BNY MELLON

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BNY Mellon **Investor Solutions**

Calendar Year 2023

10-Year Capital Market Assumptions

Key Takeaways

- Volatile markets and asset repricing during 2022 have driven significant changes to our 2023 forecasts relative to our 2022 outlook.
- The majority of our 2023 10-Year Capital Market Assumptions (CMAs) forecast higher expected returns across most asset classes when compared to 2022 assumptions (see Exhibit 1).
- Equity market expected returns have increased due to slightly higher long-term growth rates and upward valuation adjustments (most notably in emerging markets).
- Fixed income asset class expected returns have reverted to levels not seen in many years, significantly higher when compared to 2022 given the dramatic increase in global bond yields.
- Alternative asset class expected returns are generally higher and in line with publicly traded markets on a risk-adjusted basis plus incremental return for alpha and illiquidity.

Overview

On an annual basis, BNY Mellon Investor Solutions, LLC develops capital market return assumptions (CMAs) for approximately 50 asset classes around the world. The assumptions are based on a 10-year investment time horizon and incorporate the macroeconomic forecasts generated by BNY Mellon Investment Management Global Economic and Investment Analysis Group. The return and risk assumptions are intended to guide investors in the development of long-term strategic asset allocations.

Slowing global economic growth and the persistence of elevated inflation have weighed heavily on market returns in 2022. With limited evidence of victory in their battle against inflation, monetary policymakers have remained resolute in their hawkish view and continue with tightening monetary policy. There have been few "safe-haven" assets in 2022, regardless of asset class, geography, market cap, style, credit quality and/or duration. However, looking forward, the increased market volatility and asset repricing during 2022 have driven notable changes to our 2023 forecasts relative to our forecasts just a year ago.

Exhibit 1: Snapshot of 2023 vs. 2022 10-Year Capital Market Return Assumptions

		2023		2022	
		Expected Return	Standard Deviation	Expected Return	Standard Deviation
Equity Markets	U.S. Equity	6.5%	18.0%	5.9%	17.4%
	International Developed	6.9%	17.1%	5.8%	17.4%
	Emerging Markets	9.3%	20.0%	7.6%	21.2%
Fixed Income	U.S. Aggregate	4.1%	4.3%	1.2%	3.4%
	U.S. High Yield	6.2%	9.4%	1.9%	9.0%
	U.S. Intermediate Municipal	2.8%	4.3%	0.9%	3.8%
	Global Agg. Ex-U.S.	3.0%	7.9%	0.3%	7.3%
	EM Local Currency	4.0%	9.5%	3.8%	9.8%
Alternatives	Absolute Return	4.3%	5.0%	3.2%	5.2%
	Hedge Funds	4.9%	6.9%	3.9%	7.0%
	U.S. Private Equity	8.2%	21.3%	7.9%	20.5%
	U.S. Core Real Estate	6.0%	8.5%	4.7%	8.1%

Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

A Time-Tested Approach That Approximates Real-World Results

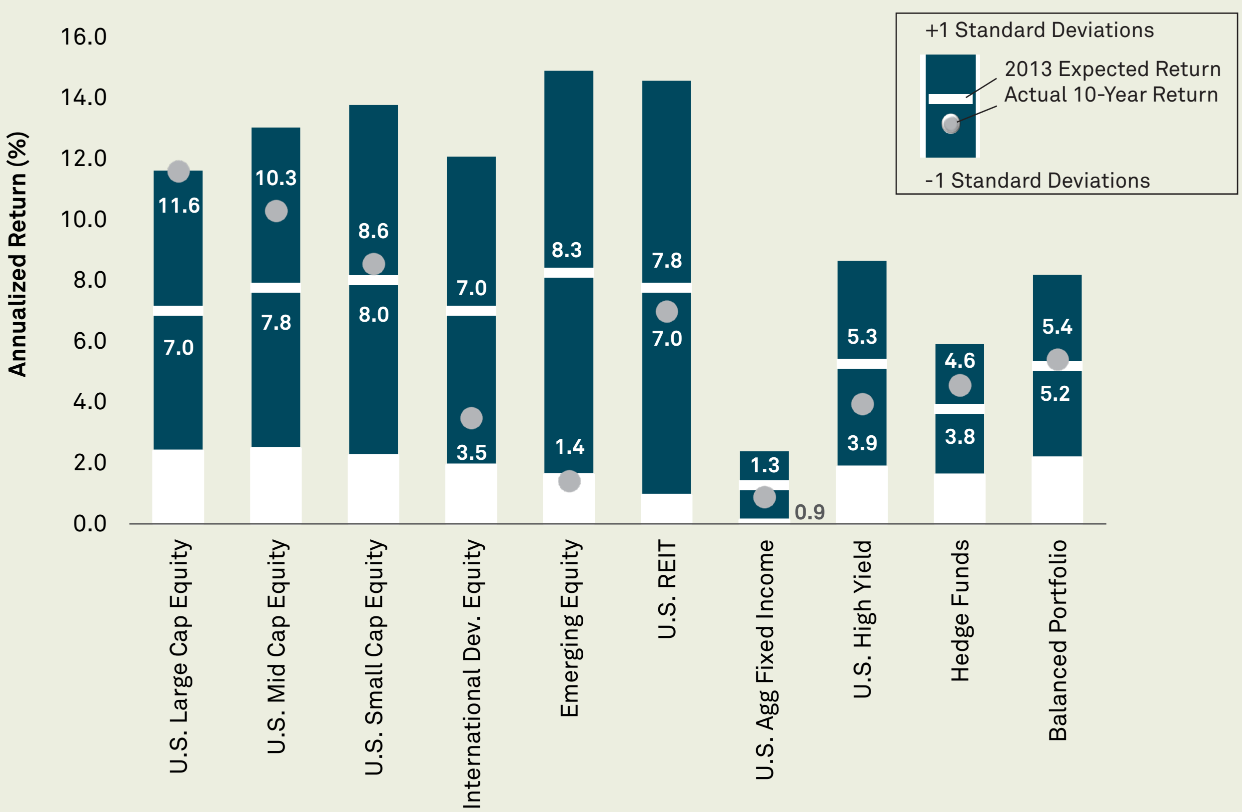
For decades, BNY Mellon has developed capital market assumptions to guide our institutional and high net worth clients in structuring their long-term asset allocations. In our opinion, capital market forward-looking return expectations must be validated against realized market returns. We continually look back and test our assumptions to assess accuracy, and improve our methodology.

Over the past five calendar years, we have back-tested our methodology and found that our 10-year projected returns, with the exception of emerging market equities (where we were too optimistic), were a close representation of actual returns for most asset classes. Exhibit 2 shows a comparison between our published 2013 capital market assumptions and actual returns over the past 10 years. The white lines represent our expected returns from 10 years ago, with the top and bottom of the bars representing plus and minus one standard deviation from the expected return. Actual returns over the past 10 years are represented by the circles. As the chart demonstrates, actual returns for each asset class (except emerging markets equities) and our expected returns fell within the one standard deviation range. Actual returns for U.S. equity were generally higher than expected, and the opposite held true for emerging markets equity. Expected returns for fixed income were extremely close to actual returns. Hedge funds slightly outperformed expectations, although we acknowledge there is significant dispersion with individual hedge fund returns relative to the broad HFRI Index.

Most importantly, the analysis also demonstrates the value of how CMAs are used for the construction of diversified portfolios. A balanced portfolio, based on our estimate of a "typical" institutional investment portfolio comprised of 55% equity, 30% fixed income, and 15% alternatives, had an expected return of 5.2% compared to the actual return of 5.4%. Though certain asset classes – especially those with high volatility – can be challenging to predict individually, a well-diversified portfolio can be relatively predictable over the long term.

The balanced portfolio presented herein is not representative of a specific strategy managed by BNY Mellon Investor Solutions, LLC as of the date of this publication and is not intended to constitute an advertisement of a specific BNY Mellon Investor Solutions, LLC product or service; instead, all information, content, and materials are for general informational purposes only.

Exhibit 2: 2013 Capital Market Return Assumptions vs. Actual 10-Year Returns Ending 9/30/2022



Source: BNY Mellon Investor Solutions, Bloomberg. Data as of September 30, 2022.

The remainder of the document discusses broad market themes/trends to watch, outlines the assumptions in depth and provides supporting details behind the numbers. We hope you find our 2023 10-Year Capital Market Return Assumptions both interesting and insightful.

Key Themes for the Next Decade

There is a multitude of themes and trends, on both the short and long-term horizon, that may notably impact capital market returns and risk in the years to come. To what degree these themes ultimately shape future asset returns remains to be seen. But this uncertainty further supports the need for investors to consider robust portfolio design to navigate long-term unforeseen circumstances over traditional mean variance-driven outcomes that assume all inputs are known perfectly in advance.

