PGIM FIXED INCOME

PERSPECTIVES

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THE CASE FOR GLOBAL BONDS

It is natural for most investors to look to their domestic bond markets when building a fixed income allocation. But is an allocation solely to domestic bonds really an optimal strategy? The case for going global in fixed income is more compelling now for a number of reasons:

- First, as yields have declined—to zero or negative levels in some countries, such as Germany, Switzerland, Sweden, and Japan—prospective returns have diminished while fears of "rate normalization" have driven participants to reduce duration.
- Second, most domestic fixed income markets are dominated by government and government-related sectors, allowing only limited opportunities for diversification. Investors who are exposed to markets with concentrated interest-rate risk may be exposed to more downside than upside.
- Finally, even in jurisdictions, such as the U.S. and Europe, with substantial non-government fixed income segments—including investment grade corporate bonds, leveraged finance, structured credit, and emerging markets—credit spreads have compressed to levels below historical averages. And spread products, like equities, are vulnerable to economic slowdowns or recessions.

Some investors have responded to these challenges by making à la carte allocations to specific credit sectors. But a dynamic allocation to a broad cross section of the global bond markets, generally currency hedged, provides an alternative approach with three potential benefits:

- First, the mitigation of concentrated interest-rate risk in the investor's domestic market.
- Second, the potential to diversify credit exposures to the broadest available set of global credit sectors and issuers.
- Third, the potential to dynamically capture the best global term premia and credit spreads from country allocation as well as sector and security selection.

In this paper, we focus on fixed income investments in six major developed markets: the U.S., EU, UK, Japan, Canada, and Australia. We contrast popular domestic bond indices from each of these jurisdictions with a broad global fixed income index, which also includes emerging market debt. By comparing sector weights, risks, correlations, and returns, we analyze both the rewards and risks of expanding one's fixed income allocation beyond the domestic market. **Our conclusion—a degree of global diversification is a good strategy for most investors looking to earn additional returns and/or mitigate risk, especially for those who invest in both spread markets and government bonds.**

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THE COMPARISON OF DOMESTIC AND GLOBAL FIXED INCOME BENCHMARKS

We begin by comparing popular bond indices representing the domestic bond markets in six major currencies—USD, EUR, GBP, JPY, CAD, and AUD—with a broad index representing the global fixed income market (Figure 1). Each market index consists of securities denominated in the domestic currency, but to facilitate comparison, the table shows all market capitalization figures in USD.

FIGURE 1: CHARACTERISTICS OF SIX POPULAR LOCAL BOND INDEXES AND THE BLOOMBERG BARCLAYS GLOBAL AGGREGATE INDEX

CCY	Index Name	First Point	Second Point		Third Point		Duration	OAS
		MV (bn USD)	Composition MV%—Treasury/Sovereign	Composition MV%—Non-Treasury/Sovereign	Yld (%)	Yld of Global Agg Hedged (%)		
USD	Bloomberg Barclays U.S. Aggregate	19,825	38	61	3.15	3.25	6.1	37
EUR	Bloomberg Barclays European Aggregate	12,977	59	40	0.65	0.26	6.8	49
JPY	Nomura BPI	9,604	83	17	0.12	0.51	8.8	4
GBP	FTSE Actuaries Conventional Gilts All Stocks	1,985	100	0	1.52	1.40	11.4	NA
CAD	Bloomberg Barclays Canadian Aggregate	1,277	30	70	2.54	2.50	7.6	45
AUD	AusBond Composite 0+ Yr	765	51	48	2.60	3.22	5.2	19
Global	Bloomberg Barlcays Global Aggregate Unhedged	50,501	56	44	1.87		7.0	35

Source: PGIM Fixed Income, Bloomberg, Bloomberg Barclays Indices, and FTSE as of February 28, 2018.

The **first point** from Figure 1 is that, with a market value of $50 trillion, the global index dwarfs any single country index. Even the largest currency blocs—the U.S. and Europe being the largest markets with just under $20 trillion and $13 trillion, respectively—are only a fraction of the size and the remaining markets further accentuate the contrast. **Second**, the global bond index also provides a broader set of credit selection opportunities beyond Treasury securities[1]; Therefore, for investors in the markets dominated by government and state/provincial sectors, going global is the only way to gain exposure to a diversified basket of bonds. **Third**, Figure 1 also contrasts the native yield of each domestic index—with the U.S., Australia, and Canada being the highest globally—with the yield of the Global Aggregate index hedged into the domestic currency (using a short-term FX hedge). In the U.S., Japan, and Australia, the hedged global index yields more than the domestic index; Europe is the only region where the global hedged yield is significantly lower than the domestic index, which is due to the relatively high cost of hedging back into EUR and the current, unusually steep yield curve prevailing in Europe.

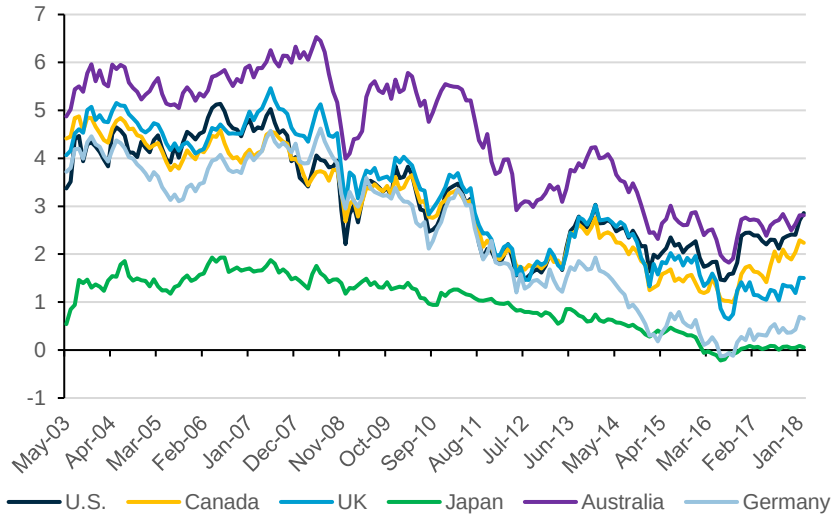
Yields in Europe and Japan remain very low and in negative territory in many cases. **With this backdrop, why are global hedged index yields similar to domestic yields in each country? The reason lies in the effects from currency hedging, which not only eliminates exchange-rate risk by converting all bonds from their native currency to the investor's domestic market currency, but it also effectively translates all the yield curves so that they start off with the target currency's front-end yield (net of a cross currency basis).** In Europe, Euribor stood at -33 bps, while in the U.S., LIBOR hovered around 227 bps net of the cross currency basis as of mid-June 2018. Hedging euro denominated bonds into dollars adds (227 – (-33)) bps, or 260 bps, to the yield of every bond. However, the hedged bond will still carry the slope of the euro curve plus the original spread to that curve.

