ARDEA Investment Management

How are fixed income strategies impacted by the market environment?

- We take a closer look at fixed income performance and risk for five main types of strategies: money market, government bond, investment grade credit, high yield credit and relative value.
- We analyse historical performance through various extreme market environments, which highlights the benefits and risks of the duration and credit exposures of the more conventional strategies.
- There isn't a clear good or bad market for relative value strategies, but we highlight three links between the broader market environment and performance: 1) extreme low rates volatility is a negative; 2) higher rates volatility is generally positive, but not in all situations; 3) RV alpha is structural, but the mix of opportunities changes with broader supply/demand dynamics.

The role of fixed income and risk/return drivers

Fixed income investments play an important role in most portfolios and are generally implemented to meet some combination of the following goals:

- Enhancing total returns.
- Preserving capital.
- Increasing portfolio income.
- Increasing portfolio liquidity.
- Diversification from equities.
- Lowering overall portfolio volatility.

These aims give rise to a wide range of fixed income portfolio construction possibilities, ranging from aggressive to defensive in terms of overall risk profile. While risk can be assessed with broad measures like performance volatility, a more accurate assessment involves understanding the underlying investment drivers. In this note, we take a closer look at common fixed income strategies and assess risk and return across market environments.

There are four main risk factors targeted by fixed income investors to generate returns:

1) **Interest rate or duration risk.** Movements in yield levels are normally the largest driver of performance in fixed income portfolios where government bonds are the dominant investment and credit risk allocation is low. Bond prices are inversely related to the level of yields, so for an investor with a long position in bonds (net of offsetting short positions in related interest rate derivatives), falling yields mean higher prices and profits and rising yields mean lower prices and profits.
2) **Credit risk.** Credit is a major source of global fixed income return and risk. The spectrum of credit is very wide and captures many forms of issuing entities but is commonly targeted at private companies. In the same way that companies can borrow money via loans from banks, they can also borrow money from investors by issuing bonds in corporate bond markets. The interest rate that companies pay is typically higher than what a government borrower would pay, which means corporate bonds usually offer higher yields than government bonds.

That additional yield is called a ‘credit spread’. In this case, the term ‘spread’ refers to the difference in yield between a corporate and government bond. Credit spreads represent additional compensation (i.e. higher yields) that investors demand in return for taking credit risk.

Credit spreads directly impact corporate bond prices because they reflect market perception of credit risk. When credit spreads decrease, corporate bond yields decline (assuming interest rates are unchanged) and bond prices rise.

The most obvious component of credit risk is ‘default risk’, which is the risk that a bond issuer fails to repay investors according to the terms of a bond. Corporates typically (but not always) have higher default risk than governments and therefore investors demand additional compensation to invest in corporate bonds.

3) **Liquidity risk.** Liquid securities are those that can be readily bought or sold in sufficient volumes, at reliably transparent prices and without incurring punitive transaction costs. Illiquid securities are those that fail to meet these criteria to varying degrees.

   Illiquid securities may carry more risk, not just because they are harder to sell but also because there may be less confidence about their market valuation.

   Even long-term investors value liquidity in order to maintain flexibility of asset allocation or access to cash and those needs are often greatest at times of market stress, when liquidity is most tested. For these reasons liquidity risk always needs to be accounted for when comparing investments.

   The additional return an illiquid asset offers above a comparable investment that’s very similar in all aspects other than liquidity is referred to as the illiquidity risk premium. This is what investors earn explicitly for giving up liquidity.

   The types of less liquid fixed income investments that offer an illiquidity risk premium includes loans, high yield bonds, securitised credit products and emerging market bonds. A fixed income portfolio can therefore take more liquidity risk by holding a larger proportion of these types of less liquid investments, and thereby harvest the illiquidity risk premium to increase returns.

4) **Idiosyncratic risk.** These are risk factors specific to a fixed income security or group of securities that are not explained by broader market factors such as duration, credit or liquidity risk. The idiosyncratic forms of risk exposures can be captured through explicit actions to hedge out the systematic or broader market risk or can be used in conjunction with these other risk factors. Manager skill is typically a bigger driver of this form of risk.

   Relative value (RV) investing is one form of idiosyncratic risk. RV strategies target groups of securities which have similar risk characteristics, but which trade at different prices and usually involve a combination of long and short positions. The resulting RV premium is less correlated with other asset classes and risk factors in a portfolio (see here for more detail on pure RV investing). The use of RV strategies spans the entire fixed income asset class and can be implemented across government bond, interest rate derivative and credit markets.

   Idiosyncratic credit risk is also a feature of many fixed income funds. These risks are often featured in the financial media when there has been significant negative event impacting a particular company (such as regulatory fines or a financial scandal), which then pushes up the default risk on that issuer’s bonds. However, this form of risk can also be a source of alpha, where bottom-up credit analysis reveals attractive risk-reward attributes in a particular issuer.

