedges to risky assets. The popularity of the 60/40 stock-bond portfolio hinges on this implicit diversification effect – Treasuries' negative correlation should lessen the pain when riskier assets sell off. However, as **EXHIBIT 2A** and **2B** highlight, while negative correlations have persisted over the last 20 years, prior data suggest a positive correlation.

Negative stock-bond correlations are not set in stone
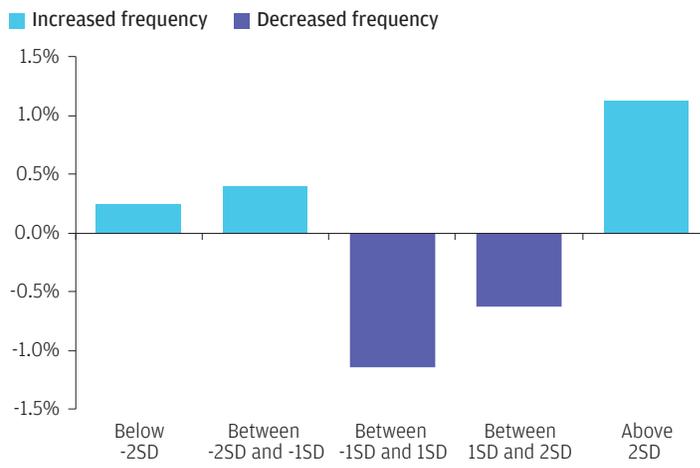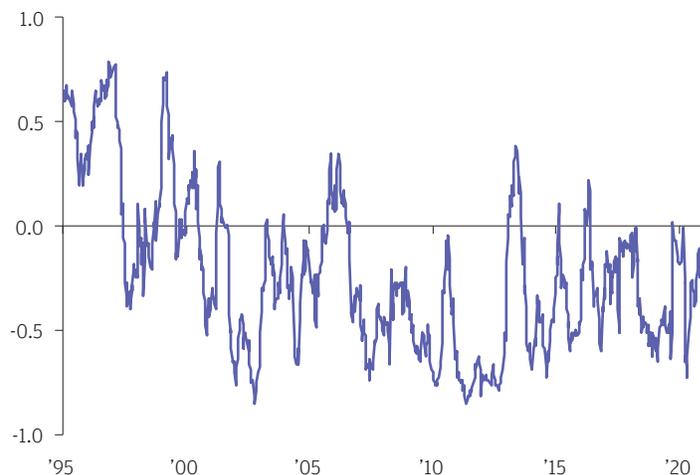
EXHIBIT 2A: ROLLING 10-YEAR STOCK-BOND CORRELATION

EXHIBIT 2B: ROLLING 6-MONTH STOCK-BOND CORRELATION

Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021. Stock-bond correlations computed based on S&P 500 returns and U.S. Treasury returns.

We continue to see the diversification benefits of holding stocks and bonds within a balanced portfolio, and forecast a modestly negative correlation of -0.3. But given current monetary policies, the potential for sharp, short-term reversals of this modestly negative relationship may be increasing. The instability of this correlation, along with the high price for this portfolio "insurance," suggests a need to investigate alternatives to the standard 60/40 allocation – a topic discussed in this year's portfolio implications chapter.[2]

Overall, we see higher uncertainty around the volatility forecasts (or, more technically, we see an increase in the volatility of volatility) and perhaps an increase in the likelihood of historically rare events. We continue to keep a close eye on these risks and for now hold our forecasted risk at a level similar to prior years.

STRUCTURAL CHANGES IMPACT OUR VOLATILITY FORECASTS

Structural developments in markets and economies impact our long-run volatility projections for the asset classes that we cover. These anticipated changes explain why our volatility estimates deviate from the volatility estimates implied by long-run data:

FIXED INCOME

The key adjustments are to credit quality and issuance trends. Over the past 15 years, U.S. corporate bond issuers have migrated toward lower quality credit; today, the majority of U.S. investment grade bonds are BBB rated.

