

Thinking about inflation in risk terms

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DANNY SULLIVAN,
FRM, CAIA
Director | Risk

Executive summary

Inflation has been subdued in the United States for the last three decades. Technological advances, increased globalization, and inflation targeting from the Fed have helped to keep inflation low. In this piece, we analyze historic inflationary environments to understand the protection offered by different types of assets. Using a variety of risk tools, we consider the impact inflation has on an investor's overall portfolio and their obligations. No single asset class can reliably protect against inflationary environments but through constructing diversified portfolios and understanding risk exposures, we believe an investor can best position themselves for an uncertain future.

Inflationary environments

Inflation is a sustained rise in the overall prices of goods and services¹. In general, economists explain inflation in two different ways:

- **Cost-push inflation** - when companies increase prices to maintain profit margins due to rising input costs.
- **Demand-pull inflation** - when too much money is chasing too few goods (i.e. central banks rapidly increase money supply causing demand to outstrip supply). When the supply of dollars exceeds the demand, the purchasing power of a dollar falls.

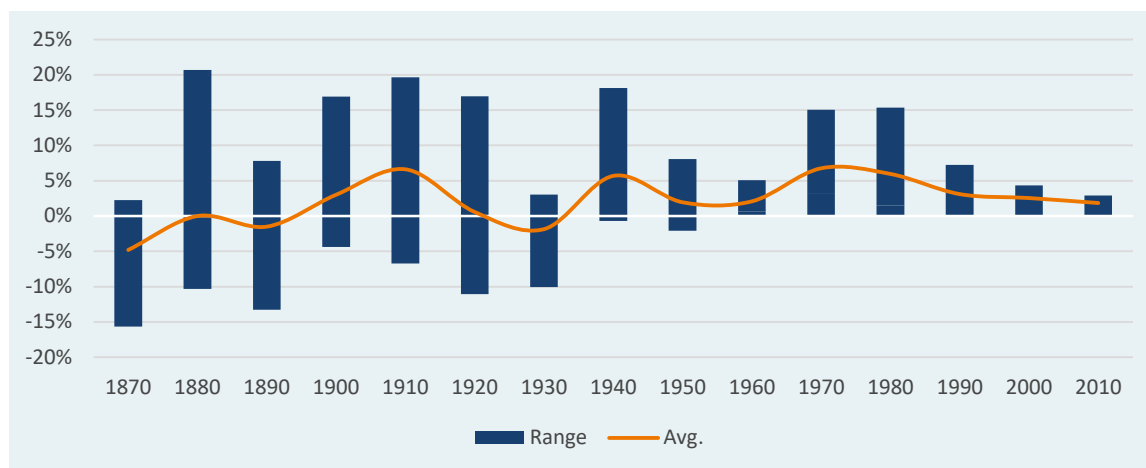
In the early 1900s, there were large swings in inflation, ranging from 20% in the 1910s to deflation in the 1920s. Inflation reached 18% in the 1940s,



VANCE CREEKPAUM,
ASA
Associate Director |
Risk Actuary

12% in the 1970s, and 14% in the 1980s. Figure 1 looks at the range of inflation by decade, which shows a narrowing of the range of inflation, and a more stable average rate over time. Stable, low, positive inflation over the past few decades has shaped how investors construct portfolios today. If we only use data from the last 10-30 years to construct portfolios, we may ignore the possibility of a change in inflationary regime.

FIGURE 1²: INFLATION RATE BY DECADE



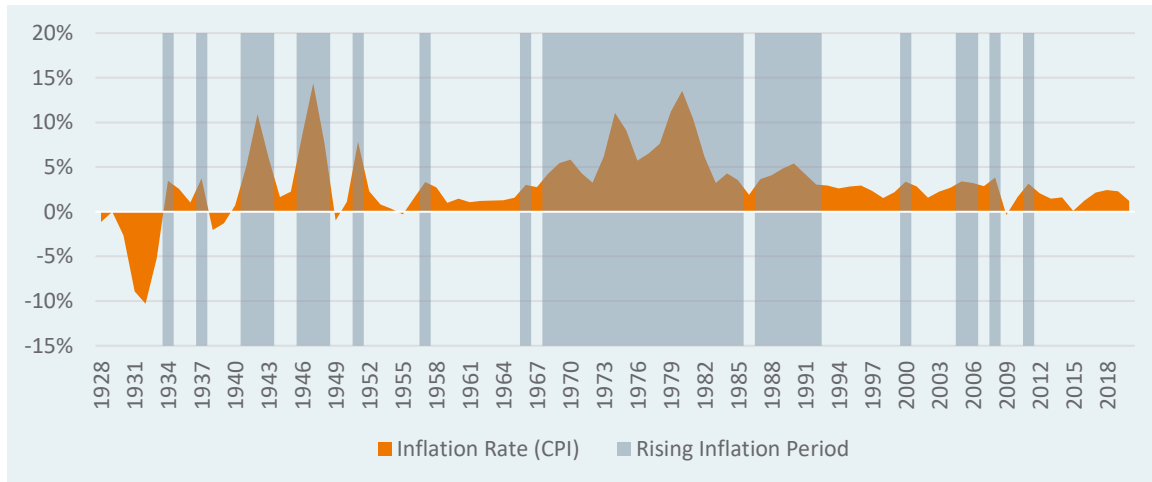
Through monetary and fiscal policy, most developed countries try to sustain an inflation rate of 2-3%. Once inflation in the US was brought under control in the early 1980's it has remained low for several reasons:

- Inflation targeting – the fed has a stated inflation target of 2%
- Rapid increase in globalization
- Policies favoring businesses over labor
- Technological advancement/automation

These disinflationary drivers continue today, in particular technological advancement and automation. However, policies may be shifting somewhat to favor labor and globalization has slowed with a focus on trade. We are writing this piece as the country is experiencing rising inflation from the supply disruptions caused by Covid-19 and the Fed has stated this inflation is transitory – but what if it is not?