Broad types of fixed income investment strategies

We outline five fixed income strategies that target these main types of risk factors to generate returns. The following table summarizes the qualitative risk and return characteristics of each type of strategy.

Figure 1: Fixed income strategy characteristics

Fixed Income Strategy Type	Total Return Potential	Income Return Potential	Return Volatility Risk	Credit Risk	Liquidity	Capacity Constraints
Money Market	Low	Low	Low	NA	High	Low
Government Bonds	Medium	Low	Medium	NA	High	Low
Investment Grade Credit	Medium	Medium	Medium	Medium	Medium	Medium/High
High Yield Credit	High	High	High	High	Low	High
Interest Rate Relative Value	Medium	NA	Low	NA	High	Low

1) **Money market.** These funds invest in money market securities, typically issued by governments and financial institutions. The investment universe is often constrained to invest in short maturity discount securities (<12 months), which limits the exposure of these funds to both duration and credit risk. Some money market funds also have the capacity to invest in asset-backed securities. High liquidity and low performance volatility are typically the main objectives of money market funds.

2) **Government bonds.** These funds target returns in government bonds and avoid corporate credit spread risk. While traditionally considered “risk-free’ from a credit perspective and with high liquidity, government bond funds are typically the most exposed to duration risk. That risk means these funds benefit significantly from an environment of falling interest rates but are exposed to losses from rising interest rates. For developed market government bond funds, there may also be scope to invest in regional government or supranational issuers. These issuers typically have very low or negligible credit risk.

3) **Investment grade credit.** Investment grade credit funds target returns through investing in corporate credit and other non-government securities. These funds generate returns through coupon income streams and capital gains from compression in credit spreads and changes in market yield levels. Investment grade funds may also be exposed to duration risk, although the average maturity of a corporate credit security is typically shorter than for governments. These funds normally have exposure limits to entities with a minimum rating level, mostly investment grade, which is normally considered to be BBB or higher.

4) **High yield credit.** These funds invest in higher yielding securities issued by entities with lower credit ratings than investment grade or in unrated entities. These credit securities may be traded in public or private markets (arranged by banks or directly by a fund manager). Some high yield funds may also have the capacity to invest in distressed credit securities, whereby an issuer is close to or in the process of defaulting on obligations and bonds of the issuer are trading at a deep discount. As the highest risk form of fixed income investing, these funds typically have a higher average return level to compensate for both higher credit and liquidity risk. Manager skill is often a greater determinant of returns than for investment grade credit, given the higher credit risk exposures in these funds. However, liquidity is lower in high yield, so these funds may set tighter limits on how quickly funds can be redeemed, such as monthly, as opposed to daily with government or money market funds. Duration risk is typically lower with high yield than investment grade credit.

5) **Interest rate relative value (RV).** These funds generate returns in interest rate markets, which encompasses both government bonds and related interest rate derivatives. These strategies do not rely on credit, duration or liquidity risk factors. Instead, returns are generated by taking both long and short positions in these markets to target relative pricing differentials, as opposed to buying and holding securities for income and capital gain. The resulting risk profile is more idiosyncratic and less correlated with the direction of government bond yields and risk assets. For example, RV funds may position for changes in yield curve shape or in the basis between government bonds and derivatives such as swaps and futures. The risk and return profile of these funds can vary depending on whether the investment process targets "pure RV" alpha only, what volatility objectives are targeted and whether the RV fund avoids material duration or credit risk exposure (and other macro-oriented risks such as cross market yield and FX). For this note, we assume a pure RV process with a low volatility objective.

Fixed income strategy proxies

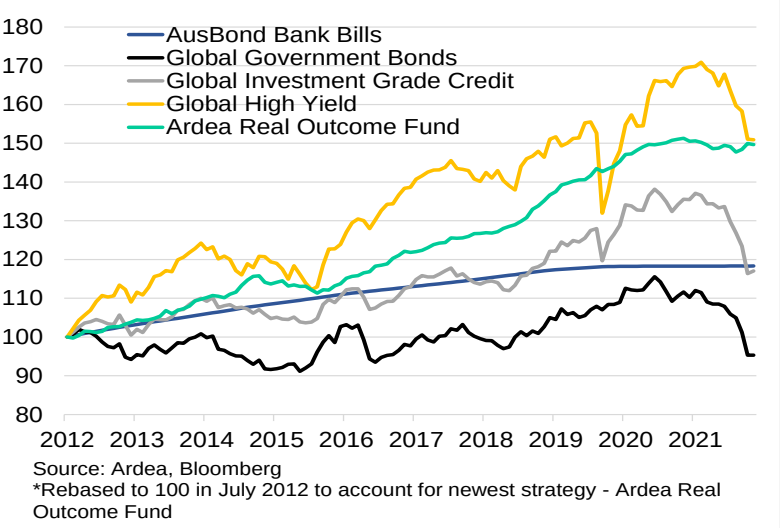
The five major fixed income strategies feature different risk/reward drivers that change through time, depending on market conditions. To illustrate the historical evidence of various market environments, we use the following proxies for the five fixed income strategies:

1) Money market: the AusBond Bank Bill Index.
2) Government bonds: the Bloomberg Global Treasury Index.
3) Investment grade credit: the Bloomberg Global Aggregate Credit Index.
4) High yield credit: the Bloomberg Global High Yield Index (DM and EM).
5) Interest rate relative value: the Ardea Real Outcome Fund.