This quality shift has changed the risk profile of credit assets, including U.S. and European corporate bonds. We adjust our volatility forecasts accordingly to reflect more risk in lower quality sectors (and vice versa for sectors with improved credit quality).

EQUITIES

Typically, full-cycle long-term volatility forecasts should be representative of the risk that equity holders face. Projections draw on, among other things, historical long-term risk. This year, our equity discussion underwent an important update. As other chapters highlight,[3] the composition of benchmark indices has clearly shifted – for example, away from energy and toward technology. In light of those changes, we revisit the typical approach for equities, examining whether the change in index composition leads our forecasts to deviate sizably (**EXHIBIT 3**).

Our analysis shows that despite this change in sector exposure, long-run equity volatility still remains in line with our forecasts. Using historical S&P 500 returns and hypothetical simulated returns using current sector weightings, both volatility forecasts yielded the same estimate. Much of the risk variation appears to be captured by our 15-year forecast window.

In the near term, however, given high starting valuations, equities may be vulnerable to correction and thus an increase in short-term volatility.

ALTERNATIVES

Our 2022 volatility forecast for alternatives is in line with prior years. As we describe in the next section, we take a deep dive into risk within this asset class.

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[2] Jared Gross, Paul Kennedy and Grace Koo, "Portfolio Implications: Portfolio construction: Moving toward a new architecture," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

[3] Tim Lintern, Stephen Parker, Nandini Ramakrishnan et al., "Equity Assumptions: Better through-cycle returns, challenging starting point," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

Structural changes in equity sector exposure have had a limited impact on long-run equity risk thus far

EXHIBIT 3: S&P 500 SECTOR WEIGHTING OVER TIME

Health care · Energy · Technology · Financials · Consumer discretionary · Other
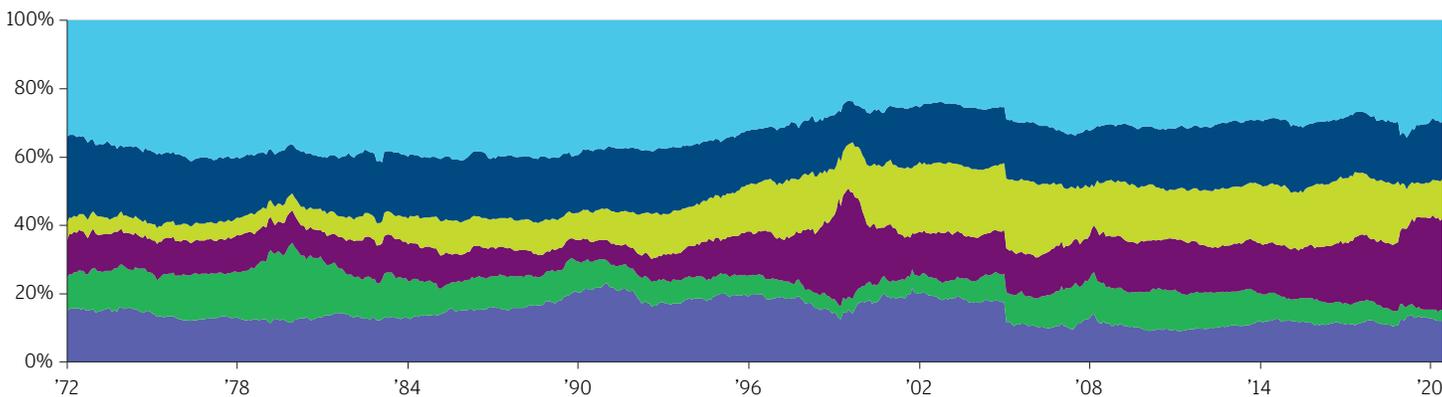
Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021.