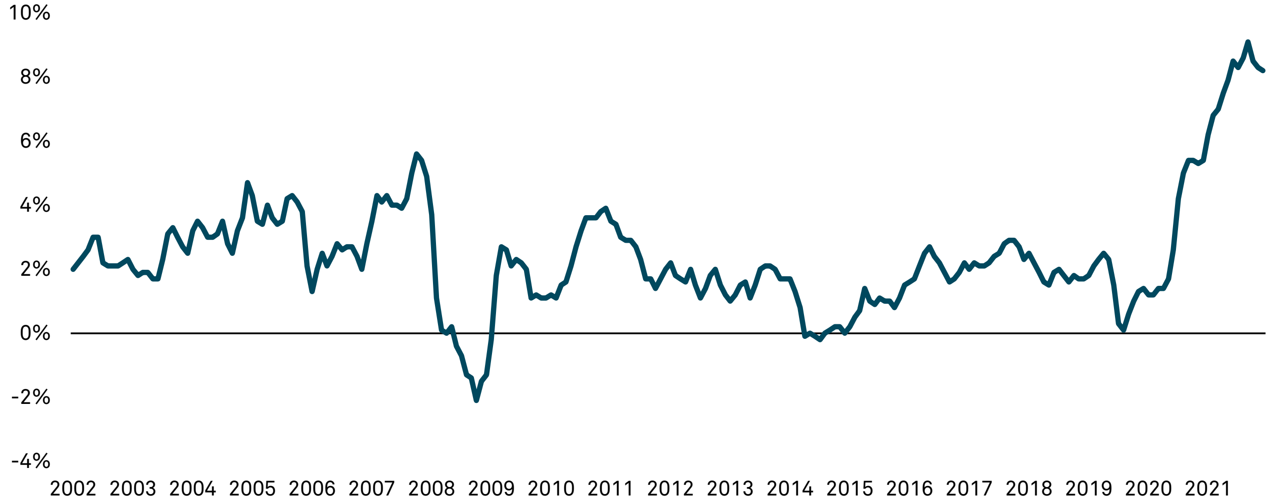
Key Takeaways

- Continued geopolitical tensions will likely result in further deglobalization and reshoring, impacting variable costs, inflation, corporate margins and investor returns.
- The complex, uncertain and systemic nature of ESG issues makes it challenging to quantify top-down. In short, it is still too early to accurately assess the impact of ESG issues from a top-down strategic asset allocation perspective.
- The long-term impact of these broader themes on asset returns and risk levels will continue to be evaluated by investors and ultimately remains to be seen.

Geopolitical Tensions and Inflation

The policy shift by the Federal Open Market Committee (FOMC), to average inflation targeting in August 2020, was introduced with the understanding that inflation would likely run above 2% for some time as an offset to lower inflation readings in preceding years. While facing increasing levels of inflation in early through mid-2021, the Fed further asserted in its statements that inflation would be transitory due to the confluence of pent-up demand and supply chains still in recovery from global covid pandemic lockdowns. Early in 2022, major economies began reporting historic levels of year-over-year (YoY) inflation. The U.S. Consumer Price Index (CPI) touched a 40-year high (see Exhibit 3), which was further exacerbated by Russia's invasion of Ukraine.

Exhibit 3: U.S. CPI, 12-Month Percentage Change, Not Seasonally Adjusted



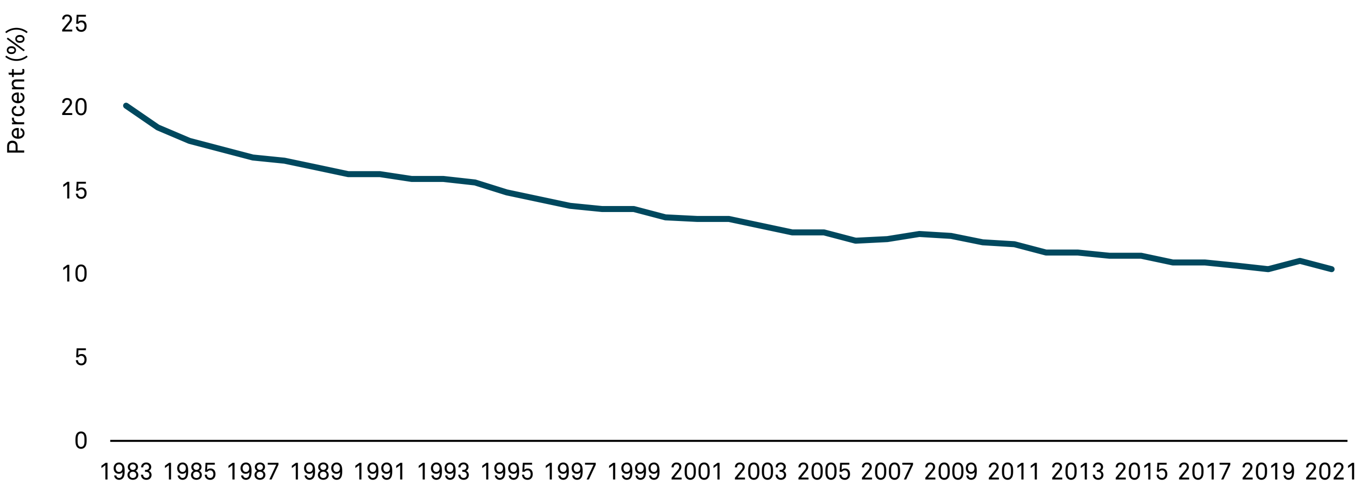
Source: Bureau of Labor Statistics. Data as of September 30, 2022.

The rapid escalation of the Russia/Ukraine war led to immense market volatility following unprecedented sanctions from numerous G7 countries. The United Kingdom and Europe, net importers of energy and heavily dependent on Russian supply, vowed to reduce dependency on Russian exports. These new restrictions and policy shifts resulted in a historic surge in energy and, in turn, consumer prices that were already at multi-decade elevated levels. These supply-driven inflationary pressures from left tail risk events – in the form of geopolitical tensions and supply chain woes – were and continue to be largely out of the control of major central banks.

Tight labor markets have added to the inflationary narrative and monopolized 2022 headlines, becoming the focal point for major central banks seeking to ease demand. Within the U.S., unemployment reached a historic low of 3.5% in tandem with a startling number of job openings that was nearly double the number of unemployed workers.

As central banks continue their tightening cycle, we expect this worker shortage to normalize as the economy slows; however, the labor environment has generally allowed workers more leverage when negotiating compensation and benefits. Among many notable impacts is an increase in unionization efforts for labor forces within multiple large corporations during 2022.[1] Even though the U.S. is far from its peak of employee union membership in the early 1980s (see Exhibit 4), an upward trend of reshoring could see a rise in unionization and increase labor costs.

Exhibit 4: Share of Wage and Salary Workers (16 and Over) Who Are Members of Unions



Source: Bureau of Labor Statistics. Data as of December 31, 2021.

The tenuous geopolitical environment of 2022 accelerated efforts by international companies to reduce the impact of conflict and political discourse on supply chains. The uncertain risk of importing natural resources from emerging market countries has shifted the need for corporations to reshore production, with agility and reliability among the drivers of change. Consequently, reestablishing manufacturing domestically for international companies will likely lead to higher labor costs and potentially tighter corporate margins. Although the reduced volatility of variable costs may correlate to more predictable costs of goods sold, the increased costs of labor may lead to higher prices for consumers as companies seek to pass through increased input prices to maintain margins.

[1] Harrison, D., Haddon, H. (2022, July 12). Union Organizing Efforts Rise in First Half of Year. Wall Street Journal.

If the trend of deglobalization and reshoring persists, we believe long-term inflation may trend higher than the 2% average the Fed is aiming for. The retreat of corporations and sovereign nations from the reliance of foreign natural resources by the U.S. and other developed market countries may put pressure on emerging market countries once supply chains normalize. This could reduce variable cost volatility and may increase corporate margins.

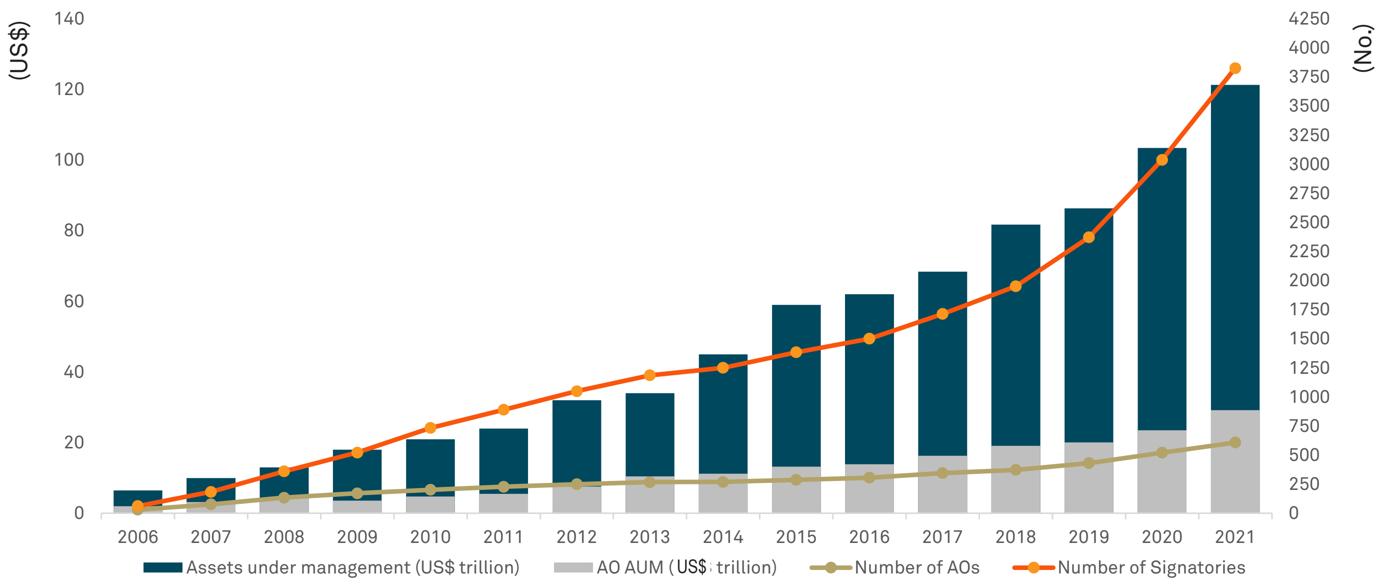
Responsible Investing[2]

According to the U.S. Forum for Sustainable and Responsible Investing (USSIF), assets under management in the U.S. that incorporate any form of Environmental, Social and Governance (ESG) considerations, grew 42% from 2018 to 2020 to $17.1 trillion.[3]

In addition, the Global Sustainable Investing Alliance (GSIA), an international collaboration of membership-based sustainable investing organizations, reported in its 2020 Global Sustainable Investment Review[4] that sustainable investment assets under management reached USD 35.3 trillion, representing 36% of all professionally managed assets across regions covered by the report.