Note that these indices are just rough guides. Each strategy captures a very wide potential universe of underlying investments and portfolio possibilities. As such, there is no universally accepted single index to proxy each investment style.

Figure 2 shows the performance of these proxies over the last decade. Note that total return comparisons are highly dependent on the sample period shown and a longer-term horizon would improve the comparable performance of government and investment grade credit indices. Since the Ardea Real Outcome Fund – proxy for relative value – has been in existence since 2012, we rebase all indices to that time to show like-for-like returns.

Figure 2: Performance of fixed income strategies over the last decade (July 2012 = 100)*



*Past performance is not a reliable indicator of future performance.

Interest rate risk (duration)

A major source of risk for most fixed income portfolios are changes in the level of interest rates. The interest rate environment captures both changes to monetary policy directly controlled by central banks and related broader supply/demand conditions that impact bond yields.

Duration is an important concept for understanding the sensitivity of a given portfolio or security to changes in the level of yields. Duration risk stems from the fact that a bond investor makes a payment today in exchange for a series of future interest payments. At the time of purchase, the bond's price reflects the present value of that future stream of interest payments, which are fixed in advance. However, the next day if the general level of market interest rates (or bond yields) rises, that fixed stream of interest payments is no longer as valuable, as it is now below current market rates. Therefore, the bond needs to be discounted to attract new buyers, and the bond price drops accordingly. The opposite happens when bond yields fall.

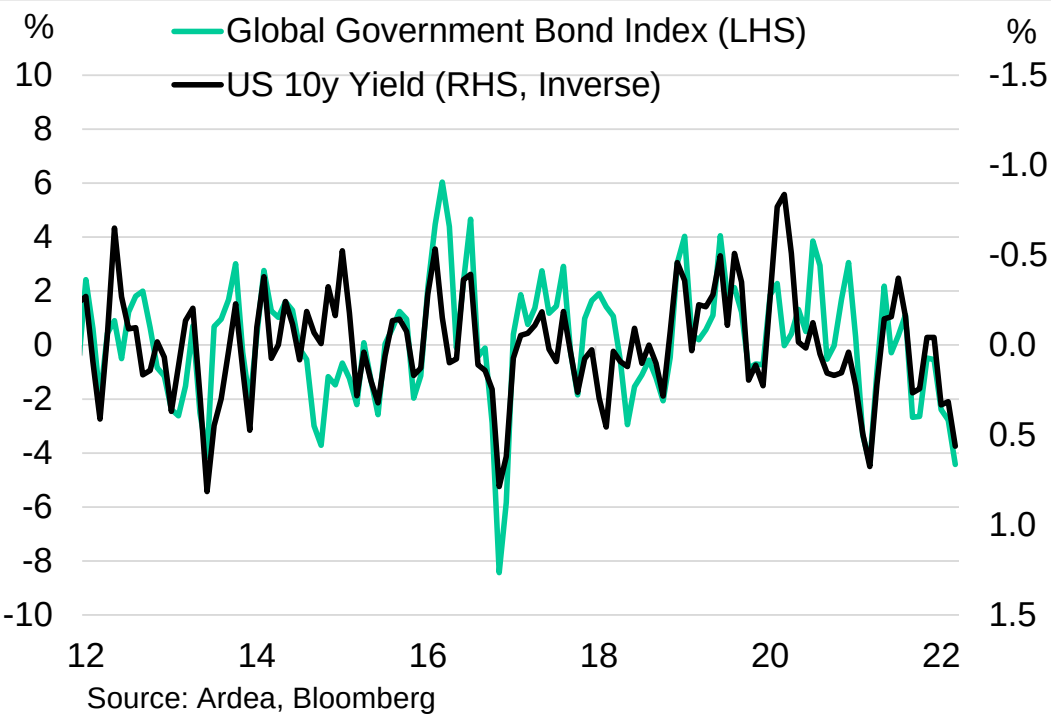
This basic concept can be measured across bond portfolios. Figure 3 provides a rough indication of how much duration risk each strategy type is exposed to. For each 1% increase (decrease) in the overall level of yields, the duration estimate provides a rough indication of the expected performance impact, based on our proxies. On this basic measure, for all fixed income styles where duration risk is above zero, higher rates = negative returns, lower rates = positive returns. It stands out in this basic analysis that government bonds are the most exposed to changes in yields. For each 100bp change in rates, government bond returns could be +/- 8.2%. Figure 4 shows the returns of government bonds are unsurprising closely aligned (inversely) to moves in the benchmark US 10y yield. Investment grade credit benchmarks feature significant exposure to interest rate risk, which exceeds otherwise riskier high yield credit benchmarks.

