



Protecting portfolios from inflation decay

By Ken Griffin, director, and Edward Yao, vice-president, at Conning

The unprecedented steps taken by the Federal Reserve Bank of the US toward monetary expansion since the financial crisis in 2008 have made the need to protect invested assets against inflation of utmost importance. It is necessary to combine insurance company modelling expertise with insurance asset management experience to develop an investment solution that will help protect the value of a portfolio during periods of accelerating price inflation.

Inflation history and outlook

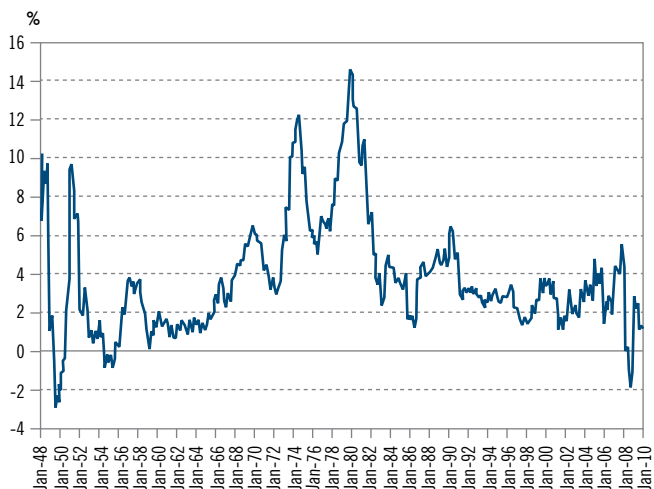
Inflation in the US has been stable and low for the past decade. However, high inflation is more common if we look at the global inflation over a longer history. There were periods of runaway inflation in late '70s and early '80s in the US, but it was still dwarfed by the inflation in some other countries around the world. Brazil was one notable example, with inflation north of 1900% in 1989 and 2400% in 1993.

Since the 1980s, the Federal Reserve Bank in the US has changed its monetary policy to stabilise inflation around a certain target (as did the central banks of many other countries around the globe including Brazil). However, because inflation is difficult to predict, it is not clear whether central banks will be able to rein in inflation at the right time to the right level.

Increases in inflation are very often underestimated. Although the risk of unexpected inflation is pervasive, people do not anticipate inflation until it has existed for an extended period of time. In point of fact, inflation tends to be serially correlated and seemingly predictable. Typically, high inflation is followed by higher inflation and its devastating impact is cumulative.

Since the 2008 financial crisis, in order to resurrect economic growth, central banks have been trying to keep interest rates low by pumping liquidity into their economies. The Federal Reserve Bank in the US has had two Quantitative

INFLATION IN THE US 1948-2010



Source: US Bureau of Labor Statistics; Conning Risk & Capital Management Solutions analytics

Easings (QEs) whereby they purchased hundreds of billions of dollars of securities from the capital markets in order to create liquidity in the financial system.

As a result, the probability of high inflation sometime in the future has greatly increased. The first signs of such consequences are showing up in emerging markets like China, which are prompting these countries to raise interest rates in an attempt to cool down their economies.

We define inflation risk as the uncertainty of the changes in price level, which is typically measured by the changes in a price index. A business can transfer the burden of expected inflation to its consumers by increasing the prices of its products by the rate of expected inflation. Inflation would not be a concern for a business if there were no inflation volatility. In reality, however, actual inflation is always different from inflation expectation. Therefore inflation risk always has to be dealt with and is a common risk exposure for all businesses. This issue is particularly acute for Property & Casualty (P&C) insurers.

Inflation's threat to P&C insurers

P&C insurers are exposed to a wide variety of risks that must be managed to within a company's risk tolerance. For example, the risk of exposure to catastrophic weather events can be managed through property location diversification or reinsurance, while other exposures are more difficult to protect against. Among such challenging exposures is the risk of unexpected inflation increases which tends to be an insidious peril that grows over time and affects all key financial metrics of an insurer. On the liability side of the balance sheet, claim payments accelerate beyond expected levels and reserve increases are required in anticipation of higher claims, leading to poor underwriting results. Company expenses also escalate beyond expectations. The adverse impact on reserve adequacy is more manifest for long tail liabilities than for short tail liabilities, because the long tail liabilities have more loss payments further into the future since the occurrence of the claims.

“Inflation is always and everywhere a monetary phenomenon.”

Milton Friedman (1970)

But it is not just the liabilities that are exposed. Interest rates begin rising as the bond market adjusts to the higher levels of inflation which in turn causes bond prices to fall and portfolio returns to suffer. If inflation rises quickly enough, the equity markets also are likely to suffer as investors grow fearful of the unstable economic conditions.