We want to analyze how assets have performed during inflationary periods throughout history. To do this, we will identify when inflation has been above its long-term average of 3% - the data in Figure 2, goes back to 1928³. Some periods last several years and if we group consecutive years of rising inflation, we observe 21 distinct periods⁴. Not all assets have return history going back to 1928, so we will provide observations for each asset going back as far as possible. Which assets performed best during these inflationary periods? Let's investigate.

FIGURE 2: INFLATIONARY PERIODS

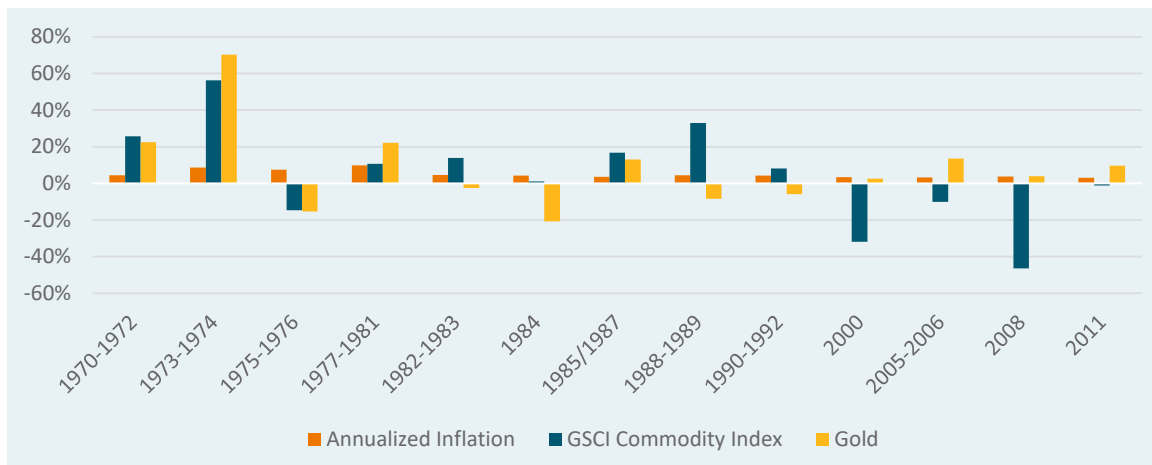


Commodities

There are three different inflationary periods in the 1970's, where the rising price of oil had a significant effect not only on inflation but on creating a recessionary environment. From 1970-1972, while the economy was in a recession and experiencing stagflation, commodity annualized returns were just over 25%. In 1973-1974, while the US was steeped in the Watergate scandal and the gold standard ended, commodities did extremely well, providing annualized returns of over 55%. 1975-1976 continued to have high inflation, but returns were down almost 15%. Why was this? In 1975 the recession ended, and we saw inflation fall and the federal funds rate was reduced from over 10% down to below 6%, indicating aggressive monetary policy. But inflation remained above the Fed's target and commodities had negative real returns in that period.

Commodities provided positive returns throughout the late 1970s to early 1990s, however, the four most recent inflation periods (since 2000) a basket of commodities⁵ has delivered negative returns.

FIGURE 3: COMMODITY RETURNS



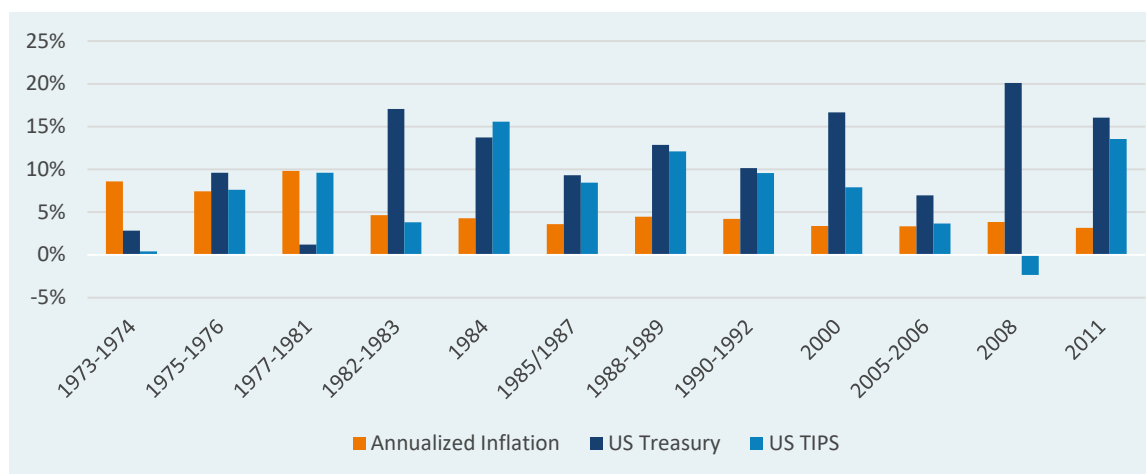
Overall, commodities have been a good hedge against significant rising inflation but have inconsistent results more recently when experiencing low or moderate inflation. Commodities are volatile and it is important to acknowledge that when we look at returns of a commodity basket, we are analyzing the behavior of many different individual commodities together. The more diversified the commodity basket, the smoother the returns should be. The Goldman Sachs Commodity Index (GSCI) is concentrated in oil and energy, and in 2008, when oil prices fell from a high of \$147 in July to \$32 in December the GSCI index lost 1000 basis points more than the more diversified Bloomberg commodity index.

Interestingly, while a commodity basket had negative returns in the last four periods, gold preserved capital or provided positive returns in all those periods. We regularly hear about the benefits of gold as a hedge against inflation, however, we observe that returns have only been positive in 8 of the 14 periods. While gold is included in commodity indexes, returns will deviate from the overall commodity basket. For example, in 2008 gold had a positive nominal return, performing better than the GSCI. We see a similar situation in 2000 when GSCI real returns were down 30% and gold was flat. This seems to indicate gold has offered downside protection when oil and energy fall. Finally, gold outperformed the GSCI index in 1973/1974 when the gold standard ended and from 1977-1981 when gold posted annualized real returns over 12%.