Since this data was reported, an unprecedented pandemic, heightened social inequity issues and a global geopolitical crisis have all arguably increased the pressure on Corporate America to focus on ESG issues, particularly inclusive work practices and a transition to a low-carbon economy. Governance & Accountability Institute's 2021 Sustainability Reporting in Focus report stated that 92% of S&P 500 companies and 70% of the Russell 1000 companies published a Sustainability report in 2020.[5] Separately, the United Nations backed Principles of Responsible Investing, the world's largest voluntary sustainability initiative, has reached 4000 signatories, including leading asset owners, asset managers and other service providers committed to incorporating an assessment of ESG issues in their investment processes. Over 2021, the number of PRI investor signatories increased by 26%, while the collective AUM represented by both the investor signatories and service providers increased by 17%.[6]

Exhibit 5: Sustainable Investing Assets Under Management and PRI Signatories



Source: US SIF 2020 Report on U.S. Sustainable, Responsible and Impact Investing Trends.

[2]At BNY Mellon Investor Solutions, we refer to Responsible Investing as an umbrella term encompassing all forms of approaches clients can utilize to evaluate ESG considerations, or their sustainability and/or impact objectives alongside their investment goals.

[3]U.S. SIF Report on U.S. Sustainable and Impact Investing Trends 2020.

[4]Global Sustainable Investment Review 2020.

[5]G&A 10th Anniversary Report Finds All-Time Highs for Sustainability Reporting of Largest U.S. Public Companies November 2021.

[6]PRI Annual Report 2021.

Even with all this momentum, most traditional efforts to incorporate ESG issues in the investment process have been a bottom-up process (e.g., at the security, company or manager level). The efforts to assess ESG from a top-down strategic asset allocation perspective are still nascent, largely due to the limitations and challenges around lack of standard disclosure and poor quality of ESG data.

In the case of climate risks assessment, there have been attempts to assess the impact of climate risks from a top-down perspective. The Task Force on Climate-related Financial Disclosures (TCFD) recommendations also suggests investors undertake climate scenario analysis[7] as one of the key elements. Much of the climate scenario analysis is currently based on specialized third-party data providers that are attempting to assess potential impact of climate risks (e.g., policy changes, stranded assets, extreme weather events, etc.) on asset values both at the asset class and industry/sector levels.

Certain asset classes may be more exposed to physical climate risks (e.g., infrastructure or real estate that is highly exposed to changes in coastal water levels or adverse climate events). Some sectors may be more exposed to regulatory risks, such as energy or utilities, especially if companies in these sectors do not have an adaptation strategy. Adaptation and mitigation strategies may also put inflationary burden on companies and, in some cases, not having these strategies in place could increase the cost of capital for some companies. Physical climate risks could also impact creditworthiness of fixed income issuers, more so in high yield debt or emerging markets. On the other hand, some private asset classes (e.g., private infrastructure) may benefit from increased investment in renewables.

Climate risks also intersect with social inequity issues. Unfortunately, those impacted the most by climate change are typically those with the fewest resources to respond to it (e.g., flooding, drought, etc.). Extreme weather events pose increasing challenges for the most poor and vulnerable communities in terms of health, food, water, livelihood, forced migration, etc.[8]

The complex, uncertain and systemic nature of ESG issues makes it challenging to quantify top-down. In short, it is still too early to accurately assess the impact of ESG issues from a top-down, strategic asset allocation perspective. At BNY Mellon, we continue to be keenly aware of the rapidly evolving Responsible Investing landscape and bring the best thinking to our long-term assessment of risks and opportunities for client portfolios.

[7]The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities. June 2017.

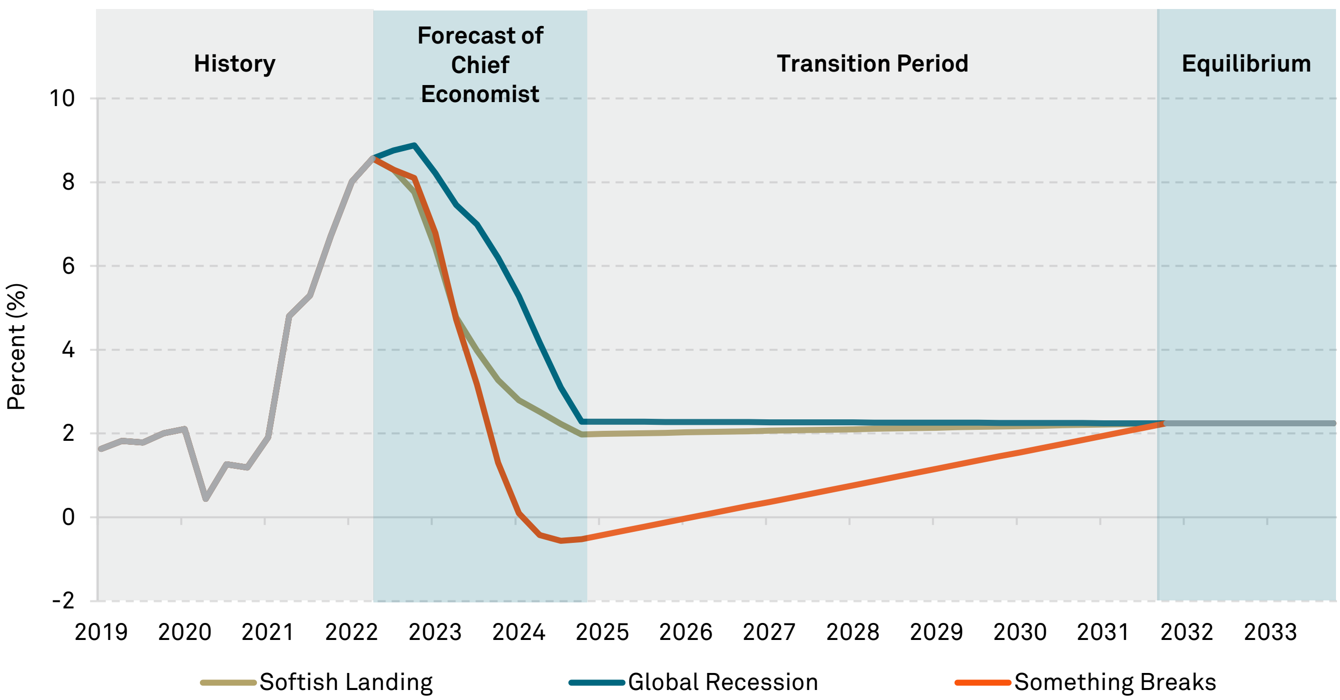
[8]The World Bank: Social Dimensions of Climate Change. Copyright 2022.

Economic Forecast Methodology for the Capital Market Assumptions

Our macroeconomic projections are central to our building-block approach used for generating expected returns of major asset classes. Our long-term projections for GDP growth, inflation and short-term rates begin with three-year forecasts based on a range of outcomes developed by the BNY Mellon Investment Management Global Economic and Investment Analysis Group. We then assume, as illustrated in Exhibit 6, that the building blocks converge toward a steady-state equilibrium based on long-term market consensus expectations.

Our methodology allows us to generate expected returns under multiple macroeconomic scenarios and time horizons. Though our capital market assumptions are based on a 10-year horizon, the forecast period can be adjusted to generate returns over a shorter horizon, such as five years, or longer-term horizons of 30 years or more.

Exhibit 6: Historical and Projected U.S. Consumer Price Index (CPI), Four Quarter Percentage Changes



Source: BNY Mellon Investor Solutions, BNY Mellon Investment Management Global Economic and Investment Analysis Group: Vantage Point, Q4 2022.

Macroeconomic Backdrop

When building capital market assumptions, we start with projections of inflation, real GDP growth, short-term interest rates and currency rates. Inflation and real GDP growth are key drivers of our expected earnings growth for equity. Projections of inflation and real cash rates are extremely influential in projecting fixed income yields and returns.

The economic projections underpinning our asset class return assumptions are based on three economic scenarios outlined in BNY Mellon Investment Management's *2022 Q4 Vantage Point*. These scenarios are summarized in Exhibit 7. We develop return expectations under each of these scenarios, then probability weight the returns to determine our overall "expected" return. This approach allows us to not only analyze portfolios based on the expected case, but also to shock the portfolio under the various scenarios. We encourage you to read the latest Vantage Point to learn more about our economic projections.