[1] *Throughout this paper, Treasuries and Treasury securities will refer to domestic sovereign issues. U.S. Treasuries will be designated as such.*

THE COMMONALITIES AMONG DURATION AND INTEREST-RATE EXPOSURES

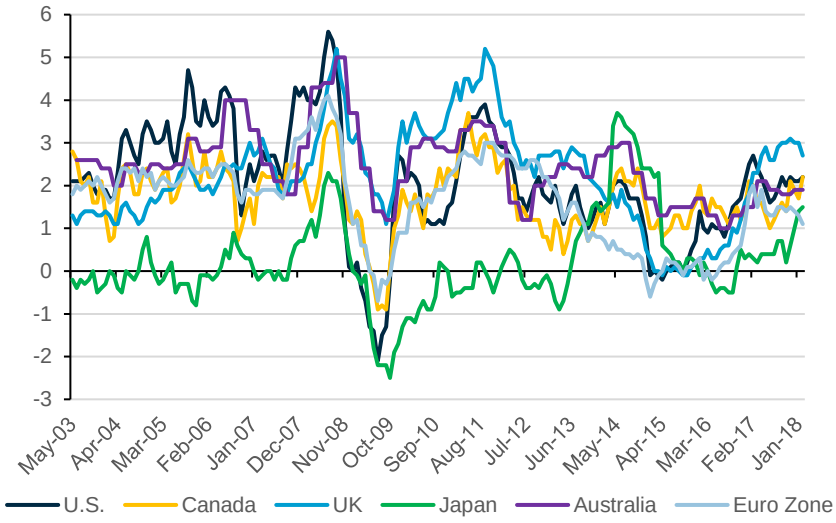
As yields across the fixed income complex trended lower over the past 15 years, Figure 2 shows that the periodic episodes of selloffs and rallies generally occurred in tandem, albeit with different degrees of volatility.

FIGURE 2: 10-YEAR GOVERNMENT RATES IN THE SIX CURRENCIES OVER 15 YEARS



Source: Bloomberg as of February 28, 2018

FIGURE 3: 15 YEARS OF INFLATION IN THE SIX CURRENCY AREAS



Source: Bloomberg as of February 28, 2018.

The general convergence in interest rates, which is also apparent in Figure 2, has been driven by increasingly correlated global factors, including technology, globalized trade, and cross-border ownership. Furthermore, the markets' increased correlation levels have been reinforced by common factors, such as the 2008-2009 Global Financial Crisis and the subsequent attempts by G4 central banks to inject liquidity through both conventional rate cuts and QE (quantitative easing), which were eventually followed by tapering and balance sheet reduction steps.

However, there have also been (and will continue to be) country-specific factors driving domestic bond yields. In the current global environment, for example, the U.S. recovery is a few years ahead of Europe, while Japan continues with efforts to normalize its economy. These variations lead to divergent rate levels, disparate curve slopes, and differing long-term interest rate trajectories across the major markets even as global factors continue to ensure high correlations among yields and prices.

Looking at inflation in the six currencies over the past decade and a half in Figure 3 shows the presence of a strong common global factor. As with interest rates, inflation has also fallen in recent years, and most central banks have struggled to meet their 2% targets even though it has been almost a decade since the financial crisis. However, recent signs indicate that concerted QE efforts and low-rate regimes are beginning to push global inflation towards central bank targets.

The commonality of factors across the complex is also observed in Figure 4, which shows that correlations between changes in 10-year rates have been positive and over 70% since 2000, indicating a strong co-movement of global rates. A few correlations have been lower, particularly in Japan, where nominal growth has remained comparatively subdued. Canadian rates have followed U.S. rates closely, while UK rates have been highly correlated with both U.S. and European rates.

FIGURE 4: CORRELATIONS AMONG 10-YEAR RATES IN THE SIX CURRENCIES

	USD	EUR	JPY	GBP	CAD	AUD
USD	1.00	0.79	0.41	0.80	0.86	0.76
EUR		1.00	0.40	0.84	0.74	0.72
JPY			1.00	0.41	0.39	0.37
GBP				1.00	0.78	0.73
CAD					1.00	0.76
AUD						1.00

Source: Bloomberg as of February 28, 2018. Monthly data since January 2000 to February 2018. Correlations based on monthly changes in 10-year yields.

