Beyond government bonds: *The benefits of diversification in a low yield environment*

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Abstract
Many institutional investors hold short-dated government bonds in excess of what is considered optimal for liquidity and risk management in the low-risk parts of their portfolios. They are increasingly considering diversification away from developed market government bonds, which currently offer exceptionally low interest rates. We simulate this type of diversification both ex-post (using historical data) and ex-ante (using convergence scenarios in which bond yields return to historical levels to varying degrees). We find that diversification improves the returns and Sharpe ratios of portfolios that previously held only government bonds. Diversification also reduces the risk and maximum drawdown levels of longer-duration portfolios that previously held only government bonds. The asset classes that have the most positive impact on risk-adjusted returns are Emerging Market Debt (EMD) and Equities. We suggest that short-dated developed government bond exposure above a certain threshold should be diversified, with the degree of diversification proportional to the extent to which short-dated government bonds are above the level considered adequate for liquidity and risk management purposes.

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Introduction

Institutional investors are currently reviewing their investment strategies to respond to the challenges posed by the historically low level of interest rates prevailing in most advanced economies. Near-zero interest rate policies implemented by most Western central banks, coupled with their direct purchase of assets in open markets, prevented the global economy from falling into a deeper recession and led to capital gains in bonds. However, these policies also had the concomitant negative implication of reducing the income potential that institutional investors can earn on their substantial government bond holdings. In addition, central bank policies laid the ground for potential future losses when monetary policy stance will eventually shift in and interest rates will start rising from current levels.

As the main purpose of allocations to short-dated developed government bonds is to provide institutional investors with a liquidity and precautionary financial buffer to be deployed when required, investing in high-quality short-dated government bonds has traditionally been perceived as the most sensible investment strategy. Indeed, over the last decade a global government bond portfolio invested into bonds issued by the most fiscally and institutionally sound countries (e.g. US, Germany, France, Netherlands, UK and Japan), with 1-3 year duration and fully hedged in dollar terms, generated a return of around 3%. Considering that over the same period, the average country-weighted inflation rate across these advanced economies was around 2.3% per year, this sample global government bond portfolio generated a positive return in real terms of about 1%: A reasonable return when seen against the benefits of a very liquid, low-risk and readily deployable portfolio.

Given the level reached by interest rates in most advanced economies, however, returns on short-dated government bonds have fallen dramatically in the last few years. Returns experienced over the last decade are unlikely to be replicated in the future. Over 2009-12, the short-duration portfolio mentioned above generated a yearly return of 1.4%, less than the inflation rate experienced during the same period, thus leading to negative real returns. The current yield on this portfolio is 0.2%, well below the prevailing inflation rate in most economies.

Institutional investors have reacted to the challenge of historically low yields either by broadening the list of government bond issuers in their investment universe or by extending the duration on their government bond portfolio. By including short-dated government paper issued by countries such as Australia, Canada, Denmark, Norway or Singapore, investors can add some extra return to their portfolio given the generally higher short-term interest rates prevailing in these economies. For instance, by extending a portfolio of global government bonds with 1-3 years' duration to these "secondary" sovereigns, the current yield would increase from 0.20% to 0.36%.

By extending the duration of their portfolios, institutional investors are of course able to enhance their returns. However, they can do so less now than they could a few years ago. Over the last 10 years, a long duration government bond portfolio investing in the same five advanced economies considered above generated a return of more than 5%, about 2% more than the return on the short-duration portfolio. In the current environment, due to the impact of central banks' monetary policy on long-dated interest rates, the current yield on the same portfolio is only 0.90%, well below the 4% to 5% prevailing early in the decade and also below the prevailing inflation rate.[1] Extending duration, however, poses an increased risk of potential higher losses should interest rates eventually "normalize" over the next few years given the higher sensitivity of longer-dated bonds to changes in interest rates. The starting level of yield has historically served as a reasonably good indicator of an investor's prospective return over the subsequent 3-year period; with government bond yields at the current levels, returns over the next few years are likely to be much lower than those achieved over the last decade, and eventually negative if the current accommodative monetary policy is reversed.

An argument often mentioned in favor of fixed income assets is that capital losses do not have to be accounted if assets are held until maturity. However, one should keep in mind that institutional investors adopt a mark-to-market accounting approach to their investments and any capital loss should be accounted for accordingly. Additionally certain institutional investors face heavy criticism when experiencing losses and mitigating actions to reduce this risk should therefore be considered.

Not only do institutional investors face the challenge of earning a satisfactory real return on their highly liquid government bond holdings and protecting them from an eventual rise in interest rates; they are also confronted with an unprecedented fiscal crisis affecting, though with different degrees of intensity, most Western economies. This crisis has brought increased volatility in the market. Anecdotal evidence points to a reduction in the exposure of institutions to sovereign bonds issued by countries facing the most acute fiscal problems, such as those in the eurozone periphery, and a flight to safe haven assets such as US Treasuries and German Bunds. This has further exacerbated the downward pressure on the yield of these assets putting further pressure on institutional investors struggling in the search of returns. This has also led to a re-thinking of the concept of risk-free assets, as the pre-crisis assumption of a zero probability of default in these markets no longer holds.

Institutional investors are therefore in the uncomfortable position of earning low returns on their government bond portfolio and being poorly compensated for the increased sovereign risk across many of the markets where they invest. This situation is unlikely to change any time soon as there is broad agreement that the fiscal crisis affecting most Western economies will require years before being resolved through a painful fiscal restructuring process. This re-thinking of the concept of the risk-free asset is also leading to a review of traditional benchmarks largely based on outstanding debt and therefore biased towards the most indebted countries. A move away from traditional benchmarks and the increase of the weight of emerging markets, whose fiscal fundamentals are often stronger than those of many advanced economies, is a trend already well under way among most institutional investors and, this trend is expected to continue over the next few years.

[1] On a more diversified government portfolio including the "secondary" sovereigns the current yield is about 1.3%, providing further evidence of the benefits of investing into the smaller and less liquid sovereigns with still strong fiscal fundamentals as we will discuss in the next sections.

Many institutional investors hold short-dated government bonds in excess of what is considered optimal for liquidity and risk management purposes

To the extent that short-dated government bond holdings are above what is considered optimal for liquidity and precautionary motives, institutional investors should consider broadening the investment guidelines to include higher-yielding asset classes to be in a better position to grasp the benefits of diversification and to preserve the value of investment portfolios, in real terms, over the medium-to-long term.

The degree of diversification should be "calibrated" to the extent to which short-dated government bonds are above the level considered adequate. For instance, portfolios where short-dated developed government bonds are slightly above levels required for liquidity and risk management, we would recommend that diversification is limited to fixed income assets only, including credit and emerging market debt. Above this level, a broadening of the investment guidelines to include Equities should be considered as risk capacity for increased volatility and lower liquidity is higher. This recommendation has indeed been followed by some of the world's monetary authorities. For instance, Switzerland has recently disclosed that its allocation to Equities was raised to 12% of its total portfolio and it is well known that Hong Kong, Singapore and the People's Bank of China have been investing in Equities for a long time.