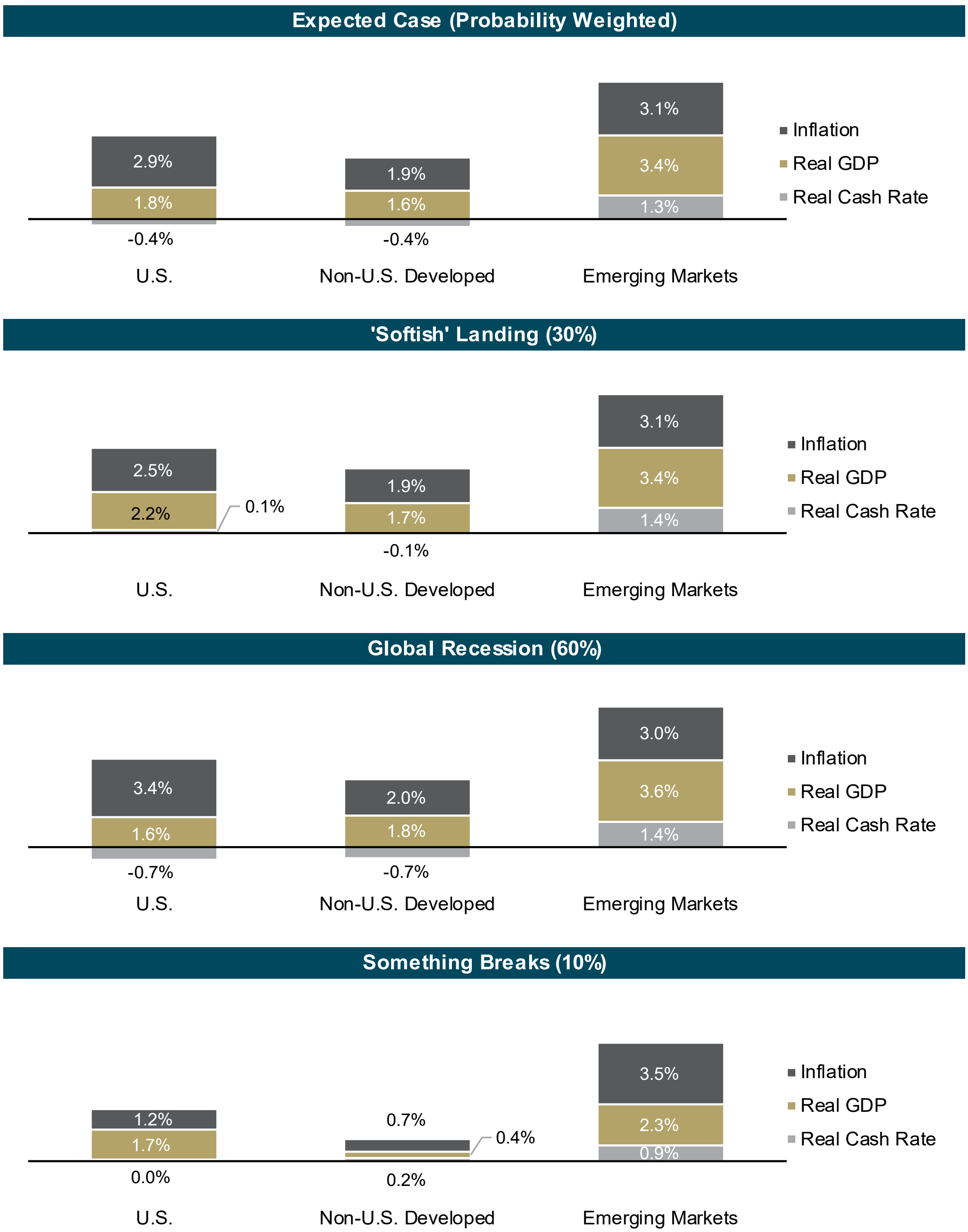
Exhibit 7: Summary of Macroeconomic Scenarios

30% Probability	**60% Probability**	**10% Probability**
'Softish' Landing	**Global Recession**	**Something Breaks**
• Global financial conditions tighten only gradually as rate hikes slow, policy divergence cools, USD strengthening wanes, market liquidity stabilizes • Disinflationary stars align perfectly for major economies, led by supply-side improvements • Tight U.S. labor markets loosen with reduced job offers, but no significant jump in unemployment • Europe imposes price-caps on gas and rapidly substitutes away from Russian energy supply and ECB slows its pace of rate hikes • Wage increases subside, inflation expectations normalize in the U.S. and in Europe • China eases zero-Covid policies • Ukraine conflict is contained, with continuing reduction in food/ commodity prices	• Europe slumps into a recession due to deepening energy shock - made worse by a messy energy and fiscal policy response as well as aggressive monetary tightening • U.S. labor markets crack and unemployment rises steeply on more than expected Fed tightening • China's zero-Covid stringency does not ebb and authorities struggle to keep the property sector afloat and domestic demand from crumpling • Interest rates stay higher for longer, and any dovish pivot in monetary policy is pushed out to 2024 or beyond	• Hawkish policy tightening by the Fed materially weakens the U.S. labor market and exposes unforseen vulnerabilities in the U.S. and global economies • Aggressive ECB tightening triggers a European debt crisis • China encounters a banking crisis as domestic demand and confidence is undermined by inadequate countercyclical policies and structural adjustment • Russia-Ukraine war escalates, energy prices spike much higher on threat of nuclear conflict • Aggressive developed market policy-tightening or geopolitical crisis expose global economic and financial vulnerabilities

Note: Percentages represent projected probabilities of each scenario occurring. The economic scenarios are provided by the BNY Mellon Global Economics and Investment Analysis team. Please refer to the Q4 2022 *Vantage Point* publication for the full analysis behind each economic scenario.

Three of the most critical economic metrics for developing our return assumptions are inflation, real GDP growth and real short-term interest rates/cash rates. Inflation and real GDP growth are key drivers of the expected earnings growth for equity. Projections of inflation and real cash rates are extremely influential in projecting fixed income yields and returns. Exhibit 8 outlines our projections for these primary buildings in the expected case and under the three macroeconomic scenarios outlined above.

Exhibit 8: 10-Year Annualized Projections of Inflation, Real GDP Growth and Real Cash Rates

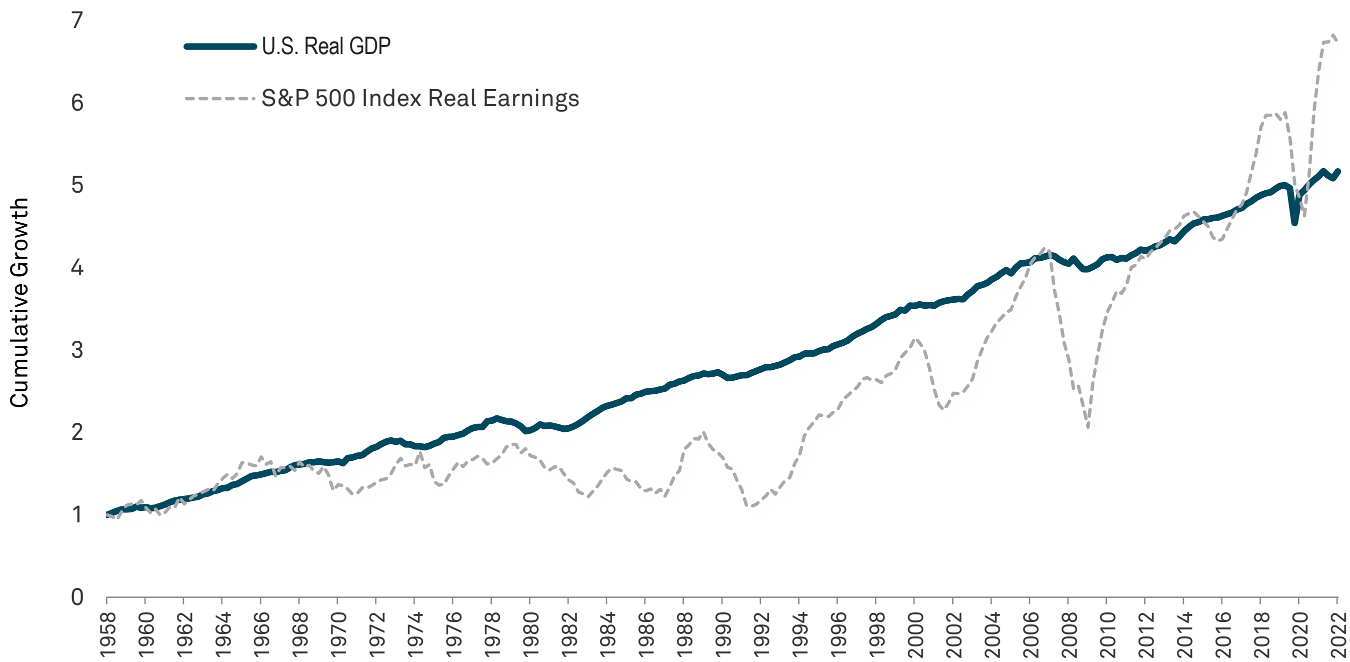


Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

Equity Markets

Our equity assumptions are developed through a building-block approach consisting of inflation, real earnings growth, income return, valuation and currency adjustments. As a baseline assumption, we assume that real corporate earnings growth will be consistent with our projections for real GDP growth. As Exhibit 9 indicates, there has historically been a reasonably strong relationship between corporate earnings growth and GDP growth over a long-term time horizon.

Exhibit 9: U.S. GDP vs. Cumulative Corporate Earnings Growth



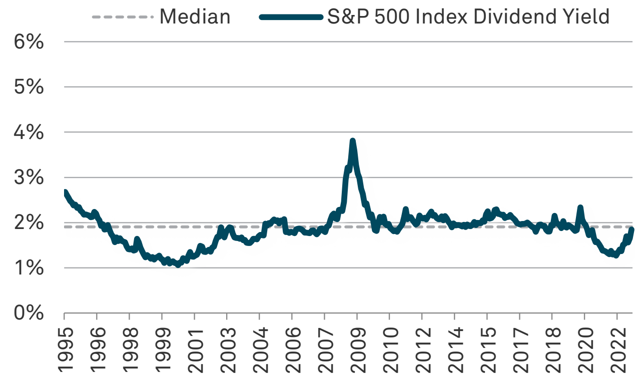
Source: BNY Mellon Investor Solutions, Bloomberg. Data as of September 30, 2022.