We have long accepted that for private market assets, both accounting volatility estimates (computed based on reported net asset values [NAVs], sometimes called observed volatility) and de-smoothed volatility estimates (discussed below) are flawed approaches. For our Long-Term Capital Market Assumptions (LTCMA) volatility forecast calculations, we seek to reflect the underlying economic risk of owning the asset. We think accounting volatility underestimates true risk – something that has been widely discussed in the literature – but also expect de-smoothed estimates to ignore some of the volatility-reducing options embedded in private market assets. In the following section, we propose a novel approach to enhance the way we evaluate private market volatility.

PRIVATE MARKET ASSET VOLATILITY: ADDING INSIGHTS FROM PUBLIC MARKETS

Private market return volatility estimates have long been a source of controversy. The metric normally in use to estimate volatility is observed volatility, also known as accounting volatility, which is based on valuations. That is understandable because publicly listed securities are marked to market, often in real time. But in private markets, by contrast, appraisals might occur as infrequently as quarterly or biannually. This lack of timely data depresses observed volatility and impairs the comparability of private and public market data.[4] In turn, this forces asset allocators seeking private market volatility estimates to rely on returns that have been de-smoothed.[5] De-smoothing seeks to estimate underlying volatility for private assets by removing the serial correlation between return estimates associated with the use of valuations.

This is a credible approach in a multi-asset investing context, but it is also an imperfect one that suffers from a number of limitations. First, de-smoothing is a purely statistical technique. It is impossible to assess the accuracy of de-smoothed volatility vs. the true economic risk of owning the asset (which is unobservable), as private markets use different pricing mechanisms from public markets. In addition, while de-smoothing can "correct" volatility levels, it doesn't adjust for the impact of smoothing on co-movement.[6]
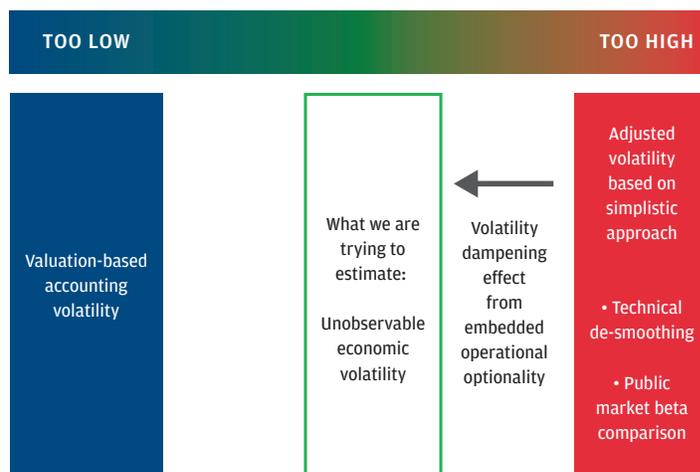
Second, the results of de-smoothing techniques are typically validated by measuring whether private market volatility estimates align with estimates for listed markets. This implies that risk drivers are similar in comparable private and public markets. This assertion is often challenged by private market investors, who believe their direct control over cash flows, and their ability to escape the scrutiny and short-term reporting focus of public markets, give them scope for enhanced risk management and reduced volatility. It has been suggested that the enhanced opportunities to make operational decisions inherent to private market investing create optionality – i.e, nonlinear impacts on asset returns. (These are similar, in a way, to how a call option reflects a nonlinear return profile of the underlying equity.) A simple comparison with comparable public markets may miss this important aspect.

If true, this would mean that traditional approaches to computing private asset volatilities may overestimate volatility and, by extension, underestimate the potential role and suitability of a private asset allocation. While we have long recognized that the differences between private and public markets, and the operational optionality of private assets, help dampen volatility, it has been challenging to find empirical support for this assertion. The valuation-based reporting data required to support the assertion simply doesn't exist.

To sum our key points so far: To better gauge private market assets' volatility, simple de-smoothing is a flawed approach, one that likely overstates volatility; we seek an approach reflecting the unique characteristics of private market assets – including what we call optionality (**EXHIBIT 4**).