Institutional investors still appear to have a strong bias towards the most traditional developed government bonds despite the low returns and the fiscal problems surrounding the issuing countries. As we will discuss in the next sections, including short-dated government bonds from smaller advanced economies and more importantly from emerging markets in a fixed income portfolio increases returns, as in most of these economies there are no unorthodox monetary policies given their better macroeconomic fundamentals when compared to advanced economies. In addition, it allows for a reduction in the fiscal risks currently faced in the sovereign bonds issued by Western economies.

Institutional investors are increasingly considering diversification away from government bonds

Government bond diversification has actually been an ongoing trend for quite a while now, at least from the beginning of the last decade, as the amount of short-dated government bonds held by central banks increased dramatically as a result of either higher commodity prices or increasing global macroeconomic imbalances. However, this trend paused in the years following the 2008 financial crisis as risk aversion among central bankers increased sharply, in a similar vein to that experienced by institutional investors.

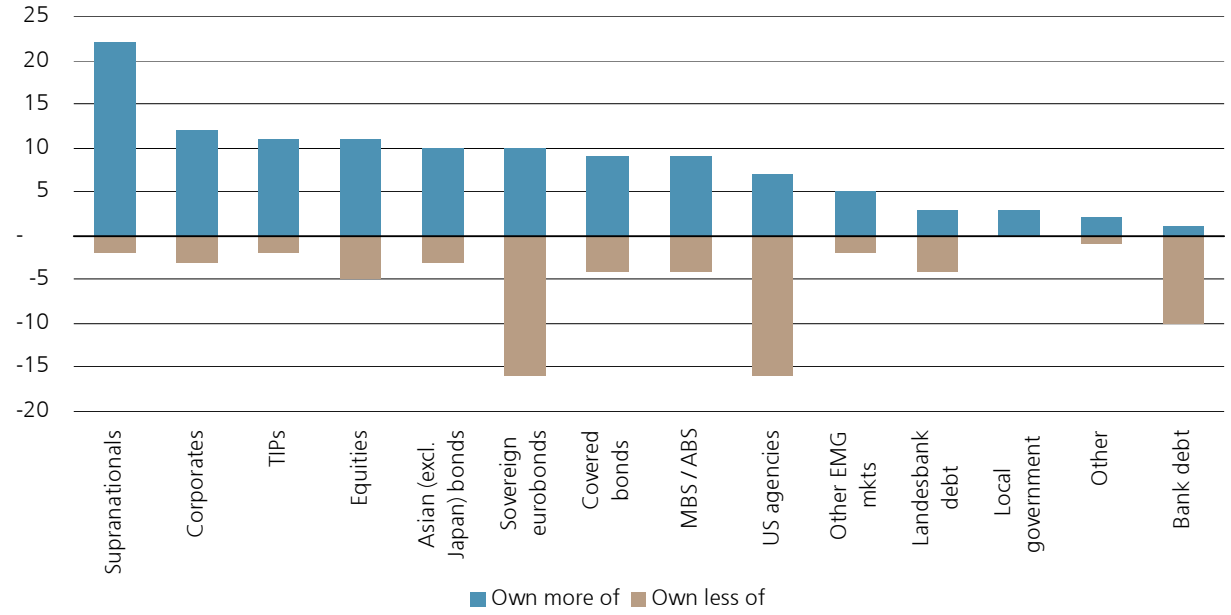
Following the more recent further fall in interest rates, the need for diversification has further increased as returns on short and long-term dated government bonds has fallen even more when compared to the years immediately following the financial crisis. But many institutional investors still appear hesitant in accelerating diversification as uncertainty over the future of the global economy and risk aversion remain elevated.

Looking to central banks, when asked which asset classes are being considered for diversification purposes, five products dominate: supranationals, corporate bonds, Inflation-linked bonds (or TIPs), Emerging Market Debt (EMD) and Equities (Fig.1). Supranationals appear to have fully supplanted US agencies as the triple-A credit diversification of choice. There is increasing demand for TIPS as one view commonly shared among investors is that sooner or later the huge monetary stimulus being implemented globally will translate into rising inflation. TIPs stabilize expected real returns by adding an inflation-hedging factor to a government bond-only portfolio. Corporates and EMD – and to a lesser extent MBS/ABS – are the asset classes selected by central banks to enhance the yield on their portfolio. Highly rated corporate bonds not only provide some pick-up in returns when compared to government bonds, they also provide some diversification from the increasing risk of default across some sovereigns. Some corporate bonds currently have yields lower than some sovereigns that until a few years ago were considered risk-free. Furthermore, the corporate bond market has also increased in size and depth as the issuance of credits has increased sharply in the last few years, as banks reduced lending and corporates restructured their debt to take advantage of low interest rates.

Demand for EMD has increased strongly over the last few years as emerging economies navigated the global crisis relatively better than most advanced economies and their fiscal fundamentals are in relatively better shape. With a growing issuance of debt in local currencies, an additional driver of the surging demand for EMD has been the appreciation trend experienced by most emerging economies' currencies reflecting their higher economic dynamism. By getting exposure to this asset class, institutional investors can take advantage of this trend while at the same time reducing their exposure to the USD, the euro and other "traditional" currencies. In some cases, the actual demand for EMD denominated in local currencies outstrips supply. One example is debt denominated in Chinese renminbi (RMB), given the ongoing restrictions to foreign investments in the Chinese domestic bond market and the still relatively small size of the accessible Chinese offshore bond market.

Institutional investors also appear to be increasingly considering Equities, as this asset class provides some diversification benefits given its historically negative correlation with fixed income assets. In a scenario of rising interest rates, a relatively small allocation to Equities can actually help, offsetting some of the unavoidable losses expected in the fixed income segment of the portfolio.

Figure 1: Likely changes in central banks' asset allocation in 2012-13



Source: UBS Global Asset Management. Based on a survey conducted in June, 2012.

In the next sections we look in detail at the benefits and risks associated with institutional investors' liquidity and risk management portions of their portfolio when their investment guidelines are broadened to introduce strategic asset allocation in higher-yielding asset classes. We carry out a historical analysis to show how a diversified portfolio provides a better risk-adjusted return when compared to high-quality government bonds only. In a forward-looking analysis, we show how a diversified portfolio including a variety of fixed income assets and eventually Equities provides better protection in a scenario of rising short- and long-term interest rates.

Both the historical and forward-looking analysis are carried out taking into account the particular nature of the investor's liquidity and risk management requirements. In particular, we recommend that increased diversification should be carried out in a controlled way, with a still significant share of the portfolio allocated to high-quality government bonds and taking into account the additional sources of risk that such a move involves.