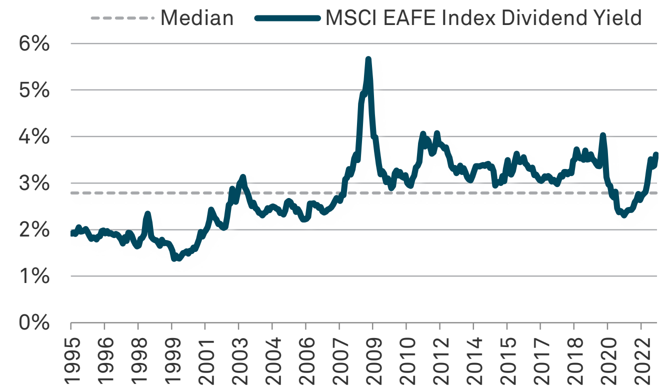
In the U.S., developed markets outside of the U.S. and emerging markets, we anticipate real earnings growth will be in line with our regional real GDP growth expectations. We anticipate real earnings growth of 1.8% in the U.S., 1.6% in the developed markets outside of the U.S. and 3.4% in emerging markets.

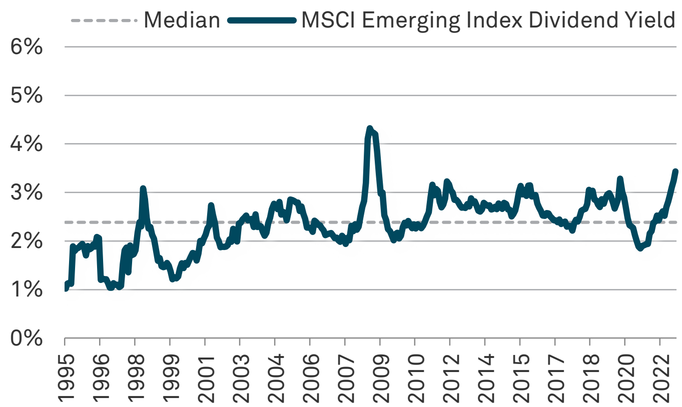
Dividend Yield

Over the next 10 years, we expect dividend yields to be a blend of historical average yields and current yields in the market. We anticipate dividend yields of 1.8% in the U.S., 2.8% in the developed markets outside of the U.S. and 2.3% in emerging markets. These figures are in line with the long-term average dividend yields as shown in Exhibit 10 and current dividend yields.

Exhibit 10: Historical Dividend Yield





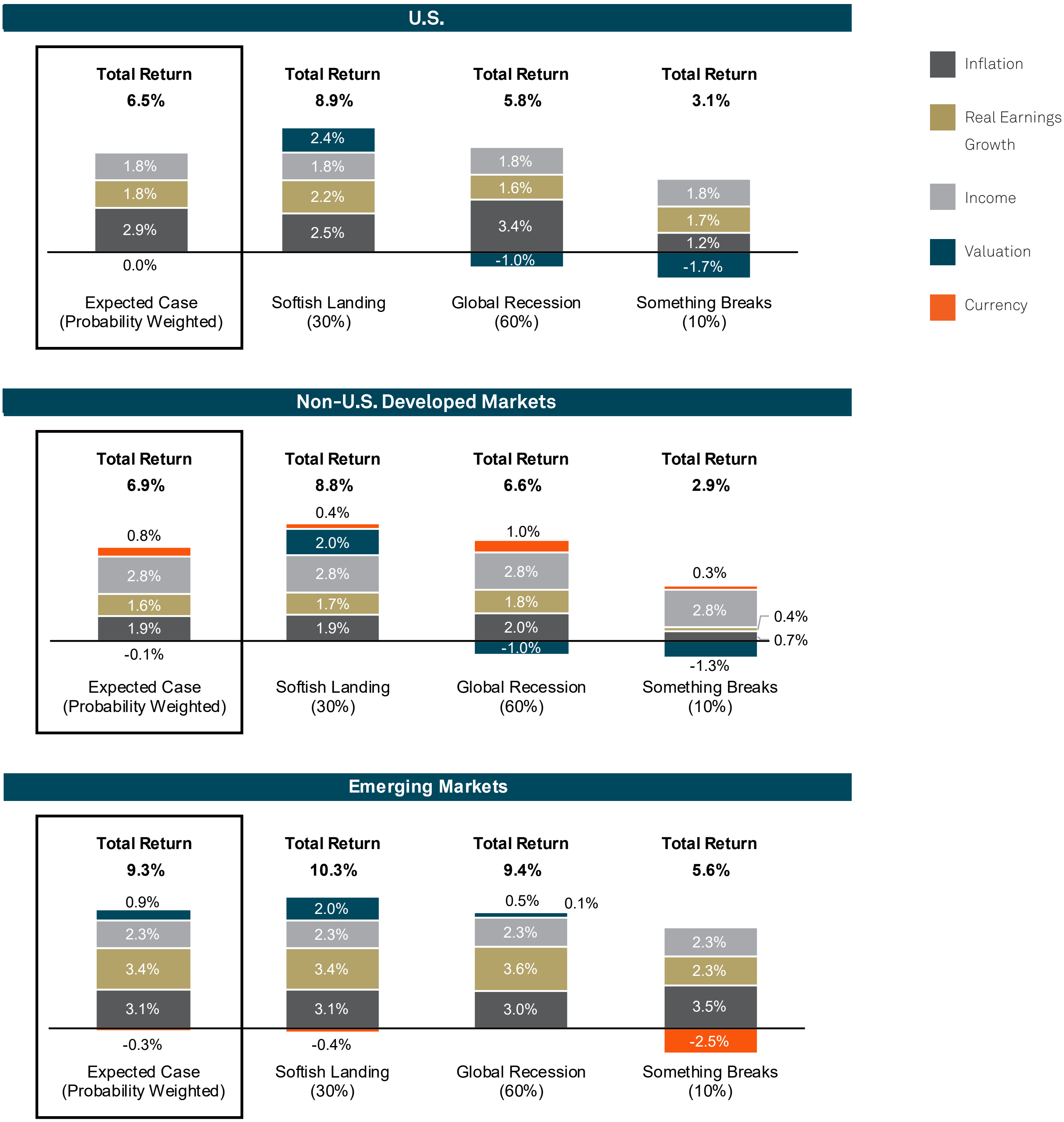


Source: BNY Mellon Investor Solutions, Bloomberg. Data as of September 30, 2022.

Once the primary equity building blocks of inflation, real earnings growth and income are established, we then adjust long-term returns for valuation and currency projections. Based on the three macroeconomic scenarios, we made a moderate adjustment for valuation (emerging markets) and currency shifts (non-U.S.). Exhibit 11 illustrates the equity market building blocks and return expectations under the three macroeconomic scenarios and the probability-weighted expected case.

In the U.S., we see a total expected return of 6.5% consisting of 2.9% inflation, 1.8% real earnings growth, 1.8% income and a negligible valuation component. For developed countries excluding the U.S., we see a total expected return of 6.9% consisting of 1.9% inflation, 1.6% real earnings growth, 2.8% income, negligible valuation adjustment and currency appreciation of 0.8%. For emerging markets, we see a total expected return of 9.3% consisting of 3.1% inflation, 3.4% real earnings growth, 2.3% income, 0.9% valuation adjustment and currency depreciation of -0.3%.

Exhibit 11: 10-Year Equity Market Expected Returns (in USD)



Source: BNY Mellon Investor Solutions. Data as of September 30, 2022. Numbers may not add up due to rounding.

Fixed Income Markets

Our fixed income return assumptions are derived from analyzing current yields in the market, projecting yields based on our three macroeconomic scenarios, reducing returns due to anticipated defaults and finally adjusting due to currency fluctuations.

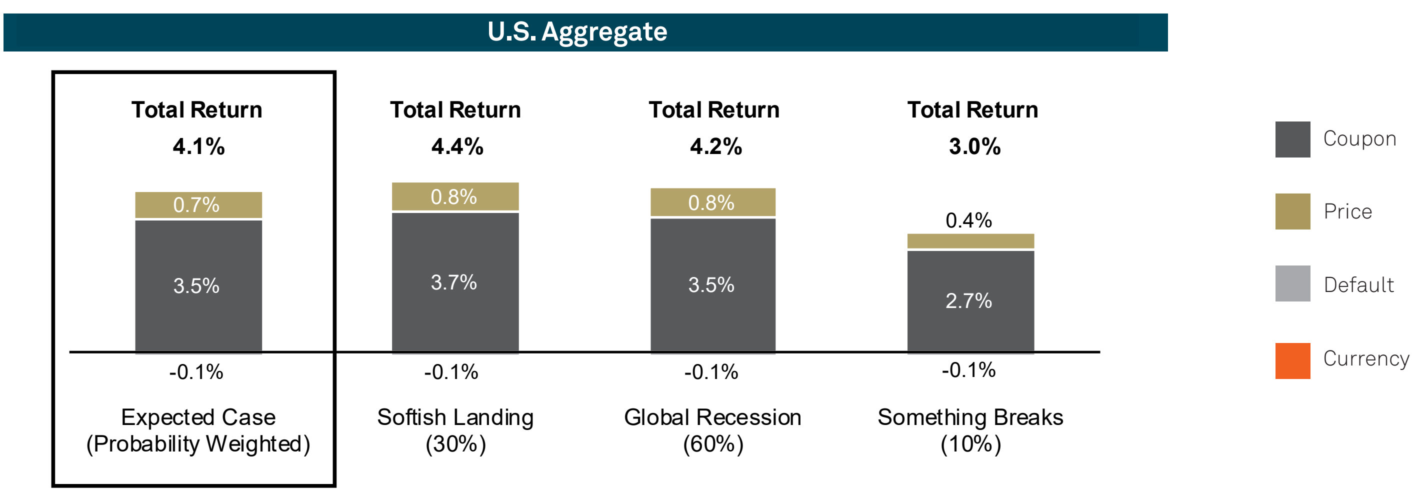
To forecast short-term interest rates, slope of the yield curve and credit spreads in the intermediate term (three years), we rely on the projections of our Chief Economist for several macroeconomic scenarios. Beyond the intermediate term, we assume these factors will migrate to market consensus expectations or to long-term historical averages.