Treasury Inflation Protected Securities (TIPS)

TIPS pay a contractual and fixed yield relative to inflation, allowing investors to lock in a real yield. TIPS are like nominal bonds, but the expected inflation component is replaced by the accrual of actual inflation. Typically, the expected rate of inflation is the most volatile and risky part of a nominal bond, so by removing it you are essentially creating a less risky bond of a similar duration (in theory).

FIGURE 4: U.S. TIPS AND NOMINAL BOND RETURNS



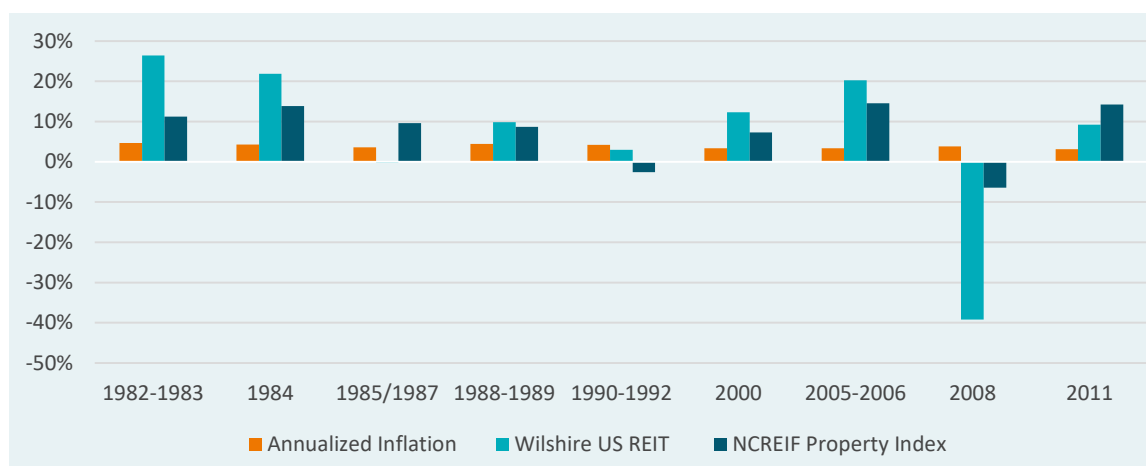
Excluding 2008, TIPS have been a great asset to hold in rising inflationary periods⁶, consistently protecting capital, and providing positive real returns. In theory, TIPS should

carry less risk than similar duration nominal bonds but in 2008 we saw the 10-year breakeven inflation rate fall from 2% to nearly zero. This indicated an expected lack of inflation in the ensuing 10 years. We also saw market liquidity dry up and TIPS subsequently fell 12% in September and October of 2008. Even though TIPS are theoretically as safe as Treasuries (they are backed by the government), they are not nearly as liquid⁷. The return of TIPS in 2008 was -2.4% versus a return of 20% for Treasuries. TIPS are very attractive for inflation protection, but they will likely not perform well in deflationary environments and liquidity can have a significant impact on these “safe” securities.

Real Estate

Real estate has provided great protection against rising inflation⁸. As inflation rises, we have seen a tendency for real estate to appreciate and for rents to increase. Historically, inflationary pressures have been directly passed to renters, making real estate an attractive asset to own in rising inflation environments.

FIGURE 5: REAL ESTATE RETURNS

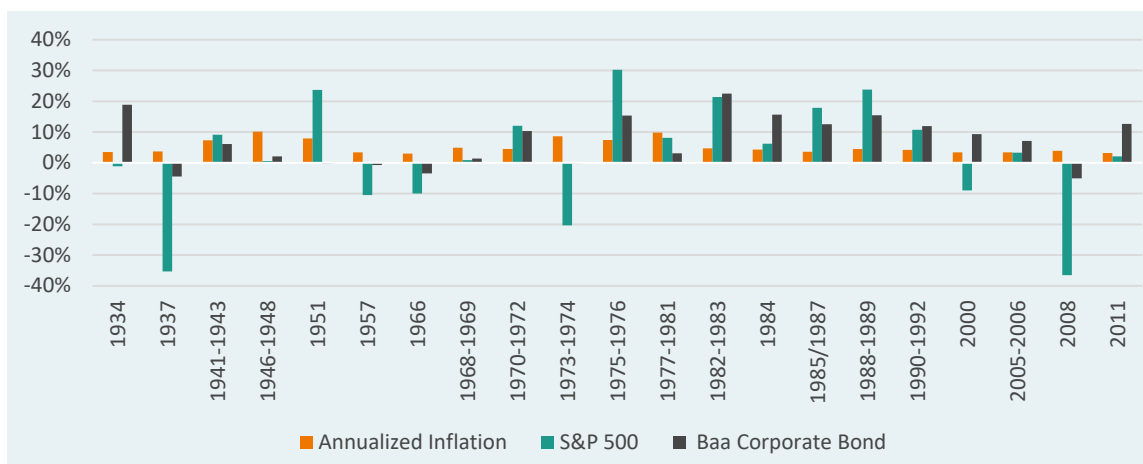


Real estate has positive returns in 7 out of 9 inflation periods. In contrast, REITS have seen wide return swings during these periods because they trade in equity markets and are liquid. The outlier in this dataset is the performance of REITS in 2008, with a loss of almost 40% versus the NCREIF property index loss of 6.5%⁹. While inflation was above the long-term average in 2008, this period was more defined by high-risk mortgages going into default and causing a recession.

Equities/Fixed Income

Equities and fixed income can provide protection when inflation is rising. We have returns going back to 1928 for equities and corporate bonds, so we will have more periods to analyze. Equities have provided positive returns in 14 out of the 21 observed inflation periods, which appears to provide good inflation protection. However, on a real return basis, equities only provide positive returns in 9 of the 21 periods.

