

Real Assets in Central Bank Reserve Portfolios: A Consequent Next Step?

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BlackRock

As bond yields are generally expected to remain low for the next few years, many investors with government bond dominated portfolios are considering broadening their investment universe. Adding new rewarded risk factors in modest doses could help increasing returns while not materially increasing the volatility of such portfolios. However, the cost of this better "average" performance is potentially larger temporary drawdowns in times of market turmoil. This brief paper discusses this idea in more detail.

The notion that reserve portfolios should be readily available for policy needs has historically set the tone for central banks' reserve portfolios, before other objectives such as stability and return. However, persistent ultra-low yields on safe assets and more varied potential stress scenarios have prompted reserve managers to take a closer look at their key objectives and constraints and be much more deliberate when balancing between them.

Thus, we observe many central banks diversifying into investment-grade credit and even equity, acknowledging that as long as the pre-set liquidity requirements are met, there can be a modest allocation away from government bonds to achieve more diversified risk factor exposures and higher yield, improving portfolio efficiency during normal market environments. This has continued to evolve following the global financial crisis that began in 2007–08, accelerated by the ever-lowering yields. More recently, real assets also coming into focus.

It is not entirely novel for central banks to invest in real assets – in fact, real estate has featured in many central bank portfolios. Across objectives such as uncorrelated return, reliable consistent income, capital appreciation and efficient portfolio construction, central banks have explored the use of real estate and infrastructure across the capital structure, including public and private market investments.

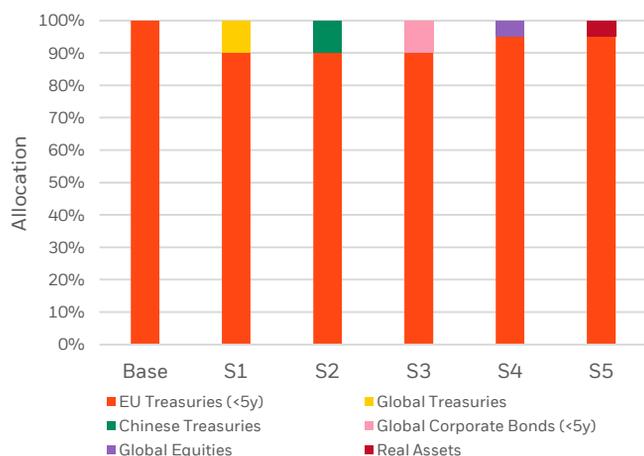
Quantifying the risk-return trade-off

To explore this thought a little bit further, we investigated the impact of adding small amounts of all maturity global Treasuries,

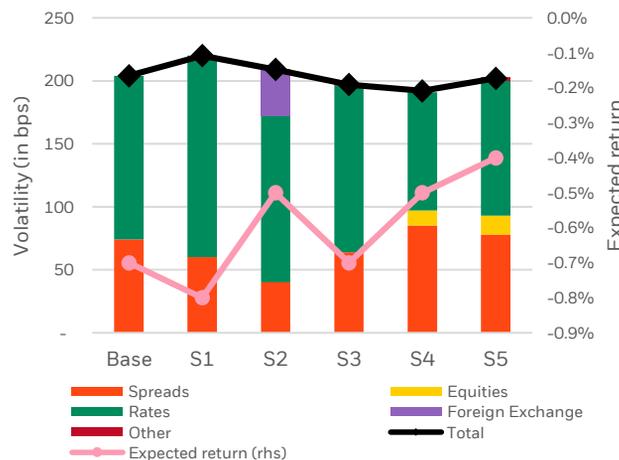
Chinese Treasuries, global corporate bonds, global equities and real assets to a base portfolio which only comprises domestic Treasuries (less than 5 years maturity). If we apply BlackRock's Investment Institute's capital market assumptions, the chart below shows that volatilities of these illustrative portfolios remain largely unchanged, but the expected return picks up in most instances. This is because another rewarded risk factor is added to the portfolio, which is dominated by interest rate and (sovereign) spread risk factor. This also explains why the effect is less pronounced, when global Treasuries are added, i.e. they do not bring a new rewarded risk factor to the base portfolio.

Of course, the asset classes could also be added cumulatively, i.e. corporate bonds, Chinese Treasuries and real assets could be added at the same time.