Figure 3: Fixed income strategy duration risk exposure

Fixed Income Strategy Type	Benchmark	Duration Risk (years)
Money Market	Bloomberg AusBond Bank Bill Index	0.1
Global Government Bonds	Bloomberg Global Treasury Index	8.2
Global Investment Grade Credit	Bloomberg Global Aggregate Credit Index	6.9
Global High Yield Credit	Bloomberg Global High Yield Index (DM and EM)	4.4
Interest Rate Relative Value	Ardea Real Outcome Fund	0.0

Source: Bloomberg, Ardea

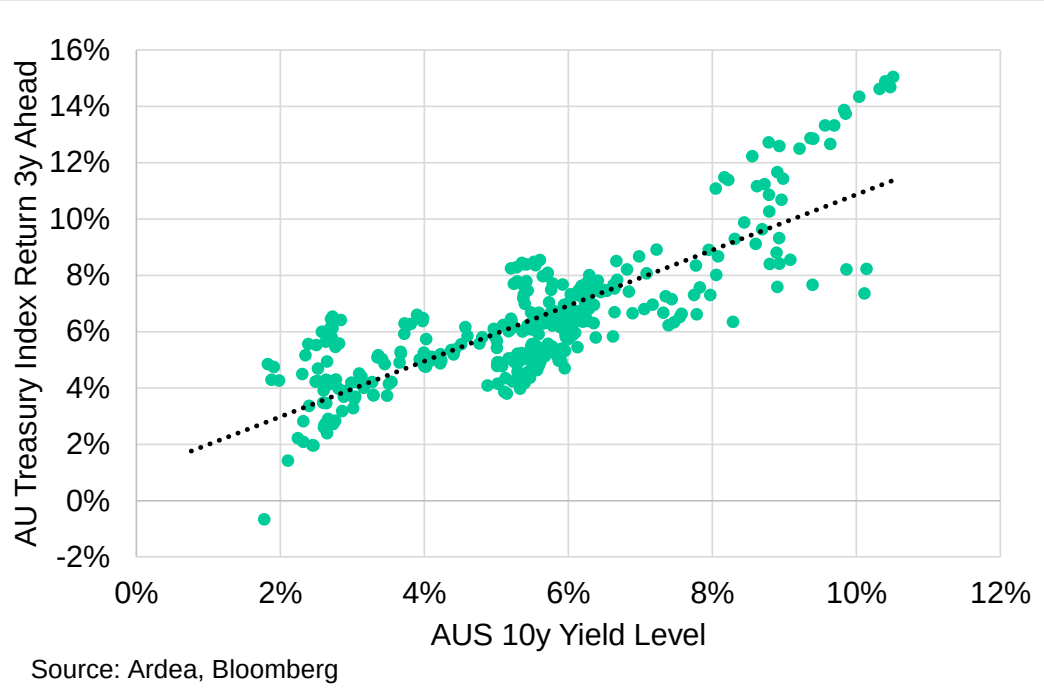
Figure 4: 3m change in government bond index returns vs US 10y yield



This simple duration comparison ignores a few other important considerations about interest rate risk (also see this article for further discussion about the limitations of conventional duration and yield):

- **The size of the move in rates matters.** The simple duration analysis assumes a 100bp move, which may over or understate actual market conditions. The absolute average annual change in the US 10y yield over the last decade is 52bp.
- **Rates often don't rise or fall evenly across the curve.** Duration analysis assumes parallel shifts in yield curves. In practice yield curves often do not experience parallel shifts higher or lower. The mismatches between the size of the move in different sectors of the curve (changes in the "shape" of the curve) can have significant consequences for fixed income performance (see here for an in-depth discussion on yield curves). For example, rising short-dated rates, but stable long-term yields may not be as bad an environment for government bond or investment grade credit funds as the duration figures suggest. Credit funds may be better insulated in an environment where long dated yields are rising and short-dated yields are stable.
- **Time horizon and the level of rates are important**. Rising rate environments are initially negative for conventional fixed income funds, but the commensurate rise in market yields also allows for reinvestment of maturities with higher expected returns and boosts future income potential (assuming yields eventually stop rising). To further illustrate this final point, Figure 5 shows the positive long-term relationship between the level of the Australian 10y yield and the subsequent 3y annualized return in the Bloomberg Australian Treasury Bond index.