FIGURE 6: EQUITIES / BOND RETURNS



The dataset starts off with a large outlier in 1937, where equities were down more than 35%. Then equities provide flat or positive returns for the periods from 1941 to 1951. The periods in 1957 and 1966 have negative returns then equities have positive returns in the subsequent two inflationary periods. 1973-1974 was bad for equities, with annualized returns of -20%. Then from 1975 to 1992, equities had positive returns in each inflationary environment. Since equities are influenced by other factors (such as economic growth), it's important to consider the unique conditions of each period. For example, the inflationary environment in 1942 (with high levels of defense spending during world war 2) is very different from the inflationary period in 1974 where the gold standard ended. Equities have done well over the past three decades (excluding the 2000 tech crash and the 2008 subprime crisis), but those crises are less inflationary, and driven more by other factors. To understand this dynamic better, we isolated the years where CPI is greater than 6%. In the table below we can see the real returns are negative in 8 of the 14 periods. In summary, equities may provide positive returns during inflationary periods, but not reliably.

Year	1947	1980	1979	1974	1942	1981	1975	1946	1951	1948	1978	1977	1973	1982
S&P 500	5%	32%	19%	-26%	19%	-5%	37%	-8%	24%	6%	7%	-7%	-14%	20%
Inflation Rate (CPI)	14%	14%	11%	11%	11%	10%	9%	8%	8%	8%	8%	7%	6%	6%
Real return	-9%	18%	7%	-37%	8%	-15%	28%	-17%	16%	-2%	-1%	-13%	-20%	14%

Corporate bonds have provided positive returns in 15 of the 21 periods. On a real return basis, they have positive returns in 11 periods. Real returns were consistently negative at the beginning of the dataset, then seemed to reverse in the early 80s and have provided positive real returns in almost all periods since then. In summary, corporate bonds have inconsistent results in inflationary periods.

PART 2 (ASSETS): How do we analyze inflation in asset space?

To analyze inflation risk, we want to understand all the possibilities of what can happen to assets in a portfolio. Elroy Dimson, an economist, and professor at the London School of business once stated:

“Risk means more things can happen than will happen.”

To understand all the things that can happen, we conduct several different types of analysis and consider as much data as possible. This includes historic scenario analysis, stress tests, risk factor analysis, and economic sensitivity analysis. We will run through a practical example to show how this information can provide valuable observations in the context of an asset allocation study.

Volatility and Correlations

There are three asset mixes being considered (identified in Figure 7¹⁰) and we will start by analyzing expected returns, volatility, and correlations. As we move from Mix 1 to Mix 3, we are creating a more diversified portfolio and lowering the expected volatility while increasing the return per unit of risk (Sharpe ratio)¹¹.

FIGURE 7

Asset Class	Mix 1	Mix 2	Mix 3
Domestic Equities	60%	50%	40%
Core Bonds	40%	30%	20%
Commodities		5%	10%
Gold		5%	10%
TIPS		5%	10%
Real Estate		5%	10%
Expected Return (%)	4	3.9	3.9
Risk (%)	9.5	9	8.7
Sharpe Ratio	0.43	0.44	0.45

Figure 8 provides correlations across assets over the last 10 years and ignores the impact of regime shifts¹². Commodities, and real estate have correlations of 0.5 with Equities. TIPS have a correlation of 0.1 and Core Bonds are slightly negatively correlated at -0.1.

FIGURE 8

	Domestic Equities	US TIPS	Core Bonds	Commodities	Real Estate	Gold
Domestic Equities	1	0.1	-0.1	0.5	0.5	0.1
US TIPS	0.1	1	0.6	0.2	0.1	0.5
Core Bonds	-0.1	0.6	1	0	0	0.4
Commodities	0.5	0.2	0	1	0.3	0.4
Real Estate	0.5	0.1	0	0.3	1	-0.2
Gold	0.1	0.5	0.4	0.4	-0.2	1

Risk Factor Decomposition

Risk factor decomposition analysis allows us to dive into portfolios to determine the true drivers of risk and return. In the case of a corporate bond, there can be risk from interest rates, credit, currency, and idiosyncratic sources. Figure 9 analyzes how each factor contributes to overall portfolio risk. The portfolio becomes more resilient to inflation surprises as inflation assets are added to the portfolio. In Mix 2, a 20% capital allocation to inflation assets translates to 11% of the risk coming from inflation factors. In Mix 3, a 40% capital allocation to inflation assets translates to 28% of the portfolio risk coming from inflation factors.

FIGURE 9

Risk Factor	Mix 1	Mix 2	Mix 3
Equity	97%	86%	70%
Rates	-2%	-2%	-2%
Credit	4%	3%	2%
TIPS	0%	1%	3%
Private Real Estate	0%	5%	11%
Commodity	0%	5%	14%
Selection Risk	1%	1%	1%

Stress Tests

Prospective stress tests can shock a specific market in isolation (i.e. If commodities fell 20%) or multiple markets concurrently (i.e. a stagflation shock that impacts currency, credit spreads, equities, inflation, and term structure). These shocks can be done on both a correlated and uncorrelated basis to provide different insights into the portfolio¹³.