Given the strength of the common factors at play, we believe rates and inflation in the advanced economies will likely remain relatively low and range-bound (Click here to read "Long-Term Interest Rates: Perfect Storm, Buying Opportunity, or Both?"). Cross border trade, investment flows, and global supply chains foster real rate and inflation convergence, while demographics and technology have ushered in an ongoing environment of disinflation and low real rates, a secular regime that we expect to remain in place for the foreseeable future. **The result of a strong common "principal component" in shared global yield moves has translated into relatively low tracking errors when a hedged global bond portfolio is substituted for a domestic fixed income benchmark.**

SPREAD SECTORS AND CREDIT DIVERSIFICATION

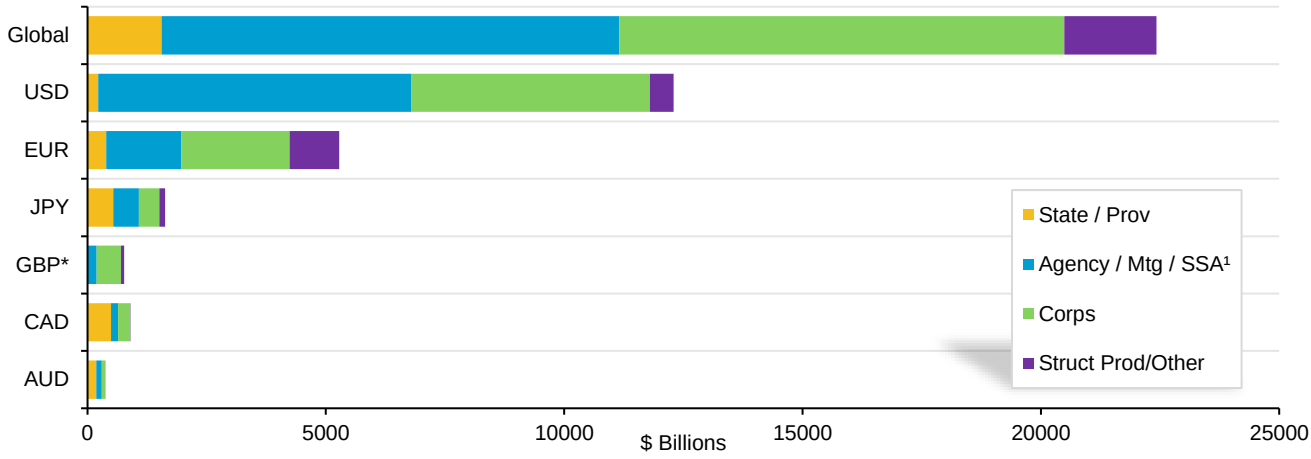
Turning to the credit sectors, at least **four** attributes provide significant opportunities for global asset allocators looking to diversify the traditional mix of interest rate and equity risk. **First,** many entities—including sovereigns, structured product vehicles, and many companies in the leveraged finance sector—do not issue common stock. Therefore, owning bonds issued by these entities gives investors exposure to risk premia and credit profiles not available through the public equity markets. **Second**, even in the case of corporate credit from common stock issuers, the debt represents an out of the money put on their enterprise value (due to the potential recovery rate) and, therefore, carries a different kind of premium (spread over risk free rates) along with interest-rate risk. That is, corporate debt and equity represent different horizontal slices of the enterprise value.

Third, credit risk premia in portfolios represent both a secular and cyclical source of significant excess returns. In particular, investors earn long-term risk premia for owning credit over full economic cycles. Further, these premia vary over the cycle and are fruitful targets for active asset allocation. Last but not least, empirically, spread products behave differently from equity; they typically present limited return upside and display negative credit migration, while also providing strong mean reversion tendencies after market selloffs. Fully optimizing these characteristics requires active trading decisions across the broadest range of the global credit markets and sectors.

Figure 5 compares the six major bond markets to the global benchmark in terms of their respective a) state/provincial, b) agency/mortgage/SSA, c) corporate debt, and d) structured products sectors. The USD non-Treasury market is larger in terms of market value and issuers than the sizes of the other markets combined,[2] and Europe's taxable investment grade, non-sovereign sector is second in terms of its size and diversity.

[2] *The bulk of the U.S. municipal market is tax-exempt and is therefore excluded from the state/provincial category.*

FIGURE 5: COMPARISON OF NON-TREASURY SECTORS IN DOMESTIC AND GLOBAL BENCHMARKS (MV IN $ BILLIONS)



	State / Prov		Agency / Mtg / SSA		Corps		SP (other)	
Currency	OAS	# Issuers	OAS	# Issuers	OAS	# Issuers	OAS	# Issuers
Global	48	272	37	490	94	2282	47	761
USD	88	138	31	55	96	932	56	518
EUR	34	64	37	161	81	660	39	191
JPY	17	78	17	74	33	400	33	209
GBP*	34	8	55	47	124	353	97	59
CAD	58	28	24	19	96	123	40	2
AUD	28	21	41	50	84	138	65	8

*Source: PGIM Fixed Income, Bloomberg, and Bloomberg Barclays Indices as of February 28, 2018. Bloomberg Barclays Global Aggregate index is unhedged in USD. Data as of February 28, 2018. *For comparative reference, GBP in this instance refers to the GBP subset of the Global Aggregate Index.*