Figure 5: Australia Treasury Index performance 3y ahead (annualized) and AU 10y yield level (since 1992)



Source: Ardea, Bloomberg

Credit risk

Beyond changes in the level of rates, credit exposure is a key source of risk in fixed income investments. Credit exposures give rise to the risk of capital loss through defaults and underperformance of credit securities relative to government bonds and cash instruments. These risks can be measured. Default probability analysis can be run on a realized basis, accounting for historical default rates or average rating exposures can be compared with default studies from rating agencies.

In Figure 6, we show a measure of credit exposure for the five main fixed income strategy types. The OAS metric is an “option-adjusted spread”, which reflects the yield spread adjusted for any embedded optionality in credit securities within the indices (for example, in some securities the issuer has the right to redeem prior to maturity or prepayment risk adds a kind of optionality to a mortgage-backed security).

Figure 6: Fixed income strategy credit spread exposure

Fixed Income Strategy Type	Benchmark	OAS
Money Market	Bloomberg AusBond Bank Bill Index	NA
Global Government Bonds	Bloomberg Global Treasury Index	NA
Global Investment Grade Credit	Bloomberg Global Aggregate Credit Index	1.2%
Global High Yield Credit	Bloomberg Global High Yield Index (DM and EM)	4.6%
Interest Rate Relative Value	Ardea Real Outcome Fund	NA

Source: Bloomberg, Ardea

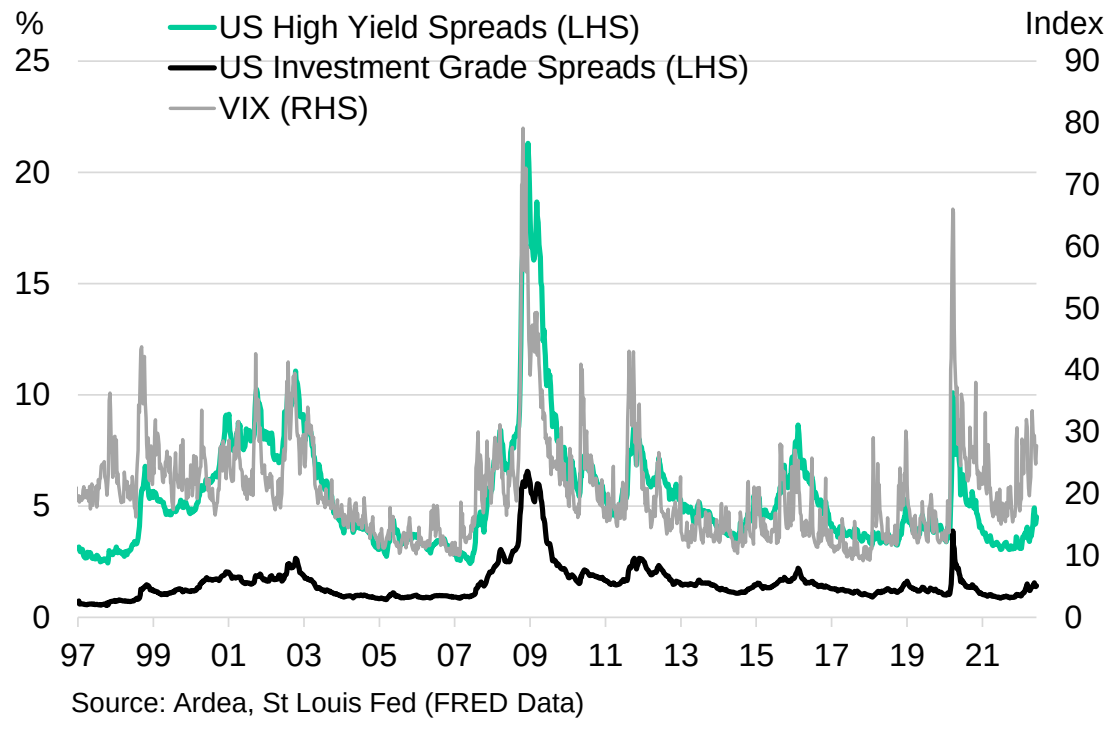
The table highlights the extent of credit spread exposure within investment grade and high yield strategies, compared with no exposure in money market and government bond portfolios. These spread exposures are just rough guides for very broad indices. Credit funds can implement many portfolio strategies to transform this exposure through credit selection and the use of credit derivatives.

At a basic level, a credit spread represents the compensation to an investor for lending to an entity with higher risk of default than governments. The spread is a form of compensation for uncertainty, which in turn is related to broader measures of uncertainty in markets such as volatility. As we've highlighted, government bonds also experience price volatility, but credit spreads experience a different type of volatility that is more closely related to equity market volatility as measured by the VIX (Figure 7). After all, both credit and equities are fundamentally linked to investor perceptions about the health of the economy and perceptions of risk aversion.