FIGURE 10: STRESS TESTS



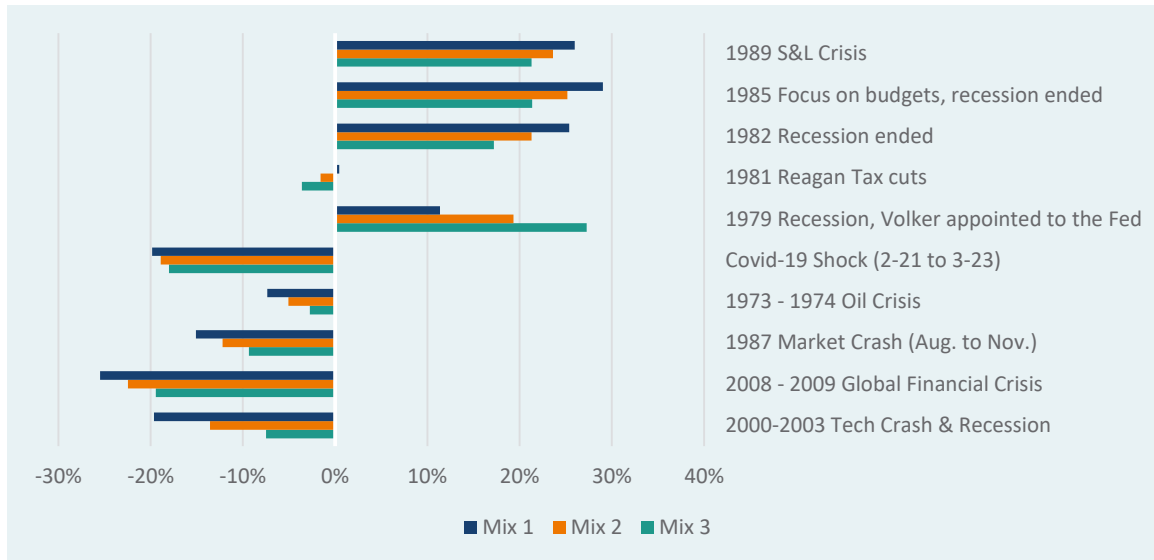
As we increase our allocation to inflation assets, the portfolio is expected to perform better in most of the observed stress tests. If credit spreads widen or interest rates rise 200 basis points, the lower allocation to core bonds in Mixes 2 and 3 improve results. If we enter a stagflation environment or nominal rates rise, the inflation protection in Mixes 2 and 3 seems to protect the portfolio. But Mix 3 could perform worse if there is a commodity shock or a reflation scenario¹⁴.

Historic Shocks

Historic scenarios tell us how our current portfolio would have performed in actual market events. In the scenarios below, we can see how adding inflation protection improves the returns during drawdowns.

Many of the most severe shocks to portfolios are equity-based. Of the historic shocks shown in Figure 11¹⁵, most were driven by equity markets. It is not surprising that Mixes 2 and 3, which hold fewer equities, will perform better in most of the negative returning scenarios. And the 1973-1974 oil crisis bodes well for portfolios with commodities exposure, so Mixes 2 and 3 are expected to lose less in this scenario. With the exception of the 1979 period, Mixes 2 and 3 underperform Mix 1 in the positive returns scenarios. If we are analyzing a particular set of portfolio options for a client, we could use the inflation periods to understand how different asset mixes would have performed.

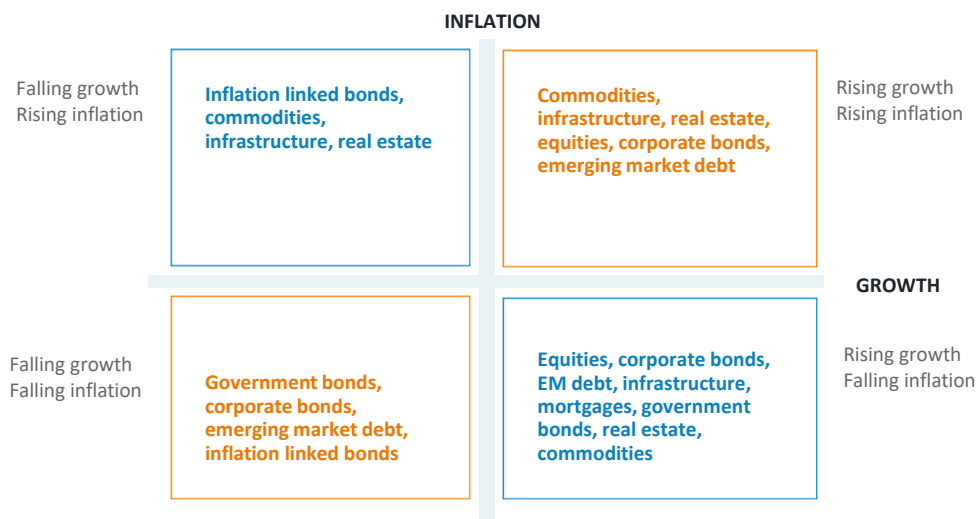
FIGURE 11: HISTORICAL SHOCKS



Economic Sensitivity

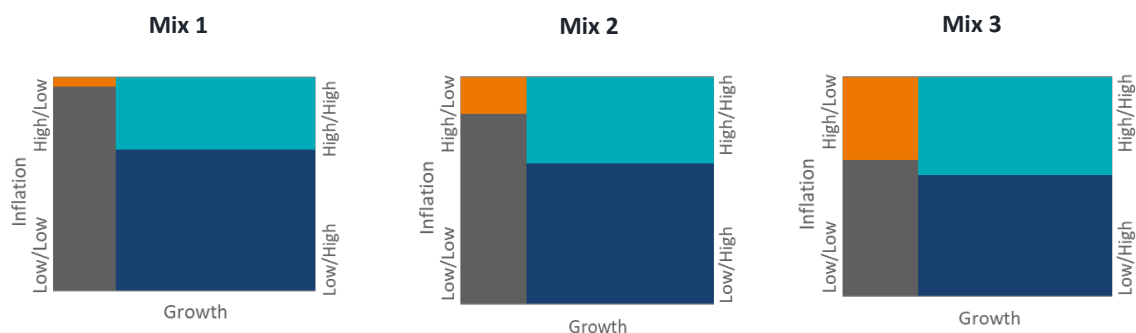
Economic sensitivity analysis provides another perspective on asset allocation. We break out rising/falling inflation and growth into quadrants to understand which economic environments our portfolios are positioned to perform best.