Asset Allocation: Portfolio Definition



Risk Decomposition and Expected Return

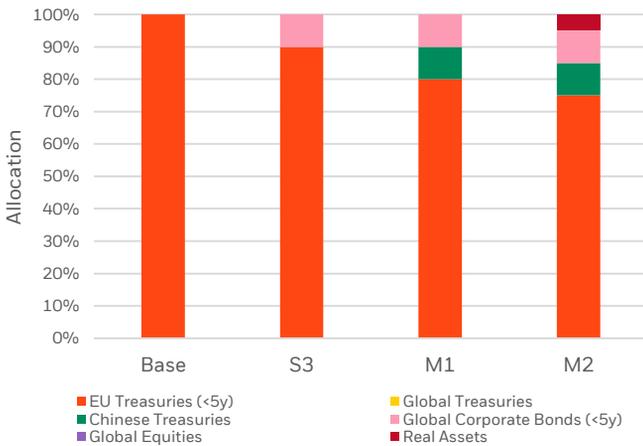


Adding riskier assets to a conservative portfolio might lead to lower risk and higher returns.

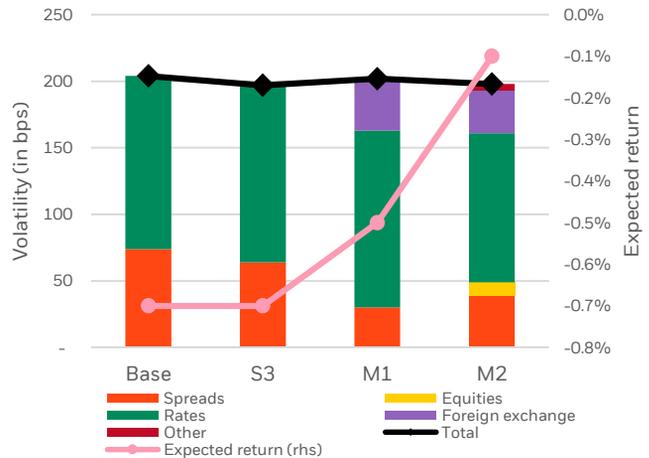
Source: BlackRock; Forecasts are not a reliable indicator of future performance. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even estimate – of future performance. Data as of 30-September-2020. The right hand chart shows the volatility (and its factor decomposition) of the respective portfolios based on 240 equally weighted monthly data. The expected return is based on BlackRock's EUR 5-year capital market assumptions (data as of 30-September-2020). Illustrative management fees were assumed for the various asset classes; for 'infrastructure', an active return of 5.5% was assumed; for 'real estate', an active return of 0.8% was assumed. "Global Treasuries" comprise 45.8% 'US Treasuries', 11.4% 'UK Treasuries', and 42.7% 'EU Treasuries'. "Global Corporate Bonds (<5y)" comprise 53.6% 'US Corporate bonds (<5y)', 4.1% 'UK Corporate Bonds (<5y)', and 42.3% 'EU Corporate Bonds (<5y)'. "Global Equities" comprise 68.7% 'US Equities', 4.2% 'UK Equities', 8.1% 'Japanese Equities', 3.5% 'Pacific ex Japan Equities' and 15.5% 'Europe ex UK Equities'. "Real Assets" comprise 50% 'Infrastructure' and 50% 'Real estate'. All developed currencies hedged to EUR.

The impact of such a cumulative addition is even more pronounced: the volatility level remains largely unchanged, but the expected return picks up more materially as shown in the chart below.