For short-term interest rates in the U.S., we see a range of 0.25% to 4.25% over the next three years depending on the macroeconomic scenario. Beyond three years, we see short-term interest rates gradually migrating to long-term consensus expectations of 2.4%. For the U.S. 10-year Treasury note, we see a range of rates over the next three years of 1.1% to 3.9% with eventual migration to a long-term rate of 3.1% in 10 years.

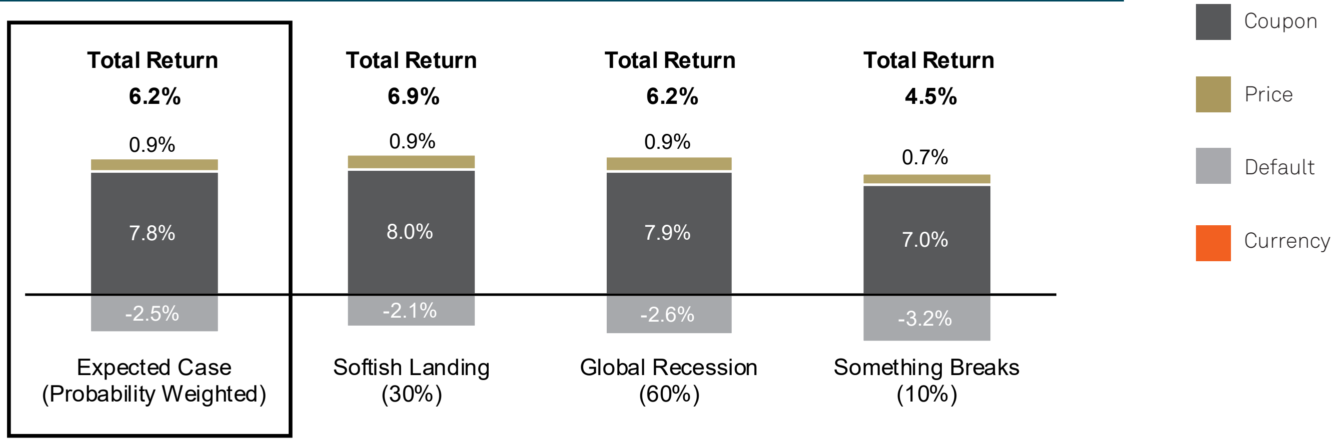
Regarding credit risk, we see U.S. investment-grade credit spreads in a range of approximately 160 to 310 basis points over the next three years depending on the scenario. Over the long-term, we assume credit spreads migrate to historical long-term averages that are adjusted to eliminate skewing from extreme events such as the global financial crisis. For our baseline economic scenario, we assume default and recovery rates will be in line with historical long-term averages. For our pessimistic economic scenarios, we have increased default rates by as much as 50%.

Summarized in Exhibit 12 are the results of our fixed income return projections along with underlying components of return. In general, we project notably higher fixed income returns for most asset classes primarily due to higher yields in 2022 compared to 2021. In U.S. Aggregate, we expect a return of 4.1% over the next 10 years. For U.S. high yield, we see an expected return of 6.2%. We also see higher returns of 3.0% for Global Aggregate Ex-U.S. There will be some benefit due to an expected weakening U.S. dollar relative to other developed currencies. Emerging markets (EM) local currency is up slightly compared to the capital market assumptions with an expected return of 3.9%.

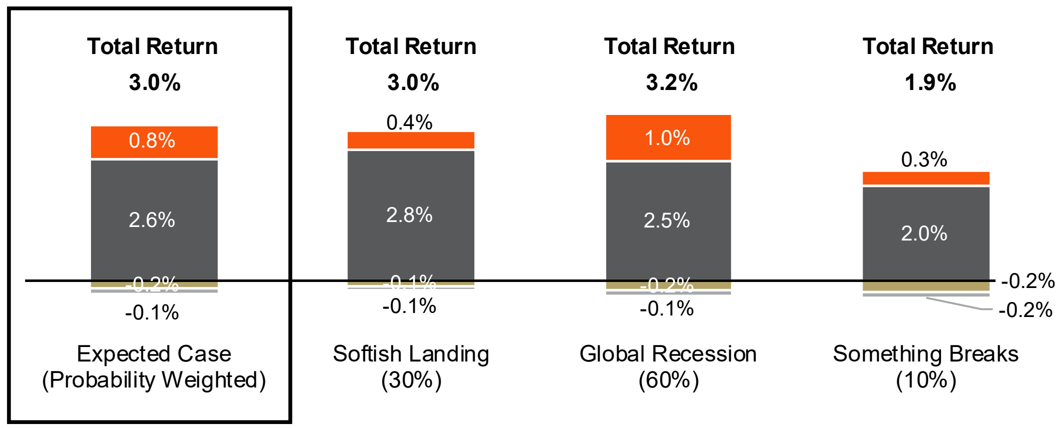
Exhibit 12: 10-Year Fixed Income Market Expected Returns (in USD)



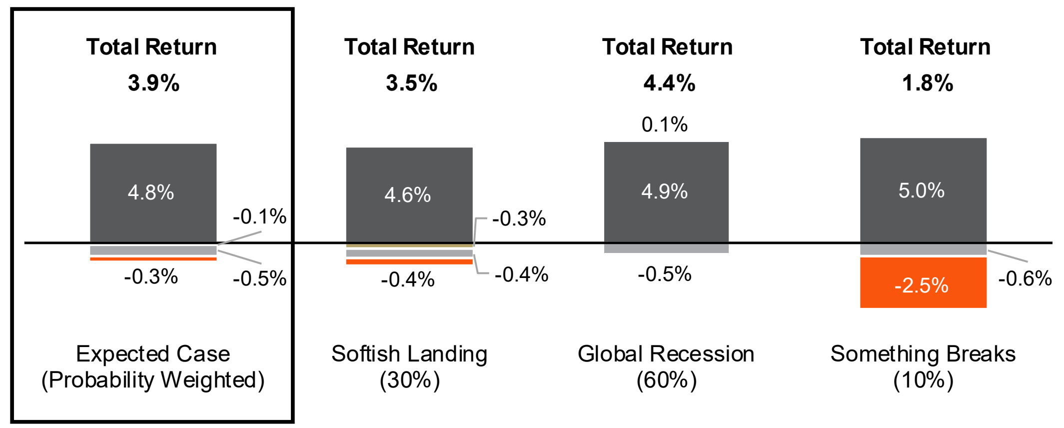
U.S. High Yield



Global Aggregate Ex-U.S.



Emerging Markets Local Currency

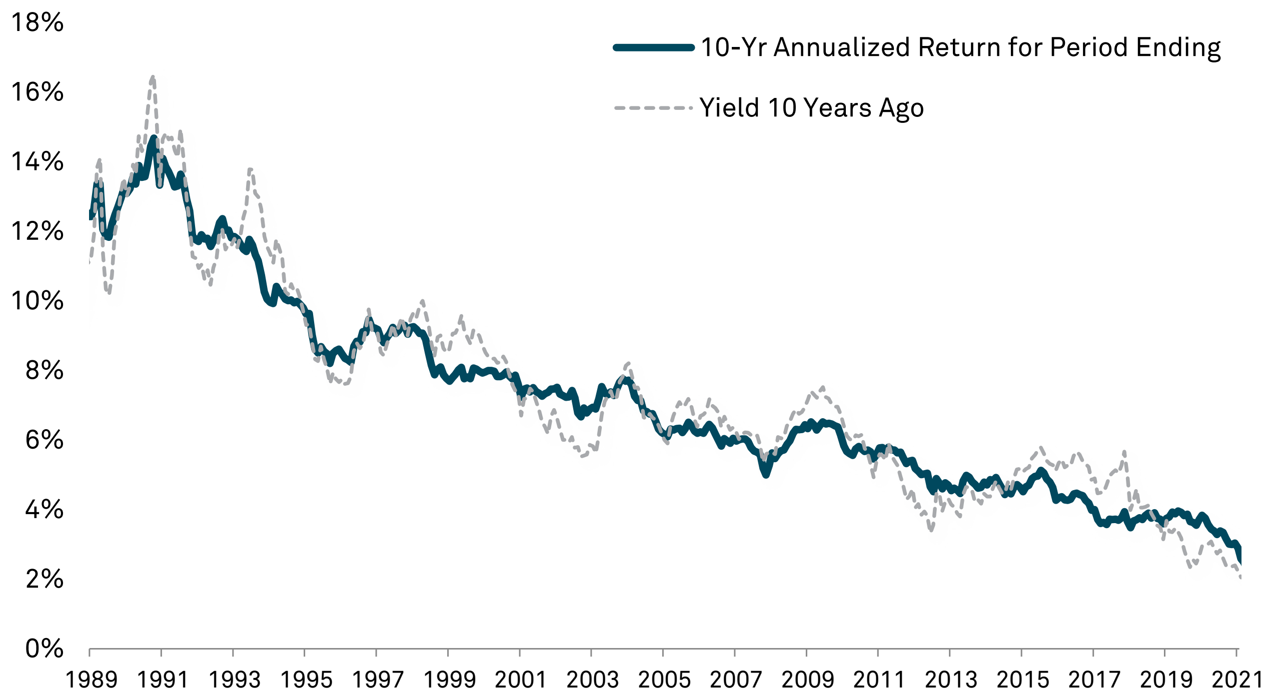


Source: BNY Mellon Investor Solutions. Data as of September 30, 2022. Numbers may not add up due to rounding.