FIGURE 12



Equities will typically perform best in a rising growth environment, whereas inflation linked bonds and commodities will do well in a rising inflation environment. We can see a similar dynamic by analyzing the economic sensitivity of Mixes 1-3.

FIGURE 13



Adding inflation protection in the portfolio shows that Mix 2 and Mix 3 have more resilience (and are expected to perform better) in high inflation/low growth environment whereas Mix 1 is more traditional and performs well in a high growth, low inflation environment.

All three mixes have similar expected returns but Mixes 2 and 3 provide lower risk and better diversification according to our correlation analysis, risk factor analysis, and economic sensitivity analysis. Mixes 2 and 3 also provide downside protection in both stress tests and historic shocks. An investor in this situation may consider the addition of inflation assets to build a more diversified and resilient portfolio.

PART 3 (LIABILITIES): How an investor should think about how much inflation protection they need

When building an asset allocation that seeks to protect returns from inflation it is easy to lose sight of the impacts that inflation can have on plan obligations. Consider a pension with a Cost of Living Adjustment (COLA): it is possible for the asset allocation to exceed expectations on a performance basis but still fail to keep pace with rising liabilities stemming from changes to inflation. Depending on how the COLA is calculated (for example, CPI for the U.S. market in aggregate) it may be possible to hedge some of this inflation risk, but in other instances it can only be partially hedged (for example, the inflation component of salary increases).

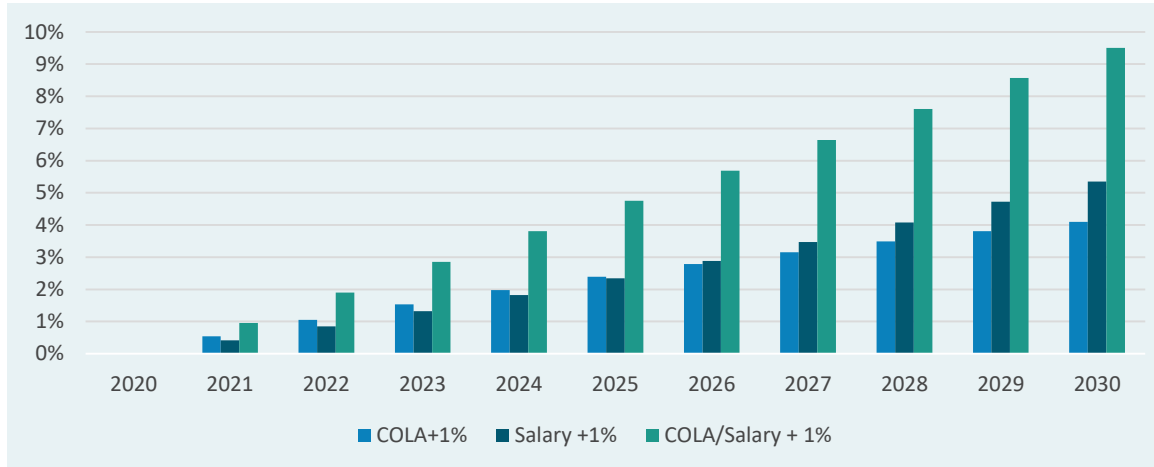
In other situations, it can be more difficult to hedge liability risk. For example, an endowment which seeks to provide tuition assistance will be hard pressed to find a ‘college tuition adjusted bond’ on the open market. To investigate this further we take two illustrative cases, a pension with a COLA and an endowment or foundation seeking to provide tuition assistance.

Case 1: Pension Inflation Sensitivity

A pension plan has two main inflation sensitive components, COLA and salary (increases are typically indexed to inflation). Below is a representative plan with a COLA cap of 3% for early benefit tiers, a current COLA attribution of 2% going forward, and salary increases tied to an

inflation base. We note below the percentage increase in actuarial liability as well as expected benefit payments by a 1% increase in inflation under each assumption over the next ten years.

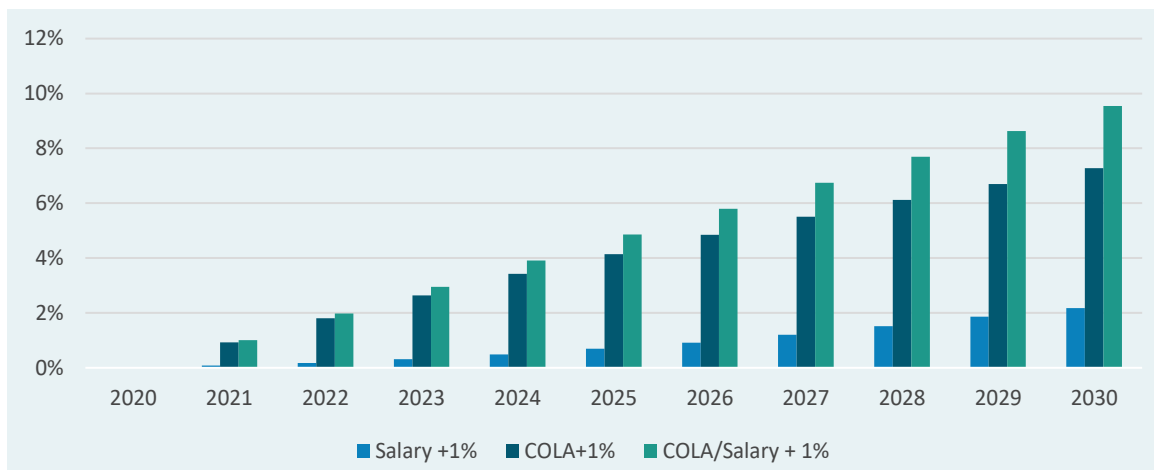
FIGURE 14: INCREASE IN ACTUARIAL LIABILITY DUE TO INFLATION IMPACTS



In this example, inflation is increased by 1% (expected inflation increases from 2% to 3% for the entire period) which results in the actuarial liability being 9.5% larger at the end of the 10-year period compared to the case where inflation remained 2%. To think of it another way, if inflation increases from roughly 2% to 3%, then the hurdle rate of the pension increases by roughly 90 basis points each year. Therefore, for the pension to remain in a similar funding status the portfolio needs to earn 90 basis points more every year (or contributions must increase to make up the difference).