Recessions and periods of heightened risk aversion such as the 2008 global financial crisis and 2020 COVID crisis drove substantial underperformance in both credit and equities. More bullish periods for credit in recent year have been where rates were low and economies in reasonable shape. Spreads tightened through these periods, adding to significant gains. The correlation with equities tends to be higher in crisis periods than in more benign environments. In this way, credit-heavy fixed income portfolios don't tend to diversify equity risk in the same way balanced and government bond portfolios can in volatile markets. The trade-off is the higher expected return of credit in more bullish risk and low volatility environments.

See this article for a more in-depth discussion on the risk factors for credit investments.

Figure 7: Investment grade and high yield CDS spreads vs VIX



How do the various Fixed income strategies perform in different market conditions?

We have outlined the sensitivity of various fixed income strategies to the two major sources of risk and return: interest rates and credit. To further illustrate how fixed income is affected by different macro and broader market environments, we show six examples of market regimes since 2008 (Figure 8). Most are periods of higher volatility with the exception of the low for longer environment of 2019.

Figure 8: Fixed income strategy performance across market environments

Strategy	2008 Crisis	2013 Taper Tantrum	2018 Fed Tightening	2019 Low for Longer	2020 COVID	2021-22 Regime change
Money Market	3.0%	2.1%	1.1%	1.7%	0.3%	0.0%
Global Government Bonds	-0.8%	-1.4%	-0.2%	8.3%	1.8%	-14.5%
Global Investment Grade Credit	-10.8%	1.1%	-0.6%	12.1%	-3.9%	-14.3%
Global High Yield Credit	-23.6%	5.9%	-2.0%	11.7%	-12.8%	-11.7%
Interest Rate Relative Value*	-	4.1%	1.8%	9.4%	1.5%	-0.3%
Equities (S&P 500)	-42.7%	17.8%	-7.3%	17.1%	-17.7%	-8.6%

Source: Ardea, Bloomberg **Ardea Real Outcome Fund performance available from 2012*.

1) Lehman's collapse and peak of global financial crisis (Sep-08 to Feb-09)

- The fallout from the collapse of Lehman Brothers is among the most extreme conditions faced by any portfolio. Many countries experienced large scale financial failures and liquidity conditions deteriorated sharply across all interbank markets. Risk aversion reached extreme levels and massive government and central bank intervention was required to restore confidence and stability to even short-term cash markets. The global economy was experiencing a deep recession.
- We show here a brief period encompassing the depths of the 2008 financial crisis. The beginnings of the crisis period could be seen in early 2008 or even in 2007 in some pockets of credit markets. The impact on broader markets and economies extended for years beyond 2008-09, contributing to the subsequent European sovereign crisis and historically slow recovery in growth for many economies over the following decade.
- The impact on fixed income performance is highly dependent on the timing of the performance period, given the extreme volatility in markets at the time. Developed market government bonds, as safer assets, delivered stronger performance through November and December as major central banks cut rates sharply, but experienced modest detraction through January and February 2009 as markets started to envisage a low point for rates was near. Liquidity was at a premium through this period, which supported the attractiveness of government bonds relative to riskier assets.
- The strongest performing fixed income strategy in our sample at this time was the AUD bills index, reflecting massive RBA cash rate reductions from 7.25% at the start of Sep-08 to 3.25% by Feb-09. Government guarantees of financial institutions and central bank actions to improve money market function led to a compression in money market spreads to cash. However, at the peak of the crisis, even the usually safe AUD bills index still suffered from illiquidity amid extreme risk aversion and a

lack of trust among investors in financial institutions.

- Equities suffered massive falls and credit spread widening was among the worst on record through this period. Credit followed the poor performance of equities, especially the high yield index. Credit-heavy fixed income was not a reliable diversifier for equities at the height of the crisis, delivering a significant negative return with low liquidity.

2) Bond market "taper tantrum" (May-13 to Dec-13)

- In May 2013, then Fed Chair Bernanke hinted that the pace of bond purchases under the QE program would need to be gradually tapered. While the start of the tapering process didn't take place until the end of the year, between May and September 2013 the US 10y nominal yield lifted over 100bp to a high of 3.05% and the 10y real yield lifted 130bp to a high of 0.92%. This rise in yields was led by the long end of the curve as developed market central banks were either stabilizing or reducing cash rates. Other government bond markets also suffered heavy losses at the time, in sympathy with the largest US Treasury market.
- Duration-heavy portfolios underperformed through this period, as long-term bond yields lifted. Global government bonds were the worst performers at -2.4%. By being invested only in US Treasuries, the return was worse over this period at -3.4%. The outperformance of the AUD bills index at this time was the result of 50bp of RBA easing – the direction of monetary policy diverged from the US.
- Riskier portfolio performance varied. The anticipated reduction of QE was not enough to dent appetite for equities or credit, despite some volatility within this period. The outperformance of higher yield compared with investment grade credit also reflected the lower duration of this index.
- RV strategies delivered strong performance, benefiting from low duration exposure, but large changes in curve shape, increases in volatility and idiosyncratic risk opportunities.