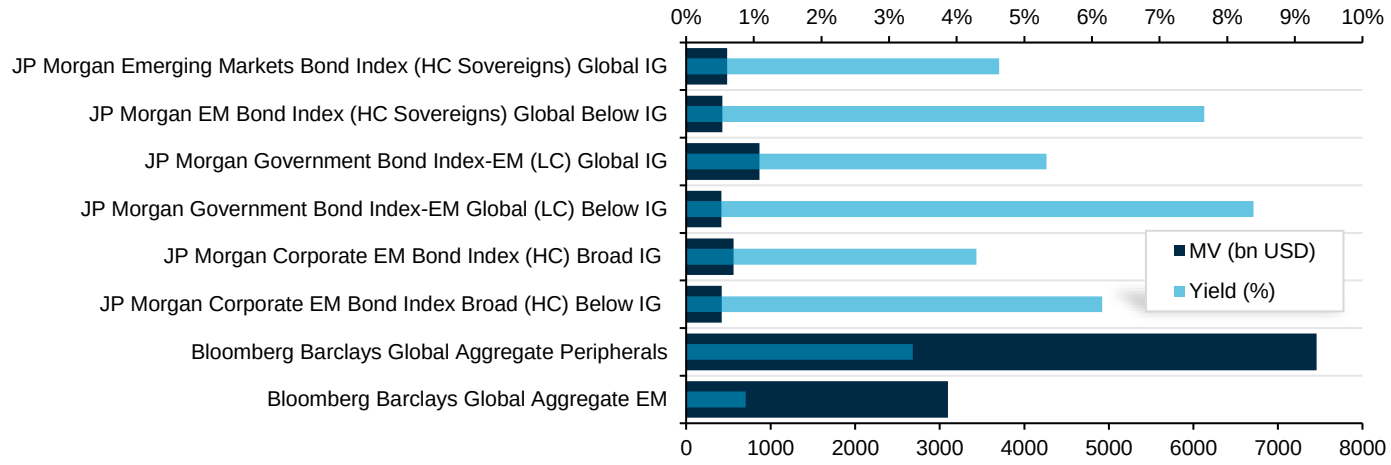
The range of spreads and issuers within the respective asset classes suggests two observations: One is that the USD and EUR markets are key for investors seeking depth and diversification, particularly for those outside of those respective markets. Second, given the geographical and sector diversity of the global benchmark, opportunities often arise to take advantage of short-term volatility in a specific sector.

When considering that spreads in different regions and sectors tend to be correlated (the "first principal component" accounts for most of the spread variance), it may initially seem that there isn't much value in diversifying into the various global spread sectors. But correlation in short-term moves does not necessarily equate to similar, intermediate- and longer-horizon outcomes. Individual countries can go into recession with the potential to adversely affect the country's entire spread market. And large swaths of a sector can get downgraded to junk when they go through difficult periods. Sector examples include U.S. telecom in the early 2000s, U.S. autos from 2005 to 2008, European sovereigns in 2011-2012, much of the U.S. oil sector in 2015, and the UK Corporate sector after the Brexit vote. **A global portfolio can diversify these risks much better than a single currency portfolio. By the same token, sector selloffs can sometimes present great investment opportunities, which was the case in each of the previously cited examples.**

EM SOVEREIGN, LOCAL, AND CORPORATE BONDS

Given that geographical diversification is a key attribute of a global bond allocation, adding EM sovereign risk premia further diversifies allocations to global interest rates, equities, and corporate credit, (even though they have some mark-to-market correlations to market risk factors). Figure 6 shows the sizes and available yields within select EM investment grade and below-IG sovereign, corporate, and domestic currency bond market benchmarks (as well as a European peripheral sovereign benchmark for completeness).

FIGURE 6: YIELDS AND SIZES OF EM AND DM SOVEREIGN MARKETS



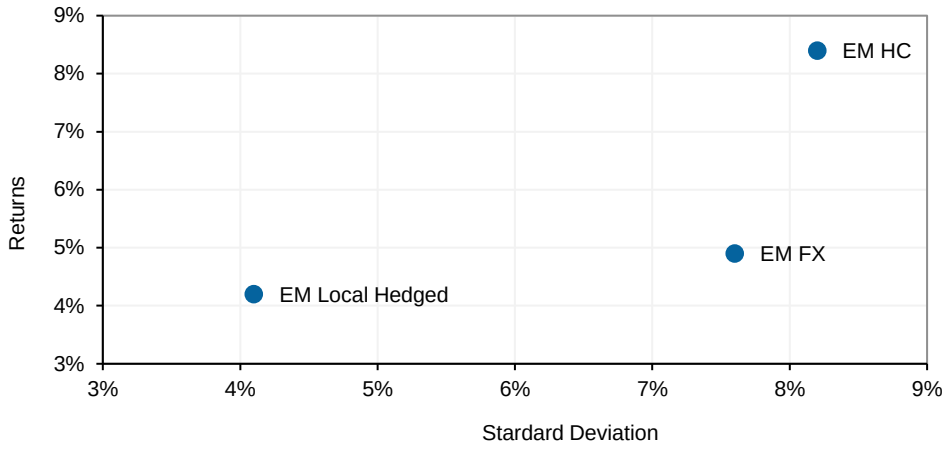
Source: Data from JP Morgan and Bloomberg Barclays as of February 28, 2018.

Regarding hard currency emerging markets debt, both sovereign and corporate markets are roughly $1 trillion asset classes—mostly in USD but with some EUR denominated issuance—and growing rapidly. The investable local market benchmark is also approximately $1 trillion in size, although the combined local markets are considerably larger. Even these substantial figures do not do full justice to the EM asset classes because there are investable issues that do not meet the index qualifications. Indeed, European investors frequently allocate to the peripheral European sovereign bond market, which is the equivalent of another multi-trillion dollar asset class that is often shunned or ignored by non-European investors.

While investors can have a separate, dedicated allocation to one or more of the three EMD asset classes, this approach should be managed carefully. **First**, IG and non-IG sovereigns, corporates, and peripherals all trade on a spectrum, and allocations among them should be a dynamic exercise rather than one driven by infrequent asset allocation decisions to separate benchmarks. **Second**, allocations to EM sovereigns, corporates, local bonds, and FX all result in country exposures that should be managed holistically rather than piecemeal. **Third**, investors may appropriately want to limit country concentration, below-IG exposures, or both. A global portfolio with appropriate guidelines and constraints may manage all three aspects to the benefit of investors.

Investors may also ignore entire segments of the sector out of concern about some names within the benchmarks. For example, the EM corporate market might be skipped due to concerns about potential U.S. sanctions, companies with non-transparent governance, and other factors. Yet, by foregoing the entire market, the investor may also miss out on many global champions. Such concerns are best addressed through investment guidelines rather than wholesale asset class exclusion.