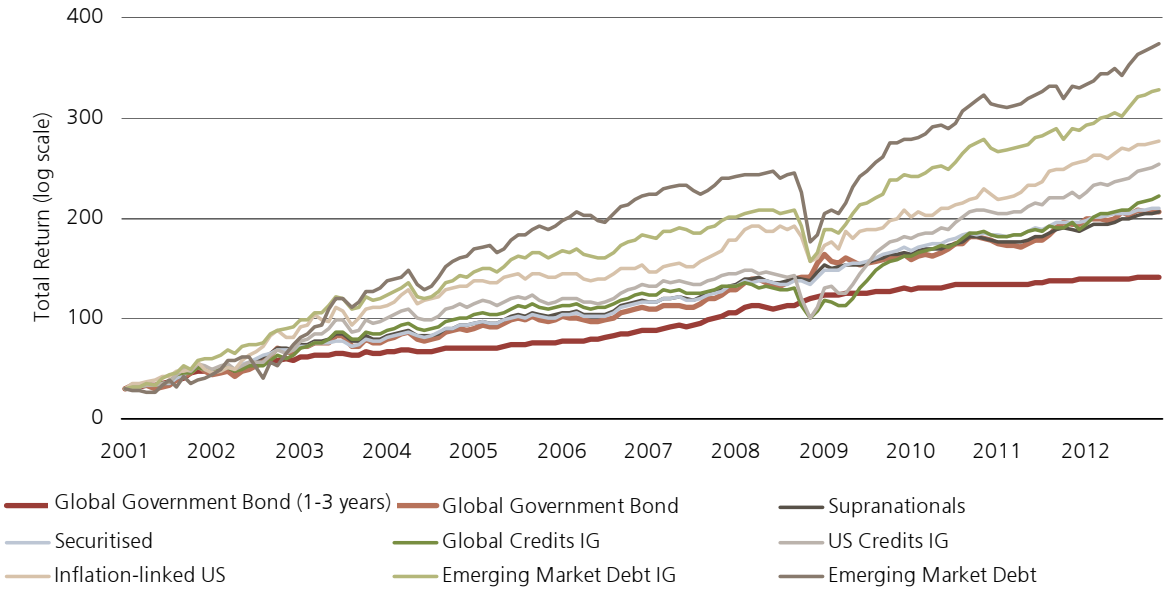
The benefits of diversification: a historical analysis

In this section we look at the historical returns, standard deviation and correlations of those asset classes that, depending on the individual circumstances of each institutional investor should be considered for diversification purposes. While we are strong advocates of a forward-looking approach for any investment decision and we will take this approach in the next section, the historical analysis of these key financial metrics allows us to form a historical set of capital market assumptions and also see how diversification could have improved the return/risk combination from a historical perspective.

In order to show the benefits of diversification in asset allocation, we consider two starting portfolios: a short-duration Global Government Bond portfolio (from now on labeled as GGB 1-3) including high-quality government bonds with 1-3 years' duration issued by the US (65%), Germany (15%), Netherlands (5%), France (5%), United Kingdom (5%) and Japan (5%); a long-duration Global Government Bond Portfolio (from now on labeled as GGB) with the same country allocation as the GGB 1-3 but including the whole duration of the asset class, based on the underlying index. While institutional investors have a different government bond allocation across countries, we consider the GGB 1-3 a starting point reflecting the average, relatively conservative allocation, with a low degree of diversification and maximum exposure to the most liquid and low-risk government bond markets. Figure 2 shows the growth in GGB 1-3 and GGB from 2001 to 2012 and compares them with the asset classes being considered by institutional investors for diversification purposes.

From a historical point of view, any of these asset classes shows better returns than GGB 1-3 portfolio, with inflation-linked bonds (TIPS) and EMD showing the highest returns. These growth rates reflect the historical returns of these asset classes illustrated in Table 1 together with standard deviations, minimum yearly returns and the Sharpe ratios. Over 2001-12, EMD was the highest-returning asset class, with an annual average return ranging from nearly 9% for the investment grade (IG) in hard currencies to over 11% for that denominated in local currencies. TIPS returned more than 7% and corporate bonds IG nearly 6%, about double of the return on the GGB 1-3 portfolio; supranational and securitized bonds have the same annual returns of 5.3%. Also, when compared to the long duration government bond portfolio (GGB), all these asset classes have a higher return.

Figure 2: Total historical returns, 2001-2012



Original data: Jan 2001=100

Source: UBS Global Asset Management and Bloomberg

Higher returns are generally associated with higher risk as measured by standard deviation and the minimum yearly return (the worst 12 months over the period in terms of return). The GGB 1-3 portfolio is the preferred asset class for most institutional investors based on liquidity and risk management requirements as it provided a return above 3% with relatively low volatility; over 2001-12 this portfolio never generated a negative yearly return. The GGB portfolio was more volatile than the GGB 1-3 and the minimum yearly return was indeed negative during the period considered (reflecting rising yields during the middle of the last decade). Supranational and securitized bonds have lower volatility levels and higher minimum yearly returns than the GGB portfolio. Corporate bonds, TIPS and EMD have higher volatility and – more importantly from a capital protection point of view – much lower minimum yearly returns when compared to the other asset classes. This partly explains why many institutional investors are reluctant to invest in these asset classes given their aversion to suffering substantial losses in their liquidity and risk management segments of their portfolios.

However, the standard deviation and the minimum yearly returns are not the right metrics to consider when considering the benefits of diversification. The Sharpe ratio gives a better measure of the extra return over the cash rate adjusted by risk. The concept of drawdown or minimum yearly returns should in fact become relevant only for the most liquid share of the short-dated government bond reserves as these funds need to be deployed at short notice. In the case of short-dated government bonds in excess of what is needed for liquidity and risk management purposes, the Sharpe ratio is a better indicator because it is a more refined risk measure for funds that are invested with a medium-to-long term investment horizon across the ups and down of the business cycle. From an adjusted-risk return point of view, EM debt, supranationals and securitized bonds appear to be superior, indicating significant benefits in terms of risk diversification. TIPS and corporate bonds IG have Sharpe ratios that are equal or below that of the GGB 1-3 portfolio; however, they have a better risk-adjusted return when compared to the GGB portfolio. Overall, most of the non-government asset classes considered here, while having sometimes very negative minimum yearly returns, show a better risk-adjusted return when compared to the portfolios that only hold government bonds.