Comparing Fixed Income Returns to Yields

One technique to affirm our expected return assumptions for fixed income is to compare the returns to current yields in the market. Regardless of where projections indicate yields may go in the future, current yield has historically been a relatively strong indicator of future returns within fixed income. To demonstrate this point, Exhibit 13 shows rolling 10-year annualized returns of the Bloomberg Barclays U.S. Aggregate Index and compares those returns to the yield of the index at the beginning of the 10-year period. We have witnessed significant rate movements over the past 30 years, but the return of the U.S. bond market over 10 years is consistent with the yield of the market at the start of the period. Rarely is the difference more than +/- 1%. With current yields,[9] one should be skeptical of expected returns for U.S. bonds being significantly different than 4% to 5% based on a 10-year horizon. Our expected return for U.S. Aggregate is 4.1% over a 10-year horizon.

Exhibit 13: U.S. Aggregate Index Returns vs. Starting Yields

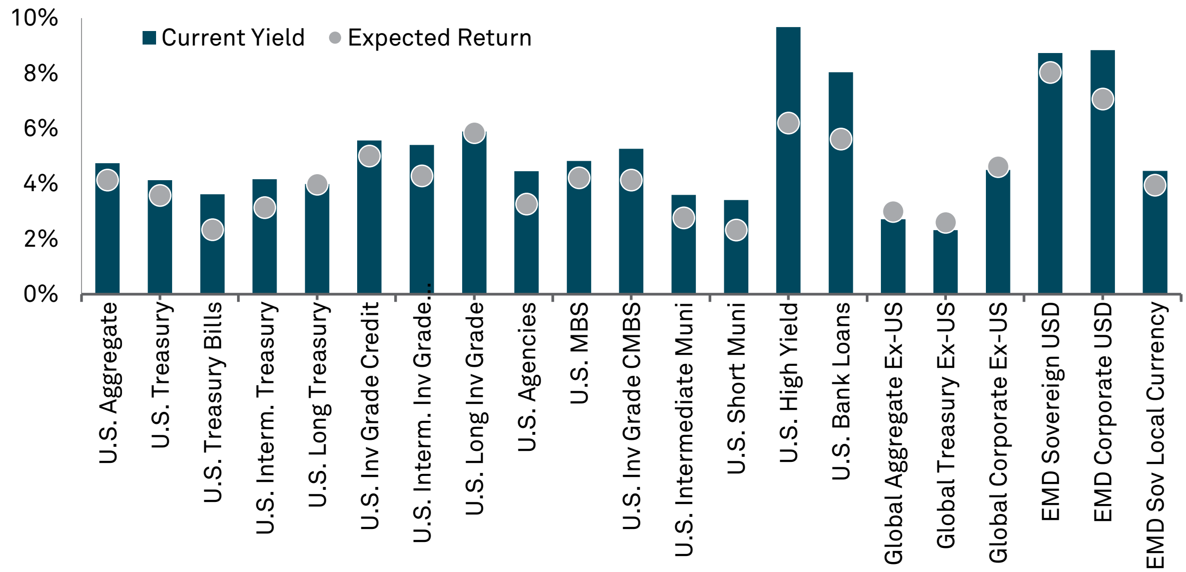


Source: BNY Mellon Investor Solutions, Bloomberg Barclays. Data as of September 30, 2022.

In Exhibit 14, we compare current yields across many fixed income sectors to our expected return assumptions. For most asset classes, the expected return is generally consistent with the current yield. One major exception is high yield fixed income and bank loans, where defaults result in a return less than the current yield.

[9]Current yields were 4.8% as of September 30, 2022.

Exhibit 14: Current Fixed Income Yields vs. Expected Returns



Source: BNY Mellon Investor Solutions, Bloomberg Barclays. Data as of September 30, 2022.

Alternatives

We believe expected returns for alternative asset classes will generally be in line with publicly traded markets on a risk-adjusted basis, plus incremental return for alpha and liquidity. Manager skill is a critical component in this asset class, so an investor's selection of individual managers is of utmost importance. Our expectations below relate to the asset class in aggregate.

To calculate risk-adjusted returns, we first determine the beta of the asset class relative to public markets based on our expectations of return, standard deviations and correlations. We apply the beta to the public-market expected return to determine the expected return of the alternative asset class. For private markets, we add additional return to account for illiquidity. For hedge funds and other alpha-oriented asset classes, we add additional return to reflect the residual risk not captured by market returns. The additional return assumes an information ratio of 0.3 multiplied by the residual risk.

Exhibit 15 provides a summary of expected real returns (expected return in excess of expected inflation) for primary asset classes. The exhibit also compares how our expected real returns have changed from the 2022 assumptions to the 2023 assumptions. We have seen a substantial shift within fixed income, where an expected flat or positive returns after inflation is nobly different from expectations in 2022.

We point this out in our description of alternative investments because we believe alternatives should continue to play a much greater role going forward for long-term investors. While the traditional risk anchors of fixed income are now expected to generate flat or moderately positive real returns, investors should continue to evaluate additional strategies to complement fixed income. Taking advantage of liquidity premiums in areas such as private equity may be attractive to improve equity diversification and boost long-term potential returns.

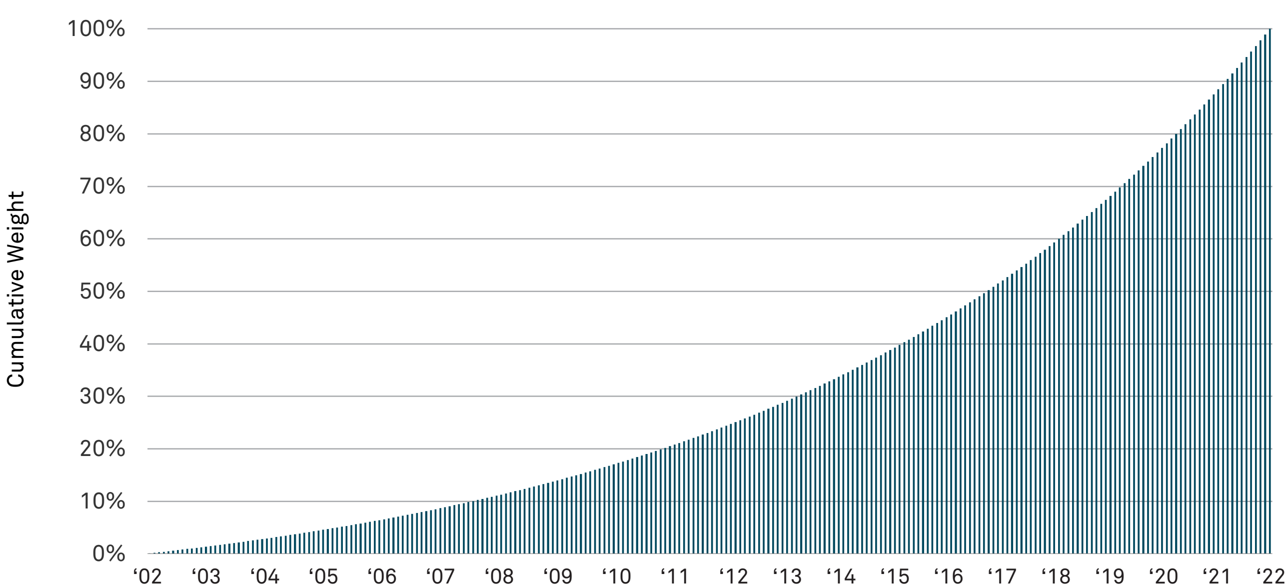
Exhibit 15: Asset Class Expected Real Return

Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

Standard Deviations and Correlations

At a high level, our standard deviations and correlations are based on long-term historical returns with additional emphasis on near-term history. Especially with illiquid asset classes, we adjust for serial correlation and smoothing of historical asset returns. To determine standard deviations and correlations, we utilized exponential weighting of the last 20 years of monthly returns (see Exhibit 16). This approach ensures an appropriate covariance matrix and smooths out results on a year-by-year basis.