How bad can it get?

How significant is the risk of unexpected inflation to an insurance company? We adopted a Dynamic Financial Analysis (DFA) approach in our analysis to answer this question and more. A DFA model includes an enterprise model which simulates the target company we want to analyse and an economic scenario generator (ESG) that simulates the economic and capital market environment of the target company. The output of an ESG is a set of simulated scenarios or paths that portray future potential economic and capital market conditions in terms of macroeconomic indicators, such as inflation, GDP, and interest rates, and returns of various asset classes, such as bonds and equities. These scenarios are brought into the enterprise model where the target company's assets, liabilities, and business operation are evaluated under each of these scenarios. Each evaluation generates a set of multi-period financial measures reflecting different aspects of the company's financial performance in the future. Pro forma financial statements are constructed across each economic scenario and under various accounting bases. Realistic distributions of various financial metrics develop in a consistent manner.

To set up the DFA model for the purpose of this article, we assume a hypothetical target company which has the asset and liability profiles of the US Property & Casualty industry. We use economic value to measure the true value of an insurance company. Economic value is defined as the market value of assets minus the discounted value of liabilities plus the discounted value of future business, all adjusted for taxes, creating the formula:

Market value of assets - Fair value of liabilities + Present value of future businesses - Present value of taxes	= Economic value
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Economic value is not observable but it avoids the distortions of regulatory accounting regimes. It marks all assets to market, takes into account the time value of money and makes the values of different companies more comparable to one another. Economic risk can be thought of as the volatility of realised economic value around expected economic value; the higher the economic risk, the larger the chance of the realised economic value being significantly different from the expected economic value. We chose this economic value volatility to measure the risk exposure.

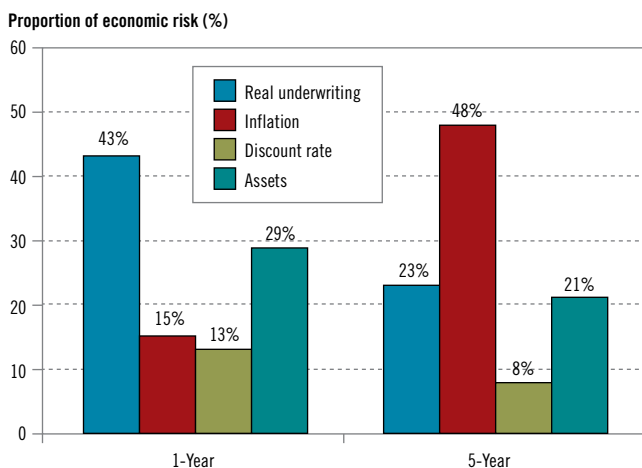
Major risks

There are four major risks borne by a P&C company: real underwriting risk, discount rate risk, asset risk and inflation risk.

A one-year horizon represents a relatively short time period, which is most often used by regulators and rating agencies to evaluate economic capital. However, by focusing on a five-year horizon, we will more fully capture the cumulative impact of economic events in the model. It also corresponds to the budgeting time horizon of many insurance companies, which is typically three to five years. The evaluation of a company's business operation over a long time horizon should serve as the base for its investment strategy.

With respect to inflation risk, we found it is not as significant as real underwriting risk or asset risk over a short one-year period – instead, it compounds over time. Over a longer 5-year horizon, inflation can be by far the largest risk factor to economic value. Unexpected inflation increases will lead to the inadequate pricing of policies and lost profitability and will generally cause yield curve disruptions. Shown in the chart below is the relative risk relationship of four key exposures over 1- and 5-year horizons.

DECOMPOSITION OF ECONOMIC RISK



Source: Conning Risk & Capital Management Solutions analytics.

Financial impact of inflation

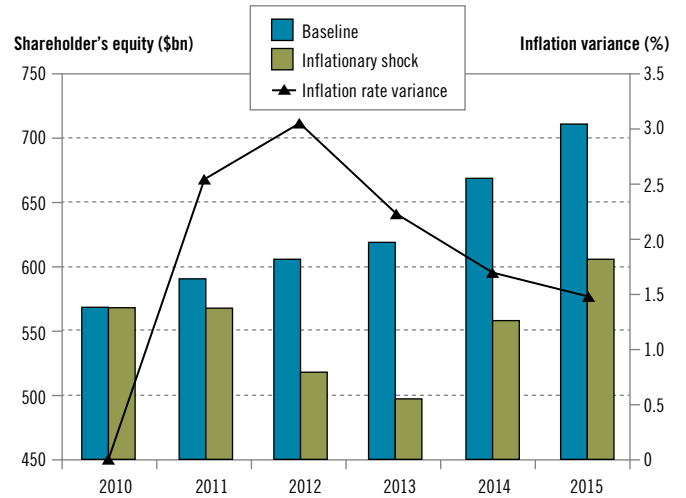
How does inflation risk translate into financial measurements?