Table 1: Historical returns, standard deviations and Sharpe ratios, 2001-2012 (in USD)*

	Annual Return	Standard Deviation	Minimum Yearly Return	Sharpe Ratio
Global Government Bond - 1-3 years	3.3%	1.4%	0.44%	0.81
Global Government Bond	5.2%	4.3%	-1.98%	0.71
Supranationals	5.3%	2.8%	-0.87%	1.11
Securitised	5.3%	2.5%	0.22%	1.24
Global Credits IG	5.7%	4.5%	-10.60%	0.78
US Credits IG	6.7%	6.1%	-14.30%	0.74
Inflation-linked US	7.4%	6.5%	-8.20%	0.80
Emerging Market Debt IG	8.9%	7.2%	-14.20%	0.93
Emerging Market Debt	10.2%	9.1%	-21.80%	0.88
Emerging Market Debt - Local currency	11.4%	11.2%	-20.20%	0.83

Global Government Bond 1 – 3 Years: Weighted average of Citigroup US GBI 1-3, German GBI 1-3, France GBI 1-3, UK GBI 1-3 and Netherlands GBI 1-3. All hedged in USD
Global Government Bond: Weighted average of Citigroup US GBI, German GBI, France GBI, UK GBI and Netherlands GBI. All hedged in USD
Supranationals: Barclays Global Aggregate Government Related. Hedged in USD
Securitized: Barclays Global Aggregate Securitized
Global Credits IG: Barclays Corporate Investment Global - US Hedged
US Credit IG: Barclays U.S. Corporate Investment Grade. US hedged
Inflation-linked USD: Barclays US Gov. Inflation-Linked All Mat. US hedged
Emerging Market Debt IG: JP Morgan EMBI Global Diversified - Investment Grade. US hedged
Emerging Market Debt: JP Morgan EMBI Global Diversified Index. US hedged
Emerging Market Debt Local currency: GBI-EM Global Div (in USD)

Source: UBS Global Asset Management and Bloomberg

The true benefits of diversification across the whole spectrum of the fixed income universe becomes apparent when considered from an asset allocation point of view. In modern portfolio theory, in fact, it is the degree to which asset class returns do not move together that provides the benefits of diversification. From this point of view, adding a more volatile asset class to a portfolio can actually reduce the overall portfolio volatility if its correlation with the other asset classes is low or negative. In Table 2 we illustrate the historical correlation coefficients of all asset classes included in our investment universe.

First of all, it is noteworthy that government bonds from different jurisdictions are generally highly correlated, thus reducing the scope of geographical diversification within this asset class. This point should be kept in mind by institutions with large exposure to government bonds. In a scenario of rising interest rates, diversification of the portfolio across countries within the same asset class is unlikely to reduce capital losses as interest rates in different currencies will tend to rise together, particularly at the long end of the interest rate curve. Among the non-government asset classes, the degree of correlation with government bonds is generally lower than that between government bonds. In particular, EMD and corporate bonds have a very low correlation with GGB and GGB 1-3, thus providing excellent diversification benefits for a government bond-only investor. Supranational and securitized bonds have a relatively higher positive correlation with government bonds but still with a correlation coefficient oscillating between 0.5 and 0.7 (with respect to GGB 1-3), and they also provide diversification benefits. Global Equities is in the only asset class of those considered here that has a negative correlation with both GGB and GGB 1-3; as we will discuss shortly it is the low correlation with fixed income that makes this asset class an attractive diversifier for institutional investors largely invested in fixed income assets. Overall, EMD and Global Equities appear to be the two asset classes providing the widest scope for an effective increase in returns and better diversification of a government bond portfolio.

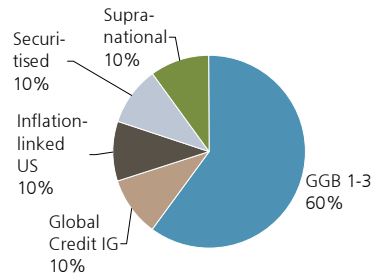
Table 2: Correlations, 2001-2012 (in USD)

	Global Credits IG	Inflation-linked US	Government US	Government GER	Government FR	Government JAP	Government NET	Government UK	Securitised	Supra-nationals	Emerging Market Debt IG	Global Equity
Global Credits IG	**1.00**	0.65	0.22	0.10	0.20	-0.10	0.18	0.14	0.66	0.67	0.81	0.23
Inflation-linked US	0.65	**1.00**	0.47	0.20	0.23	-0.03	0.27	0.22	0.71	0.70	0.71	-0.03
Government US	0.22	0.47	**1.00**	0.70	0.66	0.42	0.68	0.72	0.71	0.73	0.23	-0.28
Government GER	0.10	0.20	0.70	**1.00**	0.96	0.39	0.98	0.75	0.51	0.62	0.00	-0.41
Government FR	0.20	0.23	0.66	0.96	**1.00**	0.36	0.97	0.73	0.55	0.66	0.07	-0.36
Government JAP	-0.10	-0.03	0.42	0.39	0.36	**1.00**	0.35	0.40	0.06	0.15	-0.13	-0.13
Government NET	0.18	0.27	0.68	0.98	0.97	0.35	**1.00**	0.73	0.57	0.67	0.09	-0.36
Government UK	0.14	0.22	0.72	0.75	0.73	0.40	0.73	**1.00**	0.55	0.63	0.08	-0.29
Securitised	0.66	0.71	0.71	0.51	0.55	0.06	0.57	0.55	**1.00**	0.91	0.66	-0.09
Supranationals	0.67	0.70	0.73	0.62	0.66	0.15	0.67	0.63	0.91	**1.00**	0.62	-0.20
Emerging Market Debt IG	0.81	0.71	0.23	0.00	0.07	-0.13	0.09	0.08	0.66	0.62	**1.00**	0.29
Global Equity	0.23	-0.03	-0.28	-0.41	-0.36	-0.13	-0.36	-0.29	-0.09	-0.20	0.29	**1.00**

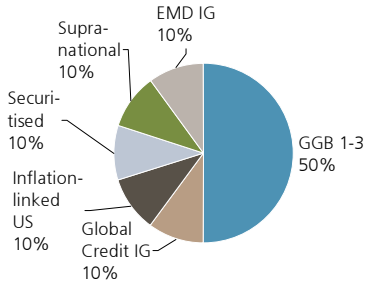
Source: UBS Global Asset Management and Bloomberg

Figure 3: Proposed diversified portfolios

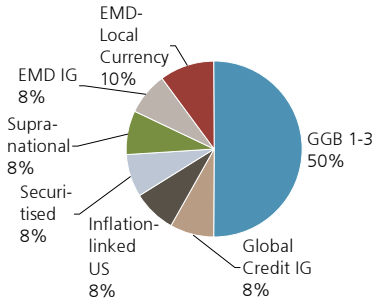
Portfolio A



Portfolio B



Portfolio C



Source: UBS Global Asset Management

In order to show the benefits of diversification of the GGB 1-3 and GGB portfolios we consider three alternative portfolios:

Diversified Portfolio A: a portfolio extending the GGB 1-3 (or the GGB) to include US TIPS (10)%; securitized bonds (10%), supranationals (10%) and corporate bonds (10%). 60% of the portfolio would still be invested into GGB 1-3 (or GGB)

Diversified Portfolio B: portfolio A extended to EMD IG in hard currencies (10%). The allocation to GGB 1-3 (or GGB) is reduced to 50%

Diversified Portfolio C: portfolio B expanded to EMD in local currency with the following allocations: US TIPS (8%); securitized bonds (8%); supranationals (8%); corporate bonds (8%); EMD IG (10%; EMD local currency (10%). The allocation to GGB 1-3 (or GGB) remains unchanged at 50% of the portfolio.