3) Fed rate hikes and fears of over-tightening (Jun-18 to Dec-18)

- The last Fed policy tightening cycle in 2018 was initially met with calm by markets, but in the latter part of 2018, investors became nervous the Fed had tightened policy too far. This backdrop was initially bearish for government bonds, but eventually became bullish following second-round support after a severe global equity sell-off unfolded as financial conditions tightened. The Fed ultimately delivered 3 hikes over H2 2018 to a Fed Funds target range 2.25-2.50% - above where many forecasters saw the rate getting to earlier in the cycle.
- The combination of higher rates and investor fears of overtightening contributed to a 7% correction in equities over H2 2018 and a significant increase in volatility. Higher yield credit also underperformed in this environment. Investment grade credit and government bonds were flat to weaker and didn't provide an offset to falling stocks. The overall flat performance of government bonds masks significant volatility within the six-month period – the global index tracked a near 6% range.
- By avoiding duration and credit exposure, interest rate RV delivered higher returns, with lower performance volatility.

4) Policy easing and low for longer (2019)

- Fixed income and equity markets delivered strong returns over 2019. Headlines were dominated by a global growth slowdown and geopolitical risks – both US-China trade tensions, the risk of a hard Brexit and recession risks from a flatter yield curve. However, despite this bearish narrative, slower growth didn't translate into a recession across major DM markets, low inflation underpinned substantial central bank policy and liquidity support which benefited all fixed income assets and equities recovered the Q4 2018 rout following a Fed dovish policy pivot.

- The full year performance was solid for all fixed income strategies in our sample. Duration-heavy portfolios performed well as central banks were supportive either through explicit policy easing or promises to keep rates low for longer. This backdrop was enough to offset perceptions of recession risk and geopolitical volatility, which proved beneficial to credit – both from a carry and spread perspective. Money market was a slight laggard in terms of overall returns, but even here was solid after accounting for its lower risk.
- RV returns were exceptional –stronger than global government bonds and ahead of both government and credit benchmarks after adjusting for performance volatility.

5) Covid shock (Q1 2020)

- Q1 2020 saw one of the largest equity market drawdowns since the 2008 financial crisis (GFC). In many ways the falls in equities and other risk assets (e.g. credit markets, commodities) were more violent than the GFC because of the speed and market dysfunction that characterized the drawdowns.
- Over this period, even high quality government bond markets experienced unprecedented volatility, impaired liquidity and dysfunction (see this article for further information about liquidity conditions in Q1 2020). However, this didn't last long as central banks intervened quickly and aggressively, resulting in +1.4% overall return, following a 1% drawdown at the peak of the Covid crisis. Other segments of fixed income, such investment grade and high yield credit (and asset-backed securities) experienced far greater and longer lasting liquidity impairment and market dysfunction than core interest rate markets.
- Interest rate RV delivered positive returns and lower performance volatility. Within RV, option-related positions provided a significant source of protection against very large and unpredictable swings in yield curve shape and basis relationships that are normally stable. Ultimately government bond markets caught up to RV and a common link with both strategies relative to credit strategies is positive liquidity, which was supported by central bank action to target markets most critical to the plumbing of the financial system.

6) Regime shift to higher inflation and rates (Sep-21 to May-22)

- The eight months to May 2022 was a period of heightened volatility in global markets, particularly fixed income. Markets were fixated with surging inflation, central banks talking up and then delivering aggressive policy tightening, a Russian invasion of Ukraine and a further rally in already lofty commodity markets. The net impact of these themes was a very sharp rise in bond yields, led by the front end of yield curves. The US 2y yield lifted a over 2%, outpacing a 1.4% rise in the 10y yield and briefly inverting the 2/10y curve. The curve flattening and aggressive increase in rates underpinned concerns about an upcoming recession, prompting heavy falls in equity markets.
- This market backdrop left few places to hide within conventional fixed income investments, many of which registered historically large losses. The global government bond index lost 14.5%, while investment grade credit (-14.3%) underperformed high yield (-11.7%), on account of longer duration exposure. Equities were also significantly weaker (S&P 500 -8.6%). The equity drawdown is nearer to 20% if once considers just the period from the end of 2021 to the end of May 2022.
- Fixed income RV delivered slightly negative returns over this period, but at -0.3% this loss is negligible compared with conventional strategies. Performance volatility remained low despite broader market turmoil. However, there were notable monthly falls of -0.7% and -1.0% (net of fees) in October 2021 and February 2022, respectively.
- The reason for modest negative RV returns stems from the impact of regime changes on the shapes of yield curves, which are sharp increases in the relative volatility of different points on interest rate curves and in other types of RV exposure (such as bond vs derivative basis). Micro focused RV trades can sometimes be collateral damage in the wake large macro curve volatility. The defensive

nature of pure rates RV funds - which also position directly in interest rate options – limited the size of drawdowns. These positions helped drive positive monthly performance amidst some of the worst conditions for broader markets in March and April 2022.