The performance of the industry, as measured by shareholder's equity, is shown in the chart below. Changes to shareholder's equity are primarily driven by net income and changes in unrealised investment gains and losses. Running the model through an inflation shock scenario of two standard deviations where inflation increases from roughly a 2% baseline rate to 5% shows just how damaging and long lasting an accelerating inflation rate can be to the insurance industry. Under this scenario, net income turns negative and the investment portfolio produces unrealised losses. At the lowest point, the inflation shock scenario leads to a 20% loss in shareholder's equity relative to the baseline expectation.

Protecting against inflation

What makes an ideal investment strategy to protect an insurance company from inflation risk? Insurance companies need

SHAREHOLDER'S EQUITY IMPACTS DUE TO INFLATION CHANGES



Source: Based on Conning's insurance company simulation results

investment income to supplement their underwriting income, in particular when markets are soft and price competition fierce. Good investment strategy helps insurance companies grow their capital without disproportionately increasing their risk exposure. Because both assets and liabilities of insurance companies are sensitive to inflation, a protective investment strategy provides a way to hedge inflation risk on liabilities.

An ideal inflation protective strategy for an insurance company should meet the following criteria:

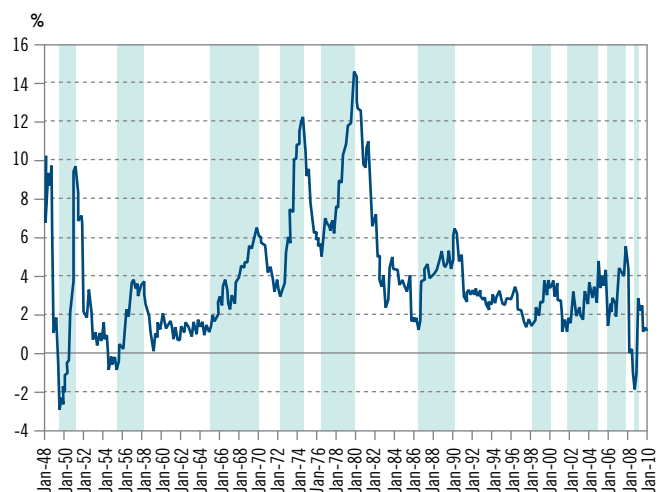
- First, it has to satisfy some basic characteristics of good investment strategies; it must be well diversified and relatively inexpensive to implement in the current capital market
- Second, it has to enhance the economic value of the company on a risk-adjusted basis, in other words, improve the economic value efficient frontier
- Third, it should not subject the company to substantially higher capital charges from the regulatory or rating agency perspective
- Last, it should not substantially reduce investment income.

Using inflation-sensitive assets to protect against inflation's harmful effects offers the opportunity for higher investment returns without onerous capital demands and investment income reductions. Through advanced modelling techniques, we can customise the optimal asset allocation that supports an insurer's specific lines of business, tax position and risk and reward preferences.

High performing assets in inflationary periods

The first step in our analysis is to investigate historical returns of different asset classes, particularly during inflationary periods, so that we have a set of selected inflation protective assets from which to form our strategy. In researching several decades of US inflation data, we find that periods of increasing inflation have occurred frequently and some have lasted for several years. We identified inflationary periods as those when the rolling 12-month inflation rate is consistently running up. As indicated by the gray areas in the following chart, from 1948 to 2010, almost half of the time, the US had an inflationary

INFLATIONARY PERIODS IN THE US 1948-2010



Source: US Bureau of Labor Statistics; Conning Risk & Capital Management Solutions analytics

environment. The annualised increase of the 12-month inflation rate during these periods was about 2.4%.

As the rate of inflation increases, the following year's inflation rate is likely to be higher as well as consumers and businesses begin to expect higher price changes due to positive serial correlation of inflation. Since unexpected inflation is more damaging to insurers than high but stable inflation, we were particularly focused on increasing inflationary episodes that act as a proxy for unexpected inflation increases. During these periods, we found that most asset classes performed poorly, particularly fixed income investments. There were, however, certain asset classes that have held up well and generated superior performance relative to the overall market.