In all three portfolios, the GGB1-3 (or GGB)'s share is at least 50%, thus providing the institutional investor with a substantial amount of low-risk and liquid government bonds. This component of the portfolio is what the institutional investor needs for liquidity and risk management purposes. Its yield would play a minor role and ultimately its actual size would depend on how excessive the short-dated government bond allocations are relative to liquidity and risk management requirements: We advocate that the larger they are, the smaller the GGB 1-3 (or the GGB) can be.

The three diversified portfolios not only provide for higher returns but also appear superior from a risk-adjusted point of view and in most cases provide better capital protection as measured in terms of minimum yearly return when compared to a portfolio that only holds government bonds. Portfolio A, including GGB 1-3 and a wide range of credit products and TIPS, shows a historical return 1 per cent higher than the government bond-only portfolio, a better Sharpe ratio and a higher minimum yearly return. By including EMD in the Portfolio B the historical returns and the Sharpe ratios further improve while the minimum yearly return does not worsen substantially, showing the additional diversification benefits of this asset class. Portfolio C, including EMD in local currency, also provides a significant pick-up in return and an improvement in Sharpe ratios; but the minimum yearly return is negative, reflecting the impact of high FX volatility between emerging markets' currencies and the USD.

The key point is that, from a historical perspective, the inclusion of asset classes that have higher returns, higher volatility and sometimes much lower minimum yearly returns can substantially improve the return of a government bond-only portfolio, lower its volatility and generally increase the minimum yearly return.

In the Table 3, we also illustrate the benefits of diversification when starting from the GGB portfolio. In this case, the pick-up in return obtained from diversifying away from government bonds is of course smaller but the improvement from a risk-adjusted perspective is still very large. From a historical perspective, by diversifying the GGB portfolio into credit and TIPS, the return increases by about 0.3% but the volatility of the diversified portfolio actually decreases, thus leading to a better Sharpe ratio. The GGB portfolio diversified further into EMD not only provides additional return but also implies a lower volatility and a better Sharpe ratio.

In terms of current yields, the benefits of diversification are even more visible: A diversified portfolio including credits and EMD actually doubles the yield when compared to the GGB portfolio. What is also remarkable is that the minimum yearly return also improves significantly, thus providing more capital protection when compared to the GGB portfolio; this is also true in the case of the portfolio including EMD in local currency. In other words, also when starting from a long-duration government bond portfolio, diversification leads to a better risk-adjusted return profile.

Table 3: Key financial metrics of three proposed diversified portfolios

	GGB 1-3	Portfolio A	Portfolio B	Portfolio C
Return	3.28%	4.34%	4.90%	5.39%
Risk	1.30%	2.00%	2.44%	2.72%
Sharpe ratio	0.83	1.07	1.11	1.17
Minimum Yearly Return	0.44%	0.76%	0.67%	-1.15%
Current Yield	0.20%	0.92%	1.25%	1.59%

	GGB	GGB + TIPS + SEC + SUP + CORP	GGB + TIPS + SEC + SUP + CORP + EMD	GGB + TIPS + SEC + SUP + CORP + EMD + EMD Loc
Return	5.23%	5.51%	5.87%	6.36%
Risk	4.26%	3.78%	3.85%	3.93%
Sharpe ratio	0.71	0.88	0.95	1.06
Minimum Yearly Return	-2.04%	-0.93%	-0.90%	-0.93%
Current Yield	0.89%	1.34%	1.60%	1.94%

Source: UBS Global Asset Management

Benefits of diversification: a forward-looking analysis

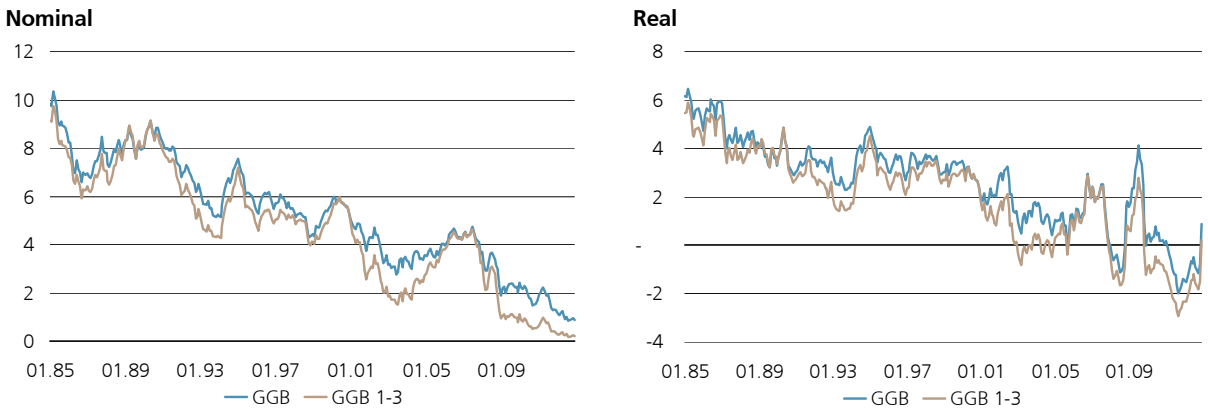
From a historical perspective – as illustrated in the previous section – a fixed income portfolio diversified across credit and EMD (but still retaining a substantial allocation to low-risk and liquid government bonds) provides a substantial pick-up in yield and is superior from a risk-adjusted return point of view. Any investment decision, however, should be based on a forward-looking approach. It is therefore time to look at how these diversified portfolios are expected to perform compared with a government bond-only portfolio over the next few years.

In order to assess the expected return of these portfolios, we need to make some assumptions about the rates of return across the asset classes we have been considering in the previous section. This is not an easy exercise given that from a long-term historical perspective the last two decades have been an exceptional period as we experienced a steady fall in the yields of most fixed income assets. This period is sometimes labeled as the "great moderation", i.e. a period of low inflation, falling volatility in the business cycle and low interest rates that translated in above average returns for bonds. In Figure 4 we illustrate the yields of the two government-bond only portfolios – GGB 1-3 and GGB – over the last 27 years. The declining trend in nominal yields is common to both the short- and long-duration portfolios. The most recent fall in yields is unprecedented from a historical point of view and reflects the massive policy response undertaken by monetary authorities around the world to avoid a global depression following the financial crisis in 2008-09 and the fiscal crisis in 2011-12. Real yields, those that truly matter to institutional investors in terms of capital preservation, turned negative over the last few years for both the GGB 1-3 and GGB portfolios. This happened as monetary authorities cut interest rates sharply and undertook unorthodox monetary policies.