Asset Allocation: Portfolio Definition



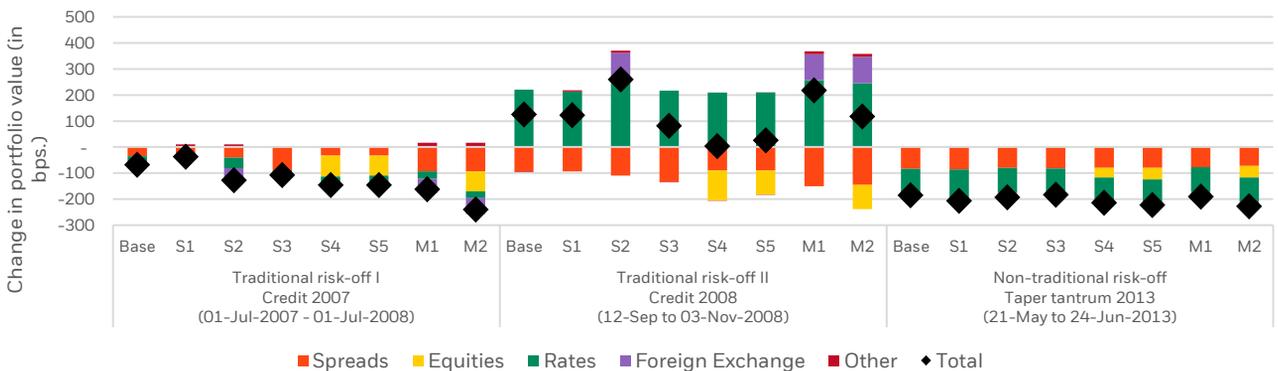
Risk Decomposition and Expected Return



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Source: BlackRock; Forecasts are not a reliable indicator of future performance. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even estimate – of future performance. Data as of 30-September-2020. The right hand chart shows the volatility (and its factor decomposition) of the respective portfolios based on 240 equally weighted monthly data. The expected return is based on BlackRock's EUR 5-year capital market assumptions (data as of 30-September-2020), as introduced on a previous slide. Illustrative management fees were assumed for the various asset classes; for 'infrastructure', an active return of 5.5% was assumed; for real estate, an active return of 0.8% was assumed. 'Global Corporate Bonds (<5y)' comprise 53.6% 'US Corporate bonds (<5y)', 4.1% 'UK Corporate Bonds (<5y)', and 42.3% 'EU Corporate Bonds (<5y)'. 'Real Assets' comprise 50% 'Infrastructure' and 50% 'Real estate'. All developed currencies hedged to EUR.

In summary, adding these asset classes diversifies the risk factor exposure of the base portfolio and is expected to enhance the efficiency of the base case portfolio materially ... on average and in the long run. However, the cost of achieving these higher expected returns in the long run is that in times of market turmoil, investors might experience larger temporary drawdowns as illustrated by the stress tests depicted in the chart below.



A cost of potentially performing better on average is performing worse in times of stress.

BlackRock, 30-November 2020. For illustrative purposes only. Risk management cannot fully eliminate the risk of investment loss. There is no guarantee that stress testing will eliminate the risk of investing in any product or strategy. The chart shows the change in portfolio value (and its factor decomposition) of the respective portfolios in various stress scenarios defined by the period depicted in the name of the stress test.

In summary, the current portfolios of many central banks are dominated by short duration, high-quality government bonds, which offer low (if not negative) returns. Applying a risk factor framework and formulating capital market assumptions with the goal to take risks in a deliberate, diversified and scaled fashion might help improving reserves portfolios. This could entail adding credit and equity risk; the aim is to reap diversification benefits. However, while such a strategy might be expected to enhance return and / or reduce volatility on average and in the long-term, it can be beneficial to complement such an analysis with scenario analyses and to embed it in the current market environment.

While liquidity needs should be prioritised unequivocally, illiquidity only causes an issue if a sale of asset has to be realised in forced circumstances. A modest allocation to real assets where appropriate can help further improve portfolio efficiency and make the total portfolio more resilient – something we have observed during the Covid-19 pandemic.

Risk Warnings

Capital at risk. The value of investments and the income from them can fall as well as rise and are not guaranteed. Investors may not get back the amount originally invested. Past performance is not a reliable indicator of current or future results and should not be the sole factor of consideration when selecting a product or strategy. Changes in the rates of exchange between currencies may cause the value of investments to diminish or increase. Fluctuation may be particularly marked in the case of a higher volatility fund and the value of an investment may fall suddenly and substantially. Levels and basis of taxation may change from time to time.

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List of representative indexes for CMAs