Is there a good and bad market environment for relative value?

Some key drivers of the broader market fixed income and risk asset environment do not have a material impact on pure RV strategies, including:

- The level and direction of interest rates.
- Risk asset sentiment.
- Broad macro variables such as growth and inflation. (A partial exception here is that the Ardea Real Outcome Fund has an inflation beta component tied to market-based inflation expectations, although RV alpha tends to be the dominant driver of performance most of the time).

Since pure RV portfolios like the Ardea Real Outcome Fund avoid conventional duration and credit risk exposure, the correlation with broader bond and equity markets is negligible over the long run (as shown in the table below) and this low correlation is maintained through periods of negative returns in broader markets.

Figure 9: Ardea Real Outcome Fund correlation with broader bond and equity markets

Ardea Real Outcome Fund - Correlation Analysis - Q2 2012 to Q1 2022		
	All Months	Negative Months
Fixed Income		
Bloomberg Global Aggregate Bond Index	0.2	0.2
Bloomberg Global Aggregate Credit Index	0.3	0.3
AusBond Government Index	0.3	0.2
AusBond Composite Index	0.3	0.3
Equities		
MSCI World Equity Index	0.2	0.1
S&P 500	0.2	0.1
ASX 200 Index	0.3	0.1

Source: Bloomberg, Ardea analysis

While uncorrelated with broader markets, RV strategies are still exposed to idiosyncratic risk, which means returns vary through time. Since inception in 2012, the Ardea Real Outcome Fund has experienced rolling 1y returns of -3.2% to +9.8% (before fees)[1]. Those periods of higher and lower returns are not distinguishable by broader market regimes such as higher/lower rates or positive/negative risk asset performance. We can, however, highlight three broad factors that impact RV performance:

1) **Extreme low volatility is negative for RV.** A market environment that is likely to be bad for RV alpha is a "Japanification" scenario where central bank intervention and market rates expectations are so low and stable that market volatility collapses across all global interest rate markets. The Japanese government bond market has experienced these conditions in recent years. This was a risk some observers were making in mid-late 2020 for all markets, although as we wrote at the time (see here) conditions were much less Japan-like under the surface.

[1] Past performance is not a reliable indicator of future performance.

2) **Higher rates volatility is generally beneficial, but not always.** The Ardea Real Outcome Fund holds a structural long position in interest rate volatility, which supports performance in this part of the portfolio through volatile periods. However, that uplift from volatility might not always be enough to offset the detraction in other parts of the portfolio, as highlighted in our earlier rates and inflation regime change example of 2021-22. The transition to new market regimes or cycles – often accompanied by higher rates volatility - can cause RV relationships to shift into new trading ranges that are unfavorable. Options and conservative risk sizing limit the magnitude of losses in these environments. As our historical scenarios show, the Ardea Real Outcome Fund has more often seen positive returns in high volatility periods but this won't always be the case. The period after large market stress events can sometimes be good for RV since these disruptions often leave a lot of distortions within as more macro and passive investors focus on broader rates risk levels

3) **RV alpha is structural, but market environments change the mix of opportunities.** Outside of stressed market periods, changing market environments often impact the types of RV exposures, rather than necessarily a better or worse overall opportunity set. We highlight some examples of broader macro rates market environment changes that can influence the mix of RV trades:

   - The amount and composition of government bond issuance. For example, new issuance premiums and bond vs derivative basis tend to rise through high fiscal deficit periods.
   - Central bank asset purchases. QE programs (or the supply of bonds net of QE) can reduce some RV opportunities, especially in more blunt trade expressions, such as bond vs futures basis. However, this environment can actually support other more curve-oriented RV strategies (central banks don't necessarily spread purchases evenly across curves).
   - Central bank liquidity. An increase in QE naturally leads the liability side of central bank balance sheets to expand, which often results in money markets being swamped with liquidity – in turn reducing some money market basis RV opportunities (for example, short-dated cross-currency basis).
   - Expectations of cash rate hikes or rate cuts influence hedging flows in particular segments of rates markets. For example, rate hike expectations might flatten an overall yield curve, driving a change in relative investor flow into money market funds. Also, rate hike or cut expectations influence the size of liability hedging flows, which in turn impacts swap vs bond spreads.

This material has been prepared by Ardea Investment Management Pty Ltd (ABN 50 132 902 722 AFSL 329 828) (Ardea), the investment manager of Ardea Real Outcome Fund (Fund), for wholesale investors only.

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