An additional impact on the pension due to inflation is on cashflow. COLA increases (and to a lesser extent, salary increases) result in larger benefit payments coming out of a pension plan in the near term, impacting the growth potential of the asset allocation.

FIGURE 15: INCREASE IN EXPECTED BENEFIT PAYMENTS DUE TO INFLATION IMPACTS



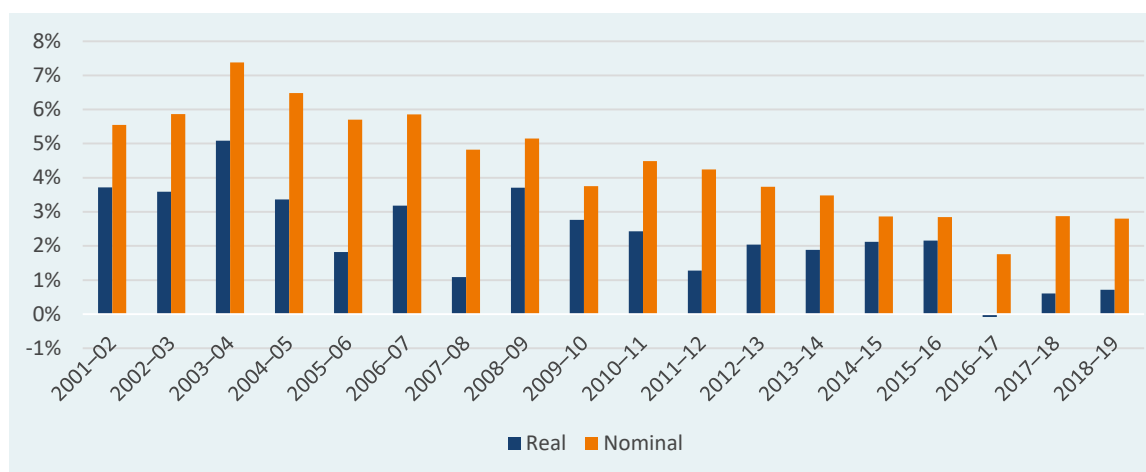
Like the liability case (and primarily because the increases are COLA driven), a 1% increase in inflation results in an increase in benefit payments by roughly 93-98 basis points each year. Hedging this risk means that the pension needs an asset such that if inflation increases by 1% then the return attributed to the entire portfolio is approximately 1% for the first year and every subsequent year.

Investing in TIPS assets will benefit the portfolio in the first year (when inflation unexpectedly rises from 2% to 3%), but has flat returns thereafter even as the liability of the pension continues to increase. While inflation is a significant determinant of the pension’s liability it is challenging to hedge with traditional assets.

Case 2: Tuition Assistance

For an endowment or foundation seeking to provide tuition assistance, the relationship between United States average tuition costs and inflation are not fully correlated.

FIGURE 16¹⁶: HISTORICAL USA TUITION COST GROWTH, YEAR TO YEAR



Year to year inflation in the United states during this period remained muted, staying between 1% to 3.5% with some notable exceptions (2009), meanwhile real tuition increases range from a 5% peak in the 2003-2004 academic year to nearly 0% in the 2016-2017 academic year. The challenge for an endowment or foundation to provide the same relative amount of tuition support is therefore based on tuition expenses which in practice may not be hedge-able with any inflation linked or inflation correlated assets.

Inflation impacts on any institution are dynamic and complex. The inflation impacts on the plan’s liability may be smooth and predictable, as in the case of a pension with a COLA, or somewhat erratic, as in the case of tuition expenses. Each case provides a unique challenge in constructing an asset allocation should inflation rise. However, inflation is one small piece of the broader investment problem. The investor must weigh the benefit of using more traditional inflation protection assets (like TIPS) during surprise inflation, and its costs in terms of lower expected return on the overall portfolio.

Conclusion

Inflation has been subdued in the United States for the past few decades. Technological advances, increased globalization, and inflation targeting from the Fed have helped to ensure inflation remains low. But will this continue in the years to come? We cannot predict how much inflation we will experience in the coming years or when inflation will rise above expectations. What we can do is identify how much inflation protection investors should consider and construct portfolios with assets that increase the likelihood of protecting real returns under different inflationary environments. Investors must balance the return needs of the plan with their long-term objectives. No single asset class can reliably protect against inflationary environments but through constructing diversified portfolios and understanding risk exposures, we believe an investor can best position themselves for an uncertain future.

Notes & Disclosures

- 1 *There are three primary measures of inflation. The Producer Price Index (PPI) captures the change in prices received by domestic producers of goods and services. The Consumer Price Index (CPI) tracks the changes in a basket of goods and reflects retail prices of goods and services including housing costs, transportation, and healthcare. Lastly, the Personal Consumption Expenditures (PCE) track the changes in a basket of goods. While CPI reflects out of pocket expenditures of urban households, PCE covers a wider range of expenditures, including goods and services purchased on behalf of households.*
- 2 *Source: Online Data Robert Shiller. <http://www.econ.yale.edu/~shiller/data.htm>*
- 3 *We start in 1928 because we cannot source reliable asset return data prior to that.*

4

Dates	Annualized Inflation	Events
1934	3.50%	U.S. debt rose
1937	3.70%	Depression returned
1941-1943	7.30%	Pearl Harbor, Defense spending tripled
1946-1948	10.10%	Truman budget cuts, Cold War began, Recession
1951	7.90%	
1957	3.30%	Recession
1966	3.00%	Vietnam War
1968-1969	4.90%	Moon landing, Nixon took office
1970-1972	4.50%	Recession, Wage-price controls, Stagflation
1973-1974	8.60%	End of the gold standard, Watergate
1975-1976	7.40%	Recession ended, Fed lowered rates
1977-1981	9.80%	Fed's 20% rate hike ended inflation, Recession, Reagan tax cuts, Recession ended
1982-1983	4.70%	Recession ended, Tax hike and defense spending