| Asset class | Name | Benchmark |
|-------------|----------------------------|--|
| EUR C | EU Cash | 3-month cash of EMU government bond quality |
| USD C | US Cash | 3-month cash of USD government bond quality |
| GBP C | UK Cash | 3-month cash of GBP government bond quality |
| USD T | US Treasuries | BBG Barc US government bond index |
| GBPT | UK Treasuries | FTSE actuaries UK conventional Gilts all GB Stocks Index |
| CNY T | Chinese Treasuries | BBG Barc China Treasury + Policy Bank Total Return Index |
| USD T<5 | US Treasuries (<5y) | BBG Barc Treasury 1-5 year Index |
| GBP T<5 | UK Treasuries (<5y) | ICE BofA UK Gilt 1-5 year (GVLO) |
| EUR T | EU Treasuries | BBG Barc Global Aggregate Euro Treasury Index |
| EUR T<5 | EU Treasuries (<5y) | ICE BofAM EMU Direct Government 1-5 years |
| USD ILB | US ILB | BBG Barc US Government Inflation-linked bond index |
| EUR ILB | EU ILB | ICE BofAML EMU Direct Government Inflation-linked (EGOI) |
| GBP ILB | UK ILB | FTSE Actuaries UK Index-linked Gilts over 5 Years Index |
| USD MBS | MBS | BBG Barc MBS Index |
| USD CB | US Corporate bonds | BBG Barc U.S. Credit Index Hedged |
| EUR CB | EU Corporate bonds | ICE BofAML Euro Corporate Index (ER00) |
| GBP CB | UK Corporate bonds | ICE BofAML Sterling Corporate Securities Index (URO0) |
| USD CB<5 | US Corporate bonds (<5y) | BBG Barc US Corporate 1-5 years Index |
| GBP CB<5 | UK Corporate bonds (<5y) | BBG Barc UK Corp 1-5 Years Index |
| EUR CB<5 | EZ Corporate bonds (<5y) | ICE BofAML Euro Corporate 1-5 Year Index (EROV) |
| USD HY | US High yield | BBG Barc US Corp High Yield 2% Issuer Capped Index |
| EUR HY | EU High yield | ICE BofAML Euro High Yield (HE00) |
| \$\$-EMD | \$\$-EMD | JP Morgan EMBI Global Diversified Index |
| L-EMD | L-EMD | JPM Morgan GBI-EM |
| USD BL | Bank loans | S&P/LSTA Leveraged Loan Index |
| RD | Real estate mezzanine debt | BlackRock proxy |
| InfD | Infrastructure debt | BlackRock proxy |
| InfE | Infrastructure | BlackRock proxy |
| RE | Real estate | BlackRock proxy |
| Gold | Gold | Gold Bullion Spot Price |
| USD Eq | US Equities | MSCI Developed - US Index |
| GBP Eq | UK Equities | MSCI Developed - United Kingdom Index |
| JPY Eq | Japanese Equities | MSCI Developed - Japan Index |
| PACxJ Eq | Pacific ex Japan equities | MSCI Developed Pacific Ex Japan Index |
| EPxGBP | Europe ex UK equities | MSCI Developed Europe ex UK Index |

Capital market assumptions methodology

Please note that certain parts of the methodology may not apply to the material.

Uncertainty and optimisation

- Expected returns and asset price volatility are difficult to predict. We believe any technique that builds portfolios should incorporate this inherent uncertainty. We consider both long-and short-term drivers of return. In the long run, we expect a relatively small number of macroeconomic drivers –economic growth, rates, inflation, credit and currencies –to determine an asset’s returns. In the short-run, other factors can overpower the structural drivers causing wider fluctuations from an asset’s fair value. Valuations can be helpful in estimating short-term returns. We combine contributions from the long-and short-term return drivers to produce a final set of return expectations with a range of uncertainty around each.
- The next step is to use this set of return expectations in an optimisation engine that offers the best trade-off between risk and return. Mean-variance optimisation would produce a portfolio that maximises expected return under one base scenario with a given level of risk. In contrast, we look to build a “least-worst” portfolio –one that maximises returns for each risk level across the worst outcomes, say for the bottom 50% of the distribution, from a set of stochastically generated scenarios (see below). This helps ensure the portfolio is not overly reliant on just the median return. This process seeks to produce a portfolio that is robust to small changes in the central return estimates.

Important Information

Stochastic engine

- We use Monte Carlo simulation to create random distributions informed by historical return distributions and centred on our expected returns. The engine simulates thousands of return pathways for each asset, representing the range of possible outcomes over a five-to 30-year time horizon. We leverage BlackRock's risk models to ensure we respect co-dependencies between asset returns. The range of scenarios incorporate our work on incorporating uncertainty in return expectations. The Black-Litterman model (1990) – a well-known model for portfolio allocation – combines long- and medium-term views in a single-period setting. Our model uses a Kalman filter – an algorithm that extracts insights about potential future paths by bringing together a number of uncertain inputs – to extend this approach into a multi-period setting. This allows us to capture the variation of expected returns over time under various scenarios – from economy-related to market sentiment driven. A large part of these variations is not predictable. Constructing portfolios that are robust to, or can exploit, these variations is a major challenge for investors. The ability to calibrate the engine with asset class views with uncertainty at arbitrary time horizons, and to evolve this uncertainty stochastically, drives the dispersion of return outcomes. Highlighting the uncertainty that investors face when building portfolios helps ensure ostensibly precise return expectations do not lead investors to concentrated portfolios.
- Simulated return paths support a broader range of applications, such as asset-liability modelling. Stochastically generated return scenarios enable investors to move with ease beyond mean-variance and optimise portfolios against their individual needs. Investors can place more emphasis on the tails of the distribution or focus on the path of returns rather than just the total return. They can incorporate flows in or out of the portfolio over the course of the investor's time horizon or place more emphasis on scenarios that are challenging for the investor's business beyond their portfolio. Investors with complex asset-liability matching requirements, such as insurers, typically rely on stochastic simulations of returns to assess and construct portfolios.