FIGURE 7: 15 YEARS OF HISTORICAL RETURN, RISK, AND CORRELATION CHARACTERISTICS OF EM HARD, LOCAL HEDGED, AND FX



	Correlation		
As of 2/28/2018	EM FX	EM HC	EM Local Hedged
EM FX	1.00	0.69	0.53
EM HC		1.00	0.72
EM Local Hedged			1.00

Source: JP Morgan as of February 28, 2018.

Emerging market debt is a growing, but under allocated, asset class. The allocation to global bonds provides access to all emerging market debt asset classes and, hence, represents a major opportunity for investors to earn risk premia in line with the sector's historical risk and reward profile observed in Figure 7. Indeed, in many emerging markets, the sovereign debt markets are a safer and higher information ratio form of exposure than the local EM equity markets. A global portfolio can efficiently allocate among hard sovereign, corporate, and local bonds, thus optimizing each country's overall exposure in the credit, currency, and rate dimensions.

GLOBAL OPPORTUNITES UNDERSCORE THE NEED FOR ACTIVE MANAGEMENT

The breadth of global mandate opportunities and the ability to draw relative-value conclusions between the pertinent asset classes and sectors emphasizes the importance of security selection and active portfolio management. Indeed, within FX, the opportunity set consists of 30 different EM and 10 different G10 currencies that present both systemic and relative selection factors, thus providing many tactical and long-term selection opportunities. In the realm of interest rates, there are about 30 developed and emerging market yield curves that present duration, curve, and issue specific selection opportunities. Lastly, the credit universe is the broadest and richest of the three opportunity sets with sector, industry, geographic, and capital structure opportunities as well as issuer specific relative value opportunities in thousands of sovereign, quasi-sovereign, agency, corporate, and structured product bonds.

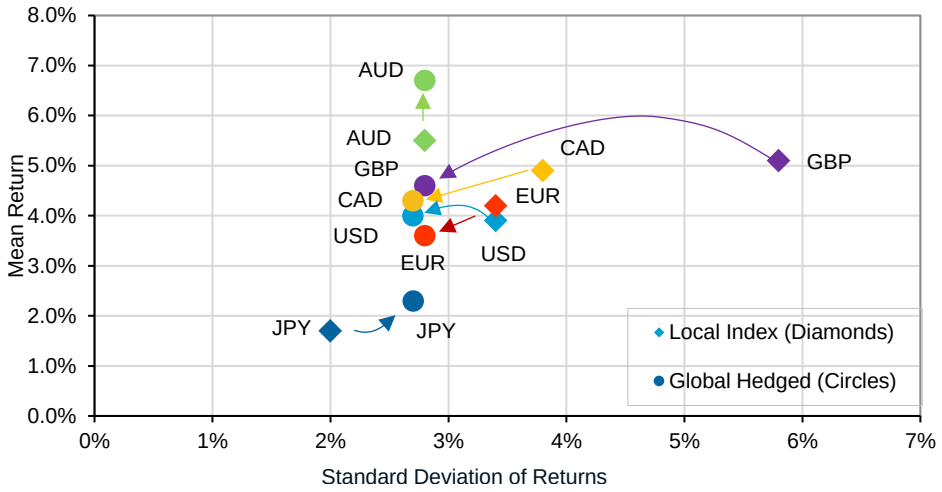
Even investors allocated to one of the two larger bond markets—the U.S. and EU, through say, a U.S. Core or Euro Core portfolio—are missing out on a large fraction of these opportunities, which we illustrate with four specific examples. **First**, consider a sovereign, such as Indonesia, that issues in both dollars and euros. The spread of a similar tenor bond may be very different in the two currencies for technical reasons, providing a relative value opportunity, and euro denominated sovereign spreads have recently traded wider than their dollar-denominated counterparts. **Second**, within a sector such as technology or energy, the opportunity to pick the best issuers from U.S., EU, and EM names facilitates the management of risk within the sector, e.g. exposure to oil names across countries can be measured and managed in the context of a broad global mandate. **Third**, the relationship between Tier 1 capital securities, subordinate bonds and senior bonds is very different for U.S., Asian, and European banks and span the ratings spectrum between investment grade and high yield. **Finally**, structured product senior bonds in dollars, euros, and pounds are essentially low-risk financing vehicles, yet remain cheap to credit ratings—which may be related to their exclusion from the most widely used, broad market benchmarks. These types of opportunities highlight a changing landscape that may be best exploited through a global mandate with a directive to buy the most attractive bonds and hedge any unwanted risks, e.g. those pertaining to rates and FX.

At different points in the cycle, the allocations culminating in the best information ratio can vary. At one point, it may be obtained by barbelling U.S. AAA-rated rated structured product assets with euro denominated BB-rated EM sovereigns, or at other times, by simply owning A-rated U.S. industrials. Periodic blow-ups in various sectors require active rotation to take advantage of an ensuing opportunity.

RETURN DIFFERENTIALS AND TRACKING ERROR CONSIDERATIONS

So far, we have made the case that an allocation to global bonds, rather than an allocation solely to one's domestic bond market, provides a greater range of markets and asset classes with the potential to not only increase opportunities for adding value through active management, but to also provide a greater degree of credit diversification while preserving exposure to global interest rates. But how has this worked out in practice? That is, what is the historical, risk/return divergence between a domestic and hedged global bond allocation? For some perspective, we turn to Figure 8, which compares the 15-year returns and standard deviations of returns for the six local bond indexes and as well as the hedged global index. The table accompanying Figure 8 also shows 10-year yields from the six largest country index components along with their respective levels of implied yield volatility.