Dates	Annualized Inflation	Events
1984	4.30%	
1985/1987	3.60%	Black Monday
1988-1989	4.50%	Fed raised rates, S&L Crisis
1990-1992	4.20%	Recession, NAFTA drafted
2000	3.40%	9/11 attacks
2005-2006	3.30%	Katrina, Bankruptcy Act, Fed raised rates
2008	3.80%	Financial Crisis
2011	3.20%	Japan earthquake

- 5 *Commodities are the raw materials that are either consumed or used to build other products, which can include: Industrial Metals, Energy, Precious metals, Grains, Softs, and Livestock. There are two large commodity index providers (Bloomberg (BCOM) and Goldman Sachs (GSCI)). The Goldman Sachs Commodity Index has data going back to 1970, whereas Bloomberg Commodity Index starts in the early 1990s. The BCOM index is more diversified and has less energy concentration than the GSCI index.*
- 6 *TIPS have only been around since 1997. We sourced simulated returns from the Ibbotson Associates synthetic US TIPS series for data prior to 1997. After 1997, we used the BC US TIPS index returns.*
- 7 *Another interesting TIPS event occurred during May and June of 2013 regarding the Taper Tantrum. Ben Bernanke suggested rates might have to go up and TIPS fell almost 8%. In May and June of 2013, TIPS behaved as if their nominal rates duration was higher than nominal Treasuries.*
- 8 *Real estate encompasses several different types of investments, from apartment buildings and shopping centers to hotels and offices. Real Estate Investment Trusts (REITs) are companies that own or finance income-producing real estate. To qualify as a REIT, the company is required to distribute dividends, other than capital gain dividends, to its shareholders each year in an amount at least equal to 90% of their taxable income. The IRS code also stipulates 75 percent of a REIT's gross income must come from real estate-related income. [https://www.sec.gov/Archives/edgar/data/866368/000119312503050799/dex991.htm#:~:text=To%20qualify%20as%20a%20REIT%2C%20the%20Company%20is%20required%20to,gain%2C%20and%20\(b\)%2090](https://www.sec.gov/Archives/edgar/data/866368/000119312503050799/dex991.htm#:~:text=To%20qualify%20as%20a%20REIT%2C%20the%20Company%20is%20required%20to,gain%2C%20and%20(b)%2090)*
- 9 *This index reports returns on a quarterly basis and benefits from smoothed return streams. The subsequent year the index was down more than 15% versus the REIT index, which was up 28%. Over the full 2008-2009 period both of these indexes had similar returns.*
- 10 *Mix 1 is a simple domestic 60/40 portfolio. Mix 2 allocates 50% to domestic equities, 30% to core bonds, then the remaining 20% is split equally across commodities, gold, TIPS, and real estate. Mix 3 allocates 40% to domestic equities, 20% to core bonds and the remaining 40% is split equally among the inflation assets.*
- 11 *Expected returns are low relative to the return targets for most institutions, so this example is intended to be illustrative only.*
- 12 *This is why it's important to consider other analysis such as historic scenario analysis and stress tests.*
- 13 *The first four shocks (Credit Spreads +100bps, Commodities -20%, Interest Rates +200bps, and Equities -20%) are uncorrelated shocks. The last four shocks (Stagflation, Disinflation, Overheated Economy, and Reflation) are correlated shocks.*
- 14 *Where there is an expansion in the economy from stimulus or monetary/fiscal policy.*

Year	Inflation rate	GDP	Events Impacting Inflation/GDP	Fed Tighten/Ease	Mix1	Mix 2	Mix 3
1979	11.25%	3.20%	Recession, Volker appointed	Tighten	11.40%	19.30%	27.30%
1980	13.55%	-0.30%	Recession	Tighten	17.80%	17.60%	17.30%
1981	10.33%	2.50%	Reagan tax cuts	Tighten	0.50%	-1.60%	-3.60%
1982	6.13%	-1.80%	Recession ended	Ease	25.40%	21.30%	17.20%
1983	3.21%	4.60%	Tax hike and defense spending	Ease	14.70%	13.70%	12.70%
1984	4.30%	7.20%	Strong economic recovery	Tighten	9.20%	7.70%	6.20%
1985	3.55%	4.20%	Focus on budgets	Ease	29.00%	25.20%	21.30%
1987	3.66%	3.50%	Black Monday	Ease	1.50%	4.40%	7.30%
1988	4.08%	4.20%	Fed raised rates	Tighten	13.20%	12.80%	12.30%
1989	4.83%	3.70%	S&L Crisis	Tighten	26.00%	23.60%	21.30%
1990	5.40%	1.90%	Recession	Ease	0.70%	2.10%	3.60%
1991	4.23%	-0.10%	Recession	Ease	24.10%	19.30%	14.50%
1992	3.03%	3.50%	NAFTA drafted	Ease	8.20%	6.60%	5.00%
2000	3.38%	1.00%	9/11 attacks	Tighten	1.20%	-0.20%	-1.70%
2005	3.39%	3.50%	Katrina, Bankruptcy Act	Tighten	4.00%	6.60%	9.10%
2006	3.23%	2.90%	Fed raised rates	Tighten	10.20%	9.60%	9.00%
2008	3.84%	-0.10%	Financial Crisis	Ease	-13.90%	-14.80%	-15.70%
2011	3.16%	1.60%	Japan earthquake	Ease	7.70%	7.70%	7.70%

16 Source: <https://nces.ed.gov/fastfacts/display.asp?id=76> data adjusted for the academic year reflecting the average cost of all four-year tuition within the United States.

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800 Fifth Avenue, Suite 3900
Seattle, Washington 98104
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