Exhibit 16: Historical Weighting for Standard Deviations and Correlations



Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

Expected 10-Year Returns and Standard Deviations

	Asset Class	Representative Index	Expected Return	Standard Deviation
Equity	U.S. Equity	Russell 3000	6.5%	18.0%
	U.S. Large Cap Equity	Russell 1000	6.4%	17.8%
	U.S. Mid Cap Equity	Russell Midcap	6.8%	19.7%
	U.S. Small Cap Equity	Russell 2000	7.1%	22.3%
	U.S. Micro Cap Equity	Dow Jones Wilshire U.S. Micro-Cap	6.9%	23.8%
	Global Equity	MSCI ACWI	6.9%	17.1%
	International Developed Equity	MSCI World Ex-U.S.	6.9%	17.1%
	International Small Cap Equity	MSCI World Ex-U.S. Small Cap	7.3%	19.5%
	Global Emerging Markets Equity	MSCI Emerging	9.3%	20.0%
	U.S. REIT	FTSE NAREIT Equity	6.2%	21.8%
	Global REIT	FTSE EPRA/NAREIT Developed Index	6.8%	19.6%
Fixed Income	U.S. Aggregate	Bloomberg Barclays U.S. Aggregate	4.1%	4.3%
	U.S. Treasury	Bloomberg Barclays U.S. Treasury	3.6%	4.6%
	U.S. Treasury Bills	Bloomberg Barclays U.S. Treasury Bills 3-6 Months	2.3%	0.4%
	U.S. Intermediate Treasury	Bloomberg Barclays U.S. Intermediate Treasury	3.1%	3.1%
	U.S. Long Treasury	Bloomberg Barclays U.S. Long Treasury	4.0%	12.4%
	U.S. Investment Grade Credit	Bloomberg Barclays U.S. Credit	5.0%	6.4%
	U.S. Intermediate Inv Grade Credit	Bloomberg Barclays U.S. Intermediate Credit	4.3%	4.4%
	U.S. Long Investment Grade Credit	Bloomberg Barclays U.S. Long Credit	5.9%	11.3%
	U.S. TIPS	Bloomberg Barclays U.S. Govt Inflation-Linked	4.4%	6.2%
	U.S. Agencies	Bloomberg Barclays U.S. Agencies	3.3%	3.1%
	U.S. MBS	Bloomberg Barclays U.S. MBS	4.2%	3.9%
	U.S. Investment Grade CMBS	Bloomberg Barclays CMBS Investment Grade	4.1%	6.6%
	U.S. Intermediate Municipal	Bloomberg Barclays Municipal Bond Intermediate (5-10)	2.8%	4.3%
	U.S. Short Municipal	Bloomberg Barclays Municipal Bond Short (1-5)	2.3%	2.0%
	U.S. High Yield	Bloomberg Barclays U.S. Corporate High Yield	6.2%	9.4%
	U.S. Bank Loans	S&P/LSTA Leveraged Loan	5.6%	6.9%
	Global Aggregate Ex-US	Bloomberg Barclays Global Aggregate ex-USD	3.0%	7.9%
	Global Treasury Ex-US	Bloomberg Barclays Global Treasury ex-U.S.	2.6%	8.0%
	Global Corporate Ex-US	Bloomberg Barclays Global Agg ex USD: Corporate	4.6%	9.6%
	Emerging Mkts Sovereign USD	Bloomberg Barclays EM USD Aggregate: Sovereign	8.0%	9.7%
	Emerging Mkts Corporate USD	Bloomberg Barclays: EM USD Aggregate: Corporate	7.1%	9.2%
	Emerging Mkts Sovereign Local	Bloomberg Barclays EM Local Currency Government	4.0%	9.5%
Alternatives	Absolute Return[1,2]	HFRX Global Hedge Fund	4.3%	5.0%
	Hedge Funds[1,2]	HFRI Fund Weighted Composite	4.9%	6.9%
	Hedge Funds - Equity Hedge[1,2]	HFRI Equity Hedge	5.8%	9.6%
	Hedge Funds - Event Driven[1,2]	HFRI Event-Driven	5.4%	7.8%
	Hedge Funds - Macro[1,2]	HFRI Macro	4.2%	5.1%
	Hedge Funds - Relative Value[1,2]	HFRI Relative Value	4.4%	5.1%
	Hedge Funds - Managed Futures[1,2]	Credit Suisse Managed Futures Liquid Index	5.1%	10.8%
	Commodities	Bloomberg Commodity Index	2.9%	16.6%
	Global Natural Resources Equity	S&P Global Natural Resources	6.4%	22.9%
	Energy Infrastructure	Alerian MLP	7.2%	34.0%
	U.S. Private Equity[1,2]	Cambridge Associates LLC U.S. Private Equity	8.2%	21.3%
	U.S. Core Real Estate[2]	NCREIF ODCE Index	6.0%	8.5%
	Real Assets[3]	Blended Benchmark	4.8%	12.4%

Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

[1] Consistent with the Representative Index, returns are net of management fees.

[2] The Representative Index is not investable. Returns are based on manager averages. Actual results may vary significantly.

[3] Represents a weighted average of 1/3 U.S. TIPS, 1/3 Commodities, 1/9 Global REIT, 1/9 Natural Resources, 1/9 Infrastructure.

Expected Correlations

		Equity				Fixed Income											Alternatives				
		U.S. Equity	International Developed Equity	Emerging Equity	Global REIT	U.S. Aggregate	U.S. Treasury	U.S. Treasury Bills	U.S. Investment Grade Credit	U.S. TIPS	U.S. MBS	U.S. Intermediate Municipal	U.S. High Yield	Global Aggregate Ex-US	Emerging Markets Sovereign USD	Emerging Markets Sovereign LC	Absolute Return	Commodities	Energy Infrastructure	U.S. Private Equity	U.S. Core Real Estate
Equity	U.S. Equity	1.00	0.88	0.74	0.83	0.28	-0.05	-0.19	0.52	0.39	0.24	0.26	0.78	0.44	0.64	0.53	0.79	0.47	0.62	0.91	0.39
	International Developed Equity	0.88	1.00	0.92	0.84	0.28	-0.06	-0.13	0.53	0.39	0.22	0.27	0.80	0.57	0.72	0.72	0.82	0.58	0.59	0.81	0.39
	Emerging Equity	0.74	0.92	1.00	0.72	0.26	-0.05	-0.08	0.50	0.37	0.19	0.23	0.73	0.56	0.69	0.76	0.76	0.56	0.52	0.69	0.34
	Global REIT	0.83	0.84	0.72	1.00	0.41	0.10	-0.15	0.63	0.52	0.31	0.39	0.79	0.56	0.72	0.66	0.70	0.48	0.56	0.73	0.45
Fixed Income	U.S. Aggregate	0.28	0.28	0.26	0.41	1.00	0.90	0.17	0.89	0.83	0.91	0.79	0.43	0.71	0.64	0.46	0.13	-0.04	0.09	0.24	0.21
	U.S. Treasury	-0.05	-0.06	-0.05	0.10	0.90	1.00	0.29	0.64	0.71	0.82	0.64	0.05	0.56	0.33	0.24	-0.18	-0.25	-0.21	-0.06	0.10
	U.S. Treasury Bills	-0.19	-0.13	-0.08	-0.15	0.17	0.29	1.00	-0.01	0.03	0.21	0.04	-0.16	0.11	-0.05	0.01	-0.19	-0.16	-0.24	-0.11	-0.04
	U.S. Investment Grade Credit	0.52	0.53	0.50	0.63	0.89	0.64	-0.01	1.00	0.79	0.71	0.77	0.70	0.72	0.82	0.59	0.45	0.16	0.38	0.45	0.25
	U.S. TIPS	0.39	0.39	0.37	0.52	0.83	0.71	0.03	0.79	1.00	0.74	0.68	0.52	0.69	0.64	0.54	0.29	0.24	0.22	0.30	0.22
	U.S. MBS	0.24	0.22	0.19	0.31	0.91	0.82	0.21	0.71	0.74	1.00	0.71	0.33	0.64	0.51	0.36	0.01	-0.03	0.03	0.21	0.18
	U.S. Intermediate Municipal	0.26	0.27	0.23	0.39	0.79	0.64	0.04	0.77	0.68	0.71	1.00	0.47	0.57	0.64	0.41	0.17	-0.01	0.17	0.20	0.18
	U.S. High Yield	0.78	0.80	0.73	0.79	0.43	0.05	-0.16	0.70	0.52	0.33	0.47	1.00	0.54	0.81	0.62	0.74	0.50	0.62	0.71	0.40
	Global Aggregate Ex-US	0.44	0.57	0.56	0.56	0.71	0.56	0.11	0.72	0.69	0.64	0.57	0.54	1.00	0.68	0.80	0.34	0.32	0.23	0.37	0.24
	Emerging Markets Sovereign USD	0.64	0.72	0.69	0.72	0.64	0.33	-0.05	0.82	0.64	0.51	0.64	0.81	0.68	1.00	0.73	0.60	0.38	0.44	0.58	0.32
	Emerging Markets Sovereign LC	0.53	0.72	0.76	0.66	0.46	0.24	0.01	0.59	0.54	0.36	0.41	0.62	0.80	0.73	1.00	0.48	0.45	0.38	0.46	0.26
Alternatives	Absolute Return[1,2]	0.79	0.82	0.76	0.70	0.13	-0.18	-0.19	0.45	0.29	0.01	0.17	0.74	0.34	0.60	0.48	1.00	0.56	0.61	0.73	0.28
	Commodities	0.47	0.58	0.56	0.48	-0.04	-0.25	-0.16	0.16	0.24	-0.03	-0.01	0.50	0.32	0.38	0.45	0.56	1.00	0.49	0.40	0.18
	Energy Infrastructure	0.62	0.59	0.52	0.56	0.09	-0.21	-0.24	0.38	0.22	0.03	0.17	0.62	0.23	0.44	0.38	0.61	0.49	1.00	0.56	0.09
	U.S. Private Equity[1,2]	0.91	0.81	0.69	0.73	0.24	-0.06	-0.11	0.45	0.30	0.21	0.20	0.71	0.37	0.58	0.46	0.73	0.40	0.56	1.00	0.42
	U.S. Core Real Estate[2]	0.39	0.39	0.34	0.45	0.21	0.10	-0.04	0.25	0.22	0.18	0.18	0.40	0.24	0.32	0.26	0.28	0.18	0.09	0.42	1.00

Source: BNY Mellon Investor Solutions. Data as of September 30, 2022.

[1] Consistent with the Representative Index, returns are net of management fees.

[2] The Representative Index is not investable. Returns are based on manager averages. Actual results may vary significantly.

Only a subset of the asset classes is shown in the matrix above. A full correlation matrix is available upon request.

For illustrative purposes only. There can be no assurance that the expected returns listed above will be achieved.

Importance of Capital Market Assumptions

Capital market assumptions are the initial building block for the development of an investor's strategic asset allocation (SAA). SAA, or policy portfolio design, serves a central role as the touchstone of multi-asset investment, transforming long-term, forward-looking market forecasts into enduring portfolio allocations. However, forecasting is an inherently error-prone endeavor because financial market performance exhibits a high degree of uncertainty. These forecast errors become even more protracted as time horizons extend.

Thus, when designing a policy portfolio to weather the highs and lows of the coming market cycle, we propose investors consider a "robust" portfolio, rather than an "optimal" one. By building a portfolio that is intended to withstand the test of time, while being robust to forecast error and intertemporal forecast noise, we seek to ensure that investors have the highest probability of achieving their objectives. To learn more about how BNY Mellon utilizes our capital market assumptions and robust strategic asset allocation process to help our clients solve their investment challenges, please contact a BNY Mellon Investor Solutions representative.

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