FIGURE 8: RELATIVE TO DOMESTIC MARKETS, HEDGED GLOBAL BOND RETURNS HAVE GENERALLY BEEN SIMILAR, BUT WITH LESS VOLATILITY



As of		2/28/2018	Local Index		Global Hedged		Return/Standard Deviation		Risk		
Currency	10Y Yld (%)	Imp Vol (bps)	Returns (%)	St Dev (%)	Returns (%)	St Dev (%)	Local	Gbl Hedge	TE (%)	Max 12mo Drawdown (%)	Date
USD	3.09	70	3.9%	3.4%	4.0%	2.7%	1.2	1.5	1.27%	-2.88%	10/30/2009
EUR	0.60	43	4.2%	3.4%	3.6%	2.8%	1.2	1.3	1.73%	-6.01%	11/30/2012
JPY	0.05	13	1.7%	2.0%	2.3%	2.7%	0.9	0.8	2.33%	-4.13%	10/31/2008
GBP	1.50	59	5.1%	5.8%	4.6%	2.8%	0.9	1.7	4.09%	-10.15%	12/30/2011
CAD	2.50	63	4.9%	3.8%	4.3%	2.7%	1.3	1.6	2.11%	-4.50%	2/27/2004
AUD	2.88	63	5.5%	2.8%	6.7%	2.8%	2.0	2.4	2.41%	-8.65%	1/30/2009

Source: PGIM Fixed Income, Bloomberg, and Bloomberg Barclays Indices as of February 28, 2018. The global hedged index data points represent the Bloomberg Barclays Global Aggregate index hedged to each respective currency.

The results should be reassuring to those considering a global allocation as the returns of the global bonds have more or less matched those in the domestic market over the past decade and a half. Furthermore, in every case except Japan, the standard deviations of the hedged global index were the same or lower than those of its domestic counterpart. And perhaps more important, in all cases except Japan, the ratio (for each currency) of the mean return divided by standard deviation of return was higher for the hedged global index than for the local market index. The results for the three smaller markets, GBP, CAD, and AUD, are especially stark, showing a huge

improvement in this ratio. Therefore, the historical results reinforce the previous points about the strong diversification potential of a global allocation.

A legitimate question might be raised around the fact that domestic investors have domestic liabilities—what about the potential tracking error (TE) incurred by owning global duration instead of local duration relative to one's liabilities? The table in Figure 9 shows that in the U.S., there is a manageable tracking error between the domestic and global hedged index of 1.27%, and with the exception of the UK, the others have the tracking errors between 1.7% and 2.5%. The largest 12-month drawdowns are also shown for the hedged global index relative to the domestic bond index. Here again, the U.S. has the lowest drawdown of 2.9%, while the UK has the highest with 10.2%. Both the TE and drawdown in the UK were exacerbated by an extraordinary amount of local interest-rate volatility.

For investors with dramatically different liability durations than their domestic index, these results highlight that they will likely experience higher tracking error not only as a result of the differential in interest rate changes between the domestic and global markets, but also due to differences in duration. To ameliorate the basis risk, an investor with a firm domestic yield curve based benchmark—such as an LDI investor, domestically financed financial institution or sovereign wealth fund, etc.—could, instead of using a hedged global bond benchmark, use a liability based benchmark. That is, the investment manager would buy the most attractive bonds either domestic, or foreign, and in the absence of a view on relative FX or term structure performance, hedge currency and interest-rate risk back to that of the term-structure exposures of the domestic benchmark. In this way, the investor achieves the alpha advantages and diversification benefits of global, but reduces the mismatch between their portfolio and the targeted domestic yield curve bogey.[3]

GLOBAL OR LOCAL? COMPARING HEDGED YIELDS, VOLATILITIES, AND CORRELATIONS

While we've seen that hedged global bonds generally have attractive risk/reward characteristics, what about future expectations? Future returns are uncertain and projecting them is a complex exercise, yet one may start to form some expectations regarding yield and diversification by looking at two key comparisons:

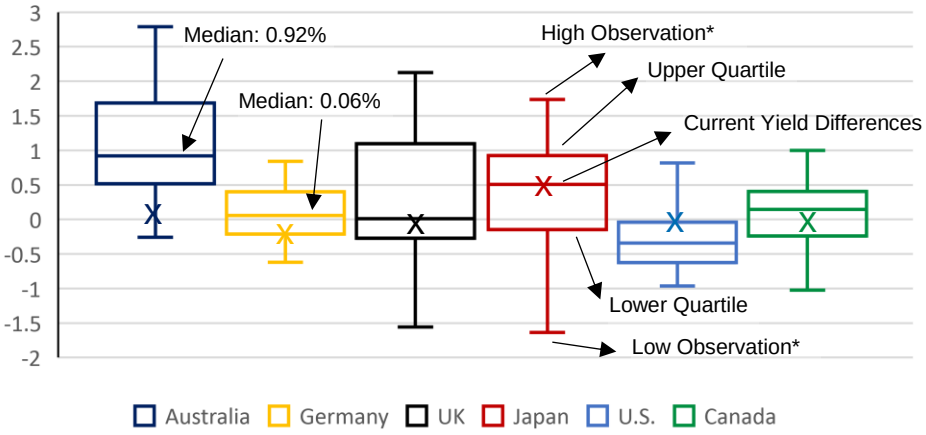
- Hedged global yields vs. domestic yields
- Hedged global bonds' level of volatility vs. those for local bonds.

To illustrate the potential incremental yield gained or lost from non-domestic bonds, Figure 9 shows a current and historical comparison of hedged global yields to individual country yields. To keep the comparison "apples to apples," we use 10-year yields in all markets, while recognizing that the actual durations of these markets differ. Hedging the currency risk isolates the investment risk to just duration and casts all instruments into the relevant domestic currency. From this perspective and at current market levels, Australian dollar, Japanese yen, and U.S. dollar investors would have various degrees of expected positive carry relative to their domestic markets, all else being equal. While past may not be prologue, it is nonetheless worthwhile to put these relationships in a historical context. For example, while the current increment of global hedged yields over Australian local yields is 0.14%, we can see from a historical perspective this increment has generally been higher—a median of 0.92% higher yield on a hedged global versus domestic bonds.