What is the outlook for interest rates and yields over the next decade? We can expect interest rates to remain low over the next 12-18 months as growth remains low and unemployment in advanced economies elevated. However, unless one believes that most advanced economies enter a prolonged period of stagnation as experienced by Japan over the last two decades, it is reasonable to expect a normalization of monetary policy conditions over the medium-to-long term as the global economy continues healing from the fall-out of the financial crisis, the financial sector completes the deleveraging process started a few years back, and economic growth conditions continue improving. In order to determine a time horizon of "normalization" in interest rates, we will assume that yields will eventually revert to their historical averages over a period of seven years, starting from current levels.[2] On the other hand, with very few exceptions (e.g. Japan), from a long-term perspective periods of negative yields in the bond markets have never been very prolonged.

[2] The 7-year convergence period in yields in the fixed income is based on the assumption that interest rates will remain at historically lows up to 2014 as already signalled by the Federal Reserve. This assumption is based on the average length of economic slowdown following balance-sheet induced stagnations that is about 10 years according to empirical research (see for instance Reinhart, Carmen M. and Kenneth Rogoff (2011), *This Time is Different: Eight Centuries of Financial Follies)*. The current period of sub-optimal growth started in 2007-08 with the global financial crisis, and by 2017 we can expect the impact of that crisis to have entirely dissipated with the global growth fully restored and monetary policy normalized.

Figure 4: Long-term yields of GGB 1-3 and GGB Portfolio, 1985-2012



Source: Bloomberg

Once the expected convergence period for yields has been defined, then the next question to address is to which level real interest rates will eventually converge. Given the steady declining trend in interest rates experienced over the last 25 years, will interest rates return to the levels prevailing before the "great moderation" when interest rates and inflation rates were much higher than those experienced in the last decade? Or will they return to levels of the years preceding the 2008 financial crisis, higher than now but still substantially lower than those prevailing before the "great moderation"?

In order to take into account the uncertainty surrounding the convergence level we consider three different scenarios. In the first scenario, real yields converge to the first quartile of historical yields over 1985-2012, those reflecting more the years when real yields were already at a relatively lower level. This is a moderate yield convergence scenario and in monetary policy terms it would correspond to normalization in interest rate levels in a context of positive but still moderate and sub-trend global growth. In the second scenario real yields revert to the median level over 1985-2012, corresponding to interest rates compatible with a return to global long-term growth. Finally, in the last "aggressive" convergence scenario, real yields converge to the third quartile of historical yields over 1985-2012, thus reflecting the period when interest rates were historically higher than those of the last decade. In economic terms, this would imply a more aggressive monetary policy over the next few years as inflation expectations increase as a result of stronger global growth and the current very loose monetary conditions.

Considering three different scenarios is not a trivial exercise as the differences in the three measures of the historical real yields are indeed significant. For instance, in the case of the US, the first quartile of historical real yields over 1985-2012 is 1.15%; the median real yield is 2.74%; and the third quartile real yield is 3.75%, three times the level of the first quartile historical real yield. Differences of the same magnitude can be observed for most of the government bond markets included in the GGB 1-3 and GGB portfolios and for the other spread products being considered in the diversified portfolios.[3]

Table 4 illustrates the results of these assumptions in terms of the increase in yearly real yields across the three different convergence scenarios and how these results translate into expected real annual returns for the GGB 1-3 and GBB portfolios and for the other asset classes. The expected real return is calculated according to the following formula:

$$Expected\ Real\ Return^{Annual} = Real\ Yield^{Today} - Duration \cdot \left(\frac{Equil\ Real\ Yield}{Real\ Yield^{Today}} \right)^{1/7} - 1$$ [4]

Unsurprisingly, the largest yearly increases in real yields are experienced in government bond portfolios. These are reflected in negative expected real returns oscillating between -0.64% and -2.58% for the GGB portfolio and between -0.06% and -0.78% for the GGB 1-3 portfolio depending on the different convergence scenarios. For most of the other asset classes, the increase in yearly real yields as they converge toward historical averages is lower, and this is reflected into either lower negative expected real returns or even positive returns in some of the convergence scenarios considered. Expected returns on EMD are generally positive over the period and turn lower or negative only in the more extreme scenario of convergence to the third quartile level of historical yields. The differences in expected real returns between government bonds and other fixed income assets should not come as a surprise, since while real yields on non-government bonds have also been falling dramatically they have generally remained positive.

[3] The only exception is represented by the Global Credit IG where the differences in historical real yields across different scenarios appear smaller than those in the US Credit IG. However, this is largely a reflection of the fact that for the Global Credit IG data goes back to 2001 only while the US Credit IG covers the whole 1985-2012 period. That is also why in the diversified portfolios discussed below we will use US credit IG rather than the Global Credit IG in order to be able to run our simulations.

[4] These results should be considered as purely illustrative as some important simplifications are assumed. First, for all the portfolio and asset classes considered we do not take account of the fact that the capital losses experienced as a result of rising yields are partly compensated by the higher coupon paid on the purchase of newly issued bonds. Secondly, the duration is assumed to remain unchanged, while it is reasonable to expect that in a scenario of rising interest rates the duration would shorten. With regard to credit and other spread products, we are assuming that the spreads would remain unchanged. Finally, we do not take into account convexity. However, the main purpose of the exercise is to show how, in a scenario of rising interest rates, a diversified portfolio is superior to a portfolio with only government bonds. We are assuming a global inflation rate of 2 per cent. As mentioned above, the convergence period is assumed to be seven years.

Table 4: Convergence scenarios for yields across asset classes and expected returns

	Current Real Yield	Current Duration	Historical Real Yields			Yield Convergence Scenarios			Expected Real Returns		
			Quartile 1	Median	Quartile 3	Moderate scenario	Median scenario	Aggressive scenario	Moderate scenario	Medium scenario	Aggressive scenario
GGB	-0.81%	5.94	1.34%	3.01%	3.69%	0.30%	0.54%	0.63%	-0.64%	-2.02%	-2.58%
GGB 1-3	-1.50%	1.86	0.50%	2.46%	3.29%	0.28%	0.56%	0.67%	-0.06%	-0.56%	-0.78%
U.S Credits IG	0.90%	7.09	2.55%	4.10%	5.03%	0.23%	0.45%	0.58%	1.26%	-0.27%	-1.19%
Global Credit IG	0.85%	6.07	1.00%	1.67%	2.52%	0.02%	0.12%	0.24%	2.73%	2.15%	1.42%
Inflation-linked US	-0.09%	8.61	1.00%	2.07%	3.31%	0.16%	0.31%	0.48%	0.57%	-0.72%	-2.22%
Securitised	0.33%	4.84	1.11%	1.83%	3.03%	0.11%	0.21%	0.38%	1.81%	1.31%	0.50%
Supranational	-0.07%	5.58	-0.01%	0.62%	1.58%	0.01%	0.10%	0.23%	1.89%	1.39%	0.63%
EMD IG	1.67%	7.43	2.02%	3.14%	4.57%	0.05%	0.21%	0.35%	3.33%	2.16%	1.13%
EMD	2.71%	8.53	3.05%	4.57%	7.29%	0.05%	0.26%	0.64%	4.36%	2.52%	-0.71%
EMD Loc Currency	3.85%	4.87	2.98%	3.70%	4.74%	-0.13%	-0.02%	0.13%	6.54%	6.03%	5.32%

Source: UBS Global Asset Management

By using these expected returns, we want now to see how the three diversified portfolios A, B and C considered in the previous section would perform in our scenarios of rising interest rates. As already mentioned, the return and risk of a portfolio depends on the correlation of the asset classes included in the portfolio. In other words, we need a correlation matrix in order to provide these estimates. In the case of the historical analysis we used the correlation matrix based on the historical data as illustrated in Table 2. However, for expected returns we cannot rely on the same historical correlation matrix as this largely reflects the conditions prevailing during the 2001-2012 period. This was an exceptional period from an economic and financial point of view if one considers the low interest rates prevailing in the booming years of the decade, the subsequent financial crisis, the global recession in 2009, the euro fiscal crisis and the associated unprecedented monetary actions undertaken by the monetary authorities.