Interest rates

- Our model provides a way to map out the yield curve at multiple time horizons in the future. This is based on estimating (1) the short rate, and (2) model implied term premia. Estimates of short rates are based on market data in the near term and on macro informed data in the long term. More specifically, in the long-term, we assume investor views about long run inflation and real growth, coupled with changing preferences as to savings and risk aversion, will determine expectations for short rates (the "Long Run Short Rate"). Model implied term premia are computed from a model based in the affine term structure class of models (Adrian, Crump and Moench, 2013) describing the yield curve using the first five principal components of yield. The model implied term premia from the affine term structure model are further calibrated to market implied term premia, with the relative weights dependent on the relevant time horizon.

Equities

- Expectations of cash flows and discount rates can help explain the variability in equity returns as shown by Campbell (1990). We have used this insight to develop a discounted cash flow (DCF) model, with a few key innovative features. Most academic research focuses on the question of whether stock returns are predictable at all. We are concerned with making the best estimates that we can. We make two additional contributions. First, the baseline DCF model estimates earnings by leveraging analyst earnings estimates in the near term as discussed by Li et al (2013) to derive the implied cost of capital. The common assumption in implied cost of capital (ICC) studies is that earnings growth implied by analyst earnings estimates in the near term should trend towards GDP growth in the long-term. This can introduce an unintended assumption of continued expansion of profit margins. We have introduced a modification to account for late economic cycle dynamics. We allow for corporate profit margins to revert to trend (the median over a rolling 10-year history) as margins typically peak late-cycle. The standard ICC approach typically tests for equity returns using linear regression tests. For our DCF model, we take the desired time horizon as an input (number of years) and we estimate the appropriate discount rate for the specific time horizon using our aggregate implied cost of capital. This way, we account for both key sources of variability in equity returns, namely changes in cash flows and changes in the discount rate.

Credit

- Our model for credit asset (excess) returns is anchored on two key elements: 1) our estimate of credit spread at a given horizon and 2) our estimated loss due to defaults and downgrades over the horizon. The first component is projected in a consistent manner with our view of real GDP growth and the link between credit spreads and equity volatility. Our approach helps explain the behaviour of credit spreads using a limited number of predictive variables. Yet, as validated by tests against more complex methods, it retains the ability to help explain a high proportion of the variance in credit spreads. The second component is estimated based on our outlook for spreads, the duration of the asset and an assumed transition matrix which captures migrations and defaults across multiple credit cycles. We currently base our transition matrix on Moody's long-run transition data. We aim to further develop our model by directly modelling transitions based on macroeconomic conditions in order to better capture cycle dynamics and the respective variation in losses due to credit events. In addition to making our estimates of credit spreads consistent with our macroeconomic views, our new credit (excess) return model allows greater flexibility of calibrating our expected returns to different credit rating compositions which may prevail over the entire time horizon.

Private markets

- The private market return models can be grouped into two categories – equity and debt. The equity models – relevant for core real estate and private equity buyouts – are based on an accounting statement framework. We estimate earnings growth and future valuations of underlying assets, which are used in conjunction with observable market data (current valuations, financing cost, leverage, etc.) to model the evolution of the capital structure over time and infer equity returns. Estimated earnings growth and future valuations are linked to components of our public market return expectations for equity, rates, and credit spreads. Crucially, they also consider the unique dynamics of each asset class, such as the changing occupancy rates for real estate. Returns for private market debt – infrastructure debt and direct lending – are estimated using a build-up approach. The total return is a build-up of underlying public market returns (risk-free rates, corporate credit spreads) and private-market specific return drivers such as the public-private spread, losses due to default and downgrades, leverage and borrowing costs. Unlike most public debt markets, infrastructure debt and direct lending are modelled as buy-and-hold investments, in line with how investors access these asset classes. External data sources include S&P Capital IQ for deals and Preqin and S&P Capital IQ for market-wide and aggregate data.
- Accounting for fees in private equity can be challenging, partly due to a wide variety of clauses that allow funds to adjust fees over time and the variety of fees involved (management, carried interest, fund expenses, transaction costs) (Phalippou, 2018). We use the academic literature and professional surveys that have started to track the limited partnership agreements (LPAs) of private equity funds. We use Preqin data on deal cash flows to and from funds to simulate the fees charged by typical LPAs. We add fee estimates to this cash flow data to calculate our data on gross-of-fees returns. The average fee estimates are in line with the most recent academic research on this topic (Doskeland and Stromberg, 2018).

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