Another example is that hedged global yields are currently 0.29% less than euro denominated local yields. However, the median level of relative hedged yield has historically been higher, with the median global hedged yield 0.06% higher than local euro yields.

[3] *An investor using an approach such as this—investing globally, but swapping term and currency exposure back to match a liability stream —would be left with the risks inherent in the alpha seeking activities as well as the basis risk stemming from the economic and market pressures impacting hedging costs and the impact of changes between the hedging instruments used (say LIBOR swaps, for example) and their domestic liability discount rates (e.g. AA-corporate rates in the case of many U.S. corporate pension funds).*

FIGURE 9: THE CURRENT LEVEL AND MEDIAN OF HEDGED YIELD DIFFERENCES (HEDGED GLOBAL YIELD—LOCAL GOV. 10Y YIELD)



*Source: PGIM Fixed Income, Bloomberg and Bloomberg Barclays Indices. Data are as of September 29, 2000 through April 30, 2018. *Excludes outliers.*

Broadly speaking, we may conclude that investors end up more or less in the same ball park in yield terms by adopting a global hedged portfolio in place of their domestic government bonds. However, while it's tempting to assume that the hedged yield will drive future performance, we must of course keep in mind that fluctuations in relative unhedged yield levels will also be a major driver of future returns. That is, while hedged yields will drive the carry differential between markets, the principal or price change will be driven by changes in relative market yields. The nuance here is that changes in short-term rates and the basis between them can change the near-term carry/yield difference; but only changes in relative long-term rates can drive principal or price changes, which can easily swamp the impact of carry, especially over short periods of time. Comparing yields also ignores the effect of rolling down the yield curve.

While yields and hedging costs are important drivers of relative return, investors should also acknowledge that while relative hedged yields and long-term relative yield changes may be paramount in determining market returns, an investor's returns could differ substantially if going global generates higher realized alpha, which could result from the expanded opportunity sets in terms of credit profile, sector allocation, and term structure as previously discussed.

Beyond expected returns, investors must also consider the risk side of the equation. While one might assume that "going global" increases risk, Figure 8 showed that the historical volatility of hedged global bonds for five of the six markets displayed was the same or lower than domestic bond market volatility. Another element of risk at the portfolio level is that of correlation: when considering an investment, a key concern is whether it is positively or negatively correlated with the investor's existing investments, since this will determine whether the new investment is likely to exacerbate (positively correlated) or ameliorate (negatively correlated) the existing portfolio's volatility.

In conclusion, what can we expect from global hedged bonds at the portfolio level? Predicting relative market performance is difficult. But both the relative proximity of current hedged global yields to local yields and the large historical overlap of their trading ranges are reassuring and suggest that returns on a duration-adjusted basis are likely to be comparable. All else being equal, global hedged bonds might be considered similar in attractiveness to domestic bonds.

But all else is not equal. Over and above the relatively balanced expected hedged returns across major markets, in our view two considerations give the hedged global alternative the advantage over local fixed income: 1). The greater opportunity set for adding value (alpha) by "going global," and 2). The diversification benefit relative to domestic bonds deriving from their lack of perfect correlation. While there is no free lunch in investing, diversification may be the closest thing to it.

THE VALUE OF DERIVATIVES FOR RELATIVE VALUE AND HEDGING

What is the appropriate role of derivatives in global bond portfolios? Derivatives in fixed income and currencies include FX forwards, interest rate futures and swaps (IRS), and single name credit default swaps (CDS). Derivatives have previously played a role in financial crises (1998 and 2008 come to mind) and have been famously labeled weapons of financial mass destruction. Indeed, investors should be cautious in using derivatives to leverage the portfolio economically, especially if the resulting risks are hard to measure. That said, we strongly recommend allowing derivatives as permissible instruments in a global bond portfolio for several key reasons:

- Derivative instruments help to isolate credit-risk premia while hedging out the underlying interest-rate and currency risks, which may or may not be attractive. This frees up the investor to have the optimal yield curve, currency, and credit exposures.

- The instruments allow efficient hedging of benchmark risks. For example, Japan has a low and flat yield curve and tight credit sector spreads, but investors can achieve their desired yen-denominated interest-rate profile via interest-rate derivatives without using cash that is best deployed elsewhere.

- These instruments allow active exploitation of relative-value opportunities, such as curve trades. For example, the Fed poses a significant risk to U.S. interest rates. Short dated forward-rate agreements, swaps, and futures allow investors to profit from, or hedge, this risk and to utilize curve trades, such as flatteners.

- These instruments permit intelligent and controlled economic leverage where appropriate. For example, shorter-dated credit exposure via CDS might be a better option late in the economic cycle—rather than going down in quality or buying 30-year industrials—but with similar spread market risk. Additionally, in comparison to cash bonds, some CDS trade cheap to cash (e.g. certain sovereigns), and some have better roll-down characteristics.

WHY MOST GLOBAL INVESTORS MAY BE BETTER OFF WITH A CURRENCY HEDGED (AS OPPOSED TO UNHEDGED) GLOBAL PORTFOLIO

A perennial question that investors tend to ask is whether their global bond benchmark should be currency hedged or unhedged. Throughout this paper, we have used currency hedged global bond indexes because of their generally superior risk-adjusted returns for the following reasons:

- G10 currencies do not have permanently embedded positive risk premia.

- FX volatility tends to dominate short- to medium-term unhedged returns. For example, with over half of the global benchmark being non-USD, U.S. investors will experience about 500 bps of volatility from FX alone, and investors from other domiciles will experience even more. Periods of currency strength/weakness (such as the USD strength from 2011-2017) will dominate differences in performance between domestic and unhedged global bonds regardless of underlying assets.

- A compelling economic argument for hedging is that most investors' liabilities are in the domestic currency, and even those that adopt a risk-controlled wealth maximization objective rather than an explicit liability matching framework have implicit liabilities in their domestic currency. Therefore, they would therefore probably be better served with a hedged benchmark.