Naive volatility adjustments for private assets overstate true risks

EXHIBIT 4: WE USE A MIDDLE WAY – ECONOMIC VOLATILITY LIKELY LIES BETWEEN ACCOUNTING AND DE-SMOOTHED VOLATILITY

TOO LOW		TOO HIGH
Valuation-based accounting volatility	What we are trying to estimate: Unobservable economic volatility	Volatility dampening effect from embedded operational optionality	Adjusted volatility based on simplistic approach • Technical de-smoothing • Public market beta comparison

Source: J.P. Morgan Asset Management. For illustrative purposes only.

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[4] Private markets rely on infrequent valuations that use irregular and often idiosyncratic transactions to estimate likely trading prices. Unlike in liquid markets, real-time price estimates are not available. This difference means that short- and medium-term fluctuations in prices that are readily observable in public markets are typically "smoothed" away by the use of pricing evidence often taken over an extended time period. In turn, this process reduces measured volatility and creates an impression of risk that is lower than, and not directly comparable to, liquid market measures.

[5] For a summary of the literature on real estate return de-smoothing, see: Jean-Christophe Delfim and Martin Hoesli, "Robust desmoothed real estate returns," *Real Estate Economics* 49, 75-105, 2021.

[6] Co-movement is the correlated or similar movement of two or more entities. "True" volatility and co-movement are unobservable; as such, any estimate is, by definition, only an approximation of the likely underlying volatility, the accuracy of which can be asserted but neither proved nor disproved.

Using convertible bond data for insights into the volatility-dampening effects of optionality

Public market data can offer some insights. While no data are directly relevant to private markets, some listed markets offer support for the thesis that assets combining exposure to underlying markets (or beta) with optionality (or unique characteristics) are likely to be less volatile than assets with exposure to beta alone.

One such source of support is the convertible bond market. Convertible bonds are publicly traded liquid assets. What this market has in common with private markets is not tradability but the optionality embedded within the assets. The optionality in convertible bonds is set at issuance. Convertible bonds embed returns from a corporate bond along with optionality on the upside.[7] Private assets embed optionality operationally, as we've discussed. The question at hand is if optionality matters for return volatility, and convertible bond data provide some insights here. We demonstrate this by constructing a hypothetical replicating portfolio of bond and equity exposures (beta), aligned with the characteristics of the convertible bond.[8] We purposefully ignored the optionality, or convexity impact, in this replicating portfolio. Comparing the volatility of the beta replicating portfolio with the actual convertible bonds[9] suggests that the volatility of the second series is between 75% and 85% of the first.

It seems likely that the extent of the volatility dampening will be a function of the scale of the optionality. In our analysis, the options embedded in convertible bonds created a volatility dampening factor in the range of 15%–25%, on average. As such, assets whose returns are dominated by the exercise of management options (e.g., private equity) should be expected to benefit from greater volatility control than assets whose returns are likely dominated by market beta (e.g., core real estate). The correct volatility dampening factor should vary by asset class.

As noted, we have long accepted that both accounting volatility estimates and de-smoothed private market volatility estimates are flawed for the purpose of LTCMA calculations. More specifically, we have long recognized the need to reflect optionality in our private market volatility estimates and have utilized our own, subjectively derived parameters. While our convertibles analysis doesn't provide a complete quantitative solution to this challenge, it does offer some factual support for this element of our approach.

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[7] Convertible bonds embed an equity call option on the underlying issuer at a pre-defined strike price. This provides convertible bondholders with upside return potential if the underlying equity rallies.

[8] Calculated as the beta (delta adjusted) return from common stock plus the return from rating-adjusted corporate bonds, all capital weighted.

[9] Data provided by Refinitiv (ticker: UCBIFX39 Index for the U.S. and UCBIFX09 Index for the euro area).

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