Hard asset sectors with exposure to commodities used in industrial production, as well as precious metals, have shown outperformance during inflationary periods. Energy sectors and energy commodities such as petroleum-based products are also strongly correlated with inflation and have been catalysts for creating inflation momentum in the past. Exposure can be gained to these hard asset sectors and commodities through the futures market, financial vehicles such as Exchange-Traded Funds (ETFs) or direct equity investments in companies that benefit from commodity price increases. Other select sectors, such as real estate, retailing, materials and technology have also provided solid returns. Convertible bonds in inflation-sensitive sectors are a capital-efficient way for insurers to gain equity-like exposure while still maintaining a relatively high level of investment income.

Other financial vehicles derive performance directly from changes in the inflation rate itself. Treasury Inflation Protected Securities, or TIPS, are indexed to the Consumer Price Index (CPI) and accrue additional principal at the rate of inflation. Inflation swaps also can provide inflation protection as a level, fixed-rate of interest is paid in return for the rate of inflation. No cash outlay is required, but insurers will need to meet certain regulatory standards before executing an agreement and would likely be subject to mark-to-market volatility. Floating rate notes can provide additional yield in the form of credit spread over a short index which would adjust higher as interest

rates rise during an accelerating inflationary period. But given today's low short-term rates, there is an immediate cost to buying protection against rapidly rising inflation and interest rates.

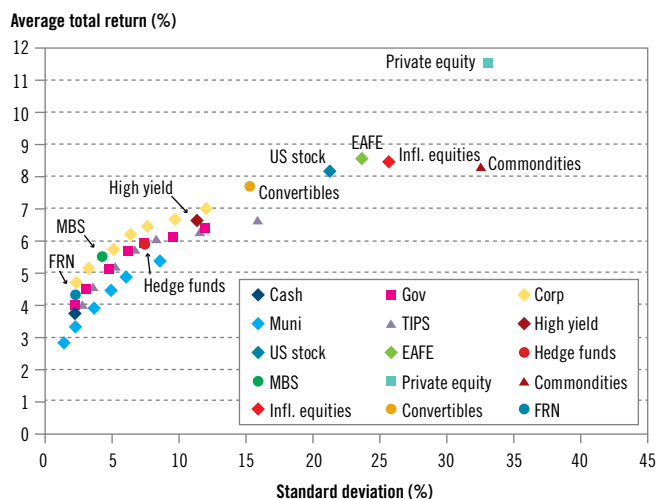
Strategies that work

Based on our analysis on the historical data and our perception of long-term dynamics of inflation, economic growth, interest rates, and returns of different asset classes, we calibrate our economic and capital market simulation model to provide realistic scenarios for economic indexes and asset returns. The following chart displays the average and standard deviation of our modelled asset class returns (the multiple points for government, corporate and municipal bonds along with TIPS represent multiple maturities). Besides TIPS, we identified Inflation Protective Equities, Commodities, Floating Rate Notes, and Convertibles as our inflation protective assets. Inflation Protective Equities cover energy, retailing, materials, technology hardware & equipment, and the real estate sector. Commodities include Crude Oil, Industrial Metal, and Precious Metal sector.

Certain asset classes such as TIPS and floating rate notes had a low risk, low return profile, while others, such as commodities, inflation-sensitive equities and convertible bonds, had higher risk and return expectations. By running our industry model through real world economic scenarios, we tested the value of adding various allocations of our inflation-sensitive assets to the insurance industry's investment portfolio. We then solved for the optimal asset allocations that maximise the economic value of the industry, while minimising the economic risk, forming what is called an efficient frontier. The following chart shows the economic value efficient frontiers of our hypothetical company with US P&C industry asset liability profile.

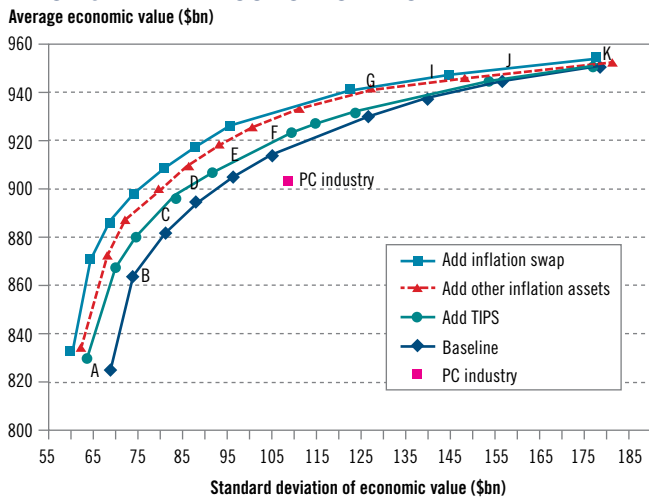
Several interesting insights can be gleaned from this type of analysis. First, including inflation protection into the industry's portfolio can greatly reduce the overall risk and improve the value of the industry. Asset portfolio returns are improved during inflationary periods, which help to offset the inflation risk held in the industry's liabilities. The timing of exceptional returns, during periods of inflationary crisis when other traditional assets are performing poorly, provides extraordinary value in stabilising results from an economic value perspective.