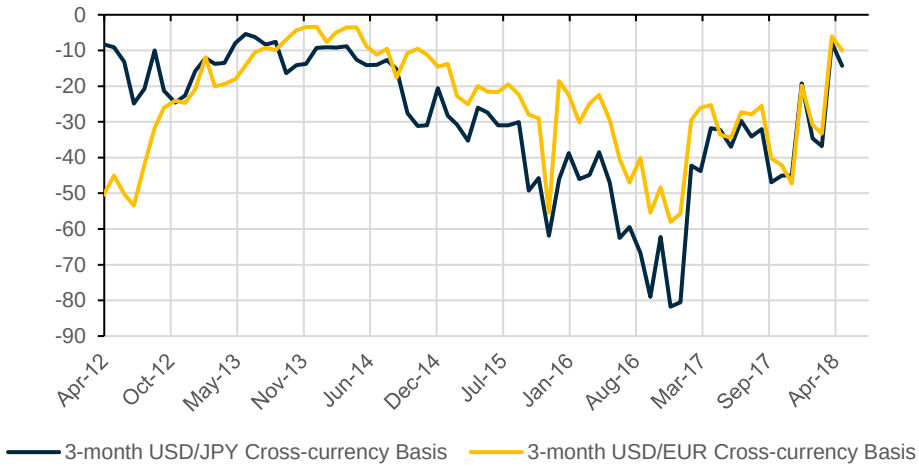
- Many non-domestic equity, real estate, and alternative allocations are unhedged, or only partially hedged, thus leaving investors with substantial currency exposures from these assets.

In short, while one could argue for an unhedged allocation for the sake of currency diversification, it may be a source of volatility without clear compensation and an investment that does not match liability streams—so careful consideration of the objectives in this case is warranted. If the fixed income allocation is meant to be a safe haven or to closely mirror liabilities, it would be better to hedge the benchmark.

What about the idea of using a global bond portfolio to express a particular long-term currency view? Let us take the example of a U.S. investor with a bearish view of the U.S. dollar. From the standpoint of maximizing returns, we expect the U.S. dollar to weaken over the coming years versus the euro and to other G10 currencies on a total return basis. This would argue for a short USD bias in global portfolios. However, short USD positions can be very volatile, and the prospects for the U.S. dollar may change over time. Even if a passive USD were to work, it is unlikely to do so in a straight line. Therefore, a passive USD short would likely be a low information ratio strategy, and an active discretionary FX allocation may be better suited to reflect a particular FX view rather than adopting an unhedged benchmark.

It is hard to predict if investors would be better off with a global currency mix in a flight-to-quality episode. The U.S. dollar, euro, and yen have all at various times been a safe haven currency during such flights (depending on the nature of the crisis). But other G10 currencies, such as AUD and NZD, tend to selloff during risk off episodes. Therefore, an unhedged benchmark may confer an advantage for investors in smaller countries, such as the UK, or for investors in commodity driven currencies, such as CAD and AUD.

FIGURES 10: CROSS CURRENCY BASIS VS. USD LIBOR : JPY AND EUR (2012 TO PRESENT)



Source: Bloomberg as of April 2018.

Another consideration for investors related to currency hedging is the cross-currency basis. With longer-dated yields in Europe and Japan at times trading at low, or even negative levels, many investors try to take advantage of the higher yields in foreign bonds while hedging their currency risk. This has led to a large cross-currency basis for USD/EUR and USD/JPY (shown in Figure 10) as there was a large demand to hedge USD assets into euros and yen. When the cross-currency basis was wide, it was less attractive for European and Japanese investors to make currency-hedged investments in the U.S. Yet, the wide basis made it more attractive for USD investors to buy European and Japanese bonds (currency hedged).

As the U.S. curve flattened, the pickup for buying longer-duration assets while hedging back into yen and euros diminished, resulting in a recent reduction of the cross-currency basis. This is expected to continue as the U.S. curve potentially flattens further and the European economic cycle catches up to the U.S. in the coming years, reducing the distorting effects of the basis.

Conclusions

Going global can result in significant diversification benefits and a much wider opportunity set for adding value through country and sector rotation, issuer selection, and term structure positioning as summarized below.

- **Interest-rate diversification:** Since global interest rate markets are not perfectly correlated, investing in multiple countries on a hedged basis can lead to a reduction in volatility and an improvement in return efficiency / information ratio.
- **Fundamental credit diversification:** Investing globally can spread a portfolio's country, industry, issuer and issue risk. While mark-to-market moves in spread products may be positively correlated across countries—especially over short periods of time—fundamental diversification can nonetheless have a positive impact on return efficiency over the intermediate to long term.

While this is particularly the case for investors in one of the jurisdictions with very limited non-government markets, even for the largest markets, it holds true that significant fundamental diversification can be achieved through a global bond allocation.

Active return opportunities: In addition to the diversification benefits, a wide array of countries, sectors, and issuers—as well as term structures—increases the potential for adding value through active management.

Derivatives: We recommend allowing these with limits to permit risk isolation, relative value, hedging, and intelligent economic leverage.

Hedged over Developed Market Unhedged: Most diversification benefits are achieved through the expanded opportunity set in securities and interest-rate markets. FX, on the other hand, appears to be a comparatively uncompensated risk. Therefore, in many cases, hedged global exposure is likely to be a better option than unhedged.

The Bottom Line: As an asset allocation choice, hedged global bonds have generally performed in line with, or outperformed, most domestic bond markets over long time horizons. But perhaps more important, 1). Hedged global bonds offer a wider opportunity set across developed and emerging markets for adding value through active management, and 2). They often have a combination of comparable correlations and comparable or lower volatilities, which should result in higher information ratios at the overall portfolio level.

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as of June 2018.

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