In building up our convergence scenarios we have assumed a normalization of the monetary conditions over the next seven years, with yields in bonds gradually rising toward their historical averages. Therefore, we believe that the best approach to estimate the expected return rates of our different portfolios should rely on a correlation matrix reflecting "normal" conditions in the global economy. This is indeed our approach, and in Table 5 we illustrate the "equilibrium" correlation matrix based on an equilibrium model that should be interpreted as a long-term, forward-looking estimate reflecting our secular views about the future development of the economy.[5] We would also like to stress that unless one believes that the US and Europe are going to enter a Japan-style 'lost decade', this correlation matrix is a fairly likely scenario for correlations across asset classes.

By comparing the forward-looking correlation matrix illustrated in Table 5 with the historical matrix illustrated in Table 2, some interesting observations can be made. Within the fixed income space, the correlation between government bonds and credit products is higher in the equilibrium forward-looking matrix than in the historical one. We believe that this is largely a reflection of the financial conditions prevailing in the last few years, with investors shifting from government bonds to other fixed income products in search for yield. This demand factor, together with the exceptionally low level of interest rates, has partly reduced correlations. In equilibrium conditions (with "normal" interest rate levels) the correlation across fixed income products is understandably higher, since the correlation matrix is based on the average returns of the different asset classes. The key consideration is that the two asset classes that maintain a low correlation with government bonds both from a historical and forward-looking point of view are EMD and Equities. These are the two asset classes that also from a forward-looking perspective provide the best opportunities to capture the benefits of diversification.

[5] This matrix is extracted from our proprietary model called Start Tool that we normally use in the design of new products or for strategic asset allocations. In the forward-looking matrix we are not able to cover the same asset classes we covered in the historical analysis. In particular we do not cover supranationals and EMD IG; this does not however prevent us from being in a position of estimating the returns of our different portfolios. For supranational we will use securitised bonds as a replacement given their very similar level of historical nominal returns and similar correlation with government bonds. For EMD IG we will use EMD in our portfolios as anyhow the IG component of EMD index is actually pretty large.

Table 5: Forward-looking correlation matrix

	GGB	GGB 1-3	Securitized	U.S. Credits IG	Global Credit IG	Inflation-linked US	EMD	EMD - Local Currency	MSCI World
GGB	**1.00**	0.97	0.83	0.92	0.98	0.75	0.54	0.30	0.25
GGB 1-3	0.97	**1.00**	0.86	0.92	0.96	0.73	0.54	0.30	0.24
Securitized	0.83	0.86	**1.00**	0.85	0.82	0.67	0.49	0.27	0.22
U.S. Credits IG	0.92	0.92	0.85	**1.00**	0.95	0.76	0.57	0.31	0.32
Global Credit IG	0.98	0.96	0.82	0.95	**1.00**	0.73	0.56	0.31	0.33
Inflation-linked US	0.75	0.73	0.67	0.76	0.73	**1.00**	0.43	0.24	0.20
EMD	0.54	0.54	0.49	0.57	0.56	0.43	**1.00**	0.55	0.45
EMD - Local Currency	0.30	0.30	0.27	0.31	0.31	0.24	0.55	**1.00**	0.25
MSCI World	0.25	0.24	0.22	0.32	0.33	0.20	0.45	0.25	**1.00**

Source: UBS Global Asset Management

In Table 6 we illustrate the expected real returns of the GGB 1-3, GGB and the three diversified portfolios across the three different real yield convergence scenarios. In general, the diversified portfolios A, B and C appear to be superior as they improve expected returns and in the case of the GGB portfolio also reduced volatility. In the case of the moderate and median convergence scenarios, incorporating non-government bond products allows the portfolio to move from negative to positive expected real returns. In the aggressive yield convergence scenario, the diversified portfolios allow substantially reduced losses when compared to GGB 1-3 and GGB portfolios. Overall, the benefits of diversification away from government bonds are substantial and allow either for an increase in real returns or for a reduction of the losses experienced in the government bond portfolio when yields increase sharply.

Table 6: Expected real returns of diversified portfolios A, B, C and D

Moderate Yield Convergence scenario

	GGB 1-3 Portfolio	Portfolio A	Portfolio B	Portfolio C	Portfolio D
Real Return	-0.06%	0.51%	0.95%	1.19%	1.45%
Risk	1.70%	2.30%	2.82%	2.80%	3.21%
Real return/Risk	-0.04	0.22	0.34	0.43	0.45
	GGB Portfolio				
Real Return	-0.64%	0.16%	0.66%	0.90%	1.16%
Risk	4.50%	3.95%	4.15%	4.09%	4.42%
Real return/Risk	-0.14	0.04	0.16	0.22	0.26

Median Yield Convergence scenario

	GGB 1-3 Portfolio	Portfolio A	Portfolio B	Portfolio C	Portfolio D
Real Return	-0.56%	-0.17%	0.14%	0.66%	0.95%
Risk	1.70%	2.30%	2.82%	2.80%	3.21%
Real return/Risk	-0.33	-0.07	0.05	0.24	0.30
	GGB Portfolio				
Real Return	-2.02%	-1.05%	-0.60%	-0.07%	0.25%
Risk	4.50%	3.95%	4.15%	4.09%	4.42%
Real return/Risk	-0.45	-0.27	-0.14	-0.02	0.06

Aggressive Yield Convergence scenario

	GGB 1-3 Portfolio	Portfolio A	Portfolio B	Portfolio C	Portfolio D
Real Return	-0.78%	-0.71%	-0.70%	-0.11%	0.25%
Risk	1.70%	2.30%	2.82%	2.80%	3.21%
Real return/Risk	-0.46	-0.31	-0.25	-0.04	0.08
	GGB Portfolio				
Real Return	-2.58%	-1.79%	-1.60%	-1.01%	-0.65%
Risk	4.50%	3.95%	4.15%	4.09%	4.42%
Real return/Risk	-0.57	-0.45	-0.39	-0.25	-0.15

Source: UBS Global Asset Management

Should Equities be included?

Some institutional investors have not, in their liquidity and risk management segments of their portfolio, traditionally invested in Equities given their focus on liquidity and low volatility. However, it appears that this is gradually changing and more investors are now moving or considering a move into this asset class. This shift is in line with central banks; it is public information that, for instance, the Swiss National Bank, the Bank of Israel or the Central Bank of Korea invests a share of their portfolio oscillating between 5% and 12% in Equities. What both institutional investors and central banks have in common is the need for liquidity and risk management.

What are the benefits for institutional investors with excess short-dated government bond reserves of expanding the investible universe to Equities? As we mentioned earlier,

Equities have a low correlation with government bonds and other fixed income instruments. Therefore allocating a share of a fixed income portfolio to Equities can improve the risk/return trade-off. Moreover, some stocks currently have dividend yields that are higher and often more stable than those that can be obtained on many government bonds, thus providing additional returns. Following the ongoing reassessment of government bonds as the 'risk-free' asset of choice, one may argue that also from a risk perspective having some stocks in a portfolio can lead to a better risk-adjusted return profile in the portfolio.

Last but not least, stocks are historically fairly priced and this is indeed the key difference when compared to the last decade. Over the period 2001-12, replacing in Portfolio C the allocation to EMD in local currency with Equities would have actually led to lower risk-adjusted returns for both the GGB 1-3 and GGB portfolios.[6] Over the last decade of the "great moderation" period, in fact, fixed income has generally led to higher returns when compared to Equities as a result of low inflation and falling yields. The poor performance of Equities over this period reflects several factors but one that appears to be dominant is that stock prices entered the first decade of the century after two decades of strong returns in the 1980s and the 1990s, and were quite expensive by historical standards.

Looking forward, in our real yield convergence scenarios, Equities are expected to perform much better than in the previous decade not only because of the gradually improving economic conditions (the economic assumption underlying the normalization in interest rates) but also because of the current starting price levels. Despite some divergences across countries and regions, there is a broad consensus view that stock prices are currently fairly priced and that over next few years the average return on Equities is expected to improve when compared to the last decade. According to this view, in our forward-looking equilibrium model, we assume that the return on Equities in nominal terms over the next seven years will be 7% with an associated volatility of 14%.

What would be the impact on expected returns of further diversifying Portfolio C by including a relatively small allocation (8%) to global Equities? The key financial metrics for this portfolio (Portfolio D) across the different convergence scenarios is also illustrated in Table 6. A relatively small allocation to Equities actually leads to a significant increase in expected real returns with a relatively small increase in volatility, thus leading to generally better Sharpe ratios. In the case of the aggressive convergence scenario, when the losses on the fixed income assets of the portfolio are the highest, the inclusion of Equities in the portfolio moves the expected real return into positive territory in the case of the diversified short-duration government bond portfolio (GGB 1-3) and reduces the negative return of the diversified long-duration government bond portfolio (GGB) to below -1%. Overall, therefore, adding a relatively small allocation of Equities to a fixed income portfolio, in a scenario of rising interest rates, helps by increasing returns and compensating for the lower returns experienced in fixed income.

[6] In the case of GGB 1-3, the return of portfolio C when allocation to EMD in local currency is replaced with Equities (MSCI World) falls to 4.26% and the reduction in volatility is relatively small (from 2.72% to 2.55%), thus leading to a worse Sharpe ratio (0.81). In the case of GGB, the return falls from 6.36% to 5.23% and volatility from 3.93% to 3.57%, thus also leading to a worsening of the Sharpe ratio from 1.06 to 0.84.

Concluding remarks

Institutional investors are largely invested in government bonds, issued by Western governments and denominated in USD, EUR and JPY for liquidity and risk management purposes. Given the level reached by both short- and long-term interest rates, the return on these allocations in real terms is almost nil and in most cases negative. It is not therefore surprising that institutions are re-assessing their asset allocation to adjust their portfolios accordingly. Diversification and the search for yield have become more important objectives.

Diversification has been an ongoing process for some time. However, we believe that this process has been too slow, reflecting the still high risk aversion and traditional bias institutional investors have towards government bonds that are perceived as low-risk. Given the liquidity and risk management needs of institutions to meet short-term contingencies, we believe that a substantial share of liquidity and risk management allocations should actually remain invested in very liquid and low-risk government bonds. However, short-dated government bonds above a certain threshold should be diversified more aggressively in other asset classes to grasp the extra returns and the diversification benefits they can offer. We also advocate that the degree of diversification beyond government bonds should be proportional to the extent to which short-dated government bond holdings are above the level considered adequate for liquidity and risk management purposes.

The case for diversification does not rest exclusively on the need to increase current yields; it also appears a very sensible strategy in terms of improving risk-adjusted returns when a forward-looking approach is adopted. While it is difficult to pinpoint the exact time of the eventual normalization and rise in interest rates, over the medium-to-long term investment horizon, it is reasonable to expect a gradual rise in yields that will translate into negative returns in government bonds. In such a scenario, in this paper we showed that a portfolio diversified across different asset classes including securitized, supranationals, corporates, TIPS, EMD (in hard and local currencies) and Equities is superior in terms of risk-adjusted returns and provides better capital protection in real terms.[7]

From an asset allocation point of view, EMD and Equities are the two asset classes providing the largest diversification benefits and leading to higher risk-adjusted returns over the long time. EMD in local currency also provides additional diversification benefits for an institutional investor willing to reduce its exposure to traditional short-dated developed government bonds in reserve currencies such as the USD, thus leading to better risk diversification via higher exposure to fiscally more sound and economically more dynamic emerging markets.

[7] This paper addresses the relatively liquid asset classes held by institutional investors. Reducing exposure to government bonds and adding exposure to liquid risk assets such as Equities may increase correlation with illiquid risk assets such as Private Equity.

GIS publications

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Equity income strategies revisited
Given the considerable interest in our recent paper titled Equity income strategies from another perspective (see below), the following study seeks to explore these ideas further. We present an innovative equity income solution that combines an actively managed high dividend portfolio and a covered call portfolio via a volatility-based asset allocation process. *February 2013*

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Better income: How multi-asset portfolios seek to provide stable income, preserve capital and protect against inflation

The current environment is tricky for income investors, with interest rates close to zero in the US, Japan and the UK. The challenges and opportunities facing income investors are the subject of this paper by strategists Matthew Richards and Daniel Rudis. They argue that, for many income investors, a multi-asset strategy with asset allocation adjusted dynamically according to market conditions is better than investing in only one asset class such as equities or bonds. *September 2012*

Equity income strategies from another perspective
Many equity investors are looking for stable, more defensive investments that still offer the potential for attractive returns. High dividend and covered call strategies offer all these qualities but their ability to capture the available opportunities for outperformance depends on the prevailing market and volatility environment. In this paper, Daniel Alonso, Philippe Bonvin and Douglas Hayley-Barker of the Asymmetric Portfolio Solutions team argue that an allocation diversified across both of these strategies offers clear style diversification benefits compared to a single investment in one or the other. *September 2012*

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