MODELLED ASSET CLASS RETURNS



Source: Conning Risk & Capital Management Solutions analytics

**ASSET LIABILITY EFFICIENT FRONTIER
END OF 5TH YEAR ECONOMIC VALUE**



Source: Conning Risk & Capital Management Solutions analytics

Second, while we see that TIPS provide risk reduction, the benefits are typically seen at the lower end of the risk and return spectrum. But by adding higher-returning commodities, inflation-sensitive equities and convertible bonds, we can gain inflation protection while still maintaining the potential for earning a higher relative return.

Third, when we include inflation protection, we can modestly extend the duration of the current bond portfolio, which improves portfolio yields and investment income. By protecting against inflation shocks with assets that have historically appreciated in value during such environments, we can afford this extension and the risk of interest rate hikes.

Last, overlaying the portfolio with an inflation swap increases average economic value or reduces economic risk across the board. As a direct hedge against inflation with no cash outlay, an inflation swap provides an inflation hedge without sacrificing investment income.

The chart below shows the impact on the industry's shareholder's equity when we include an optimal allocation to inflation-sensitive assets. While there is still a decline due to the inflation shock, performance is much improved over the current portfolio allocation.

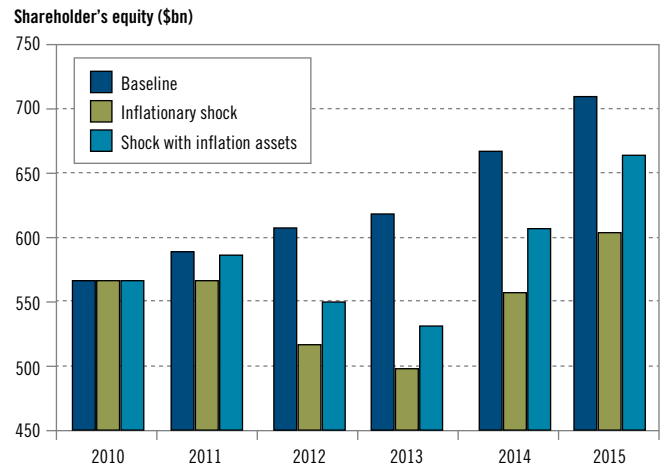
Tailoring protective strategies to individual companies

While we have come up with an inflation protective investment strategy for our hypothetical company with a generic asset-liability profile, further analysis is typically needed to get the strategy customised to a real company. The following are some important considerations:

Long tail liabilities vs. short tail liabilities

Longer tail liabilities have more loss payments made further into the future. This is typically due to the delay in claim reporting, adjusting, and settlement, the involvement of litigation, and higher claim severity. These liabilities usually include claims made under such coverage as workers' compensation, medical malpractice, professional liability and general casualty. Longer tail liabilities are more susceptible to inflation risk. The insurance companies that write lines of business with a longer

SHAREHOLDER'S EQUITY IMPACTS



Source: Conning Risk & Capital Management Solutions analytics

tail thus have more need for inflation protection. The investment strategy for these companies should have more allocation to inflation protective assets.

In our analysis, we are able to vary the liability profile of the industry and test for the most optimal asset allocations for short and long-tail lines of business. We find that long tail lines are more correlated with and prefer higher allocations to longer-dated TIPS. We also find that long tail lines prefer higher allocations to more volatile, but higher returning asset classes, such as commodities and inflation-sensitive equities, and lower allocations to convertible bonds and floating rate notes.

Capital adequacy/capital charges

Insurance companies operate under many constraints and are heavily regulated. The regulators would like to keep the insurance companies from taking too much investment risk to protect policyholders. In addition, the rating agencies demand a certain level of capital be held to justify a company's credit rating. The capital requirement for the investment risk exposure depends on the type and allocation of invested assets. Therefore, an insurer's inflation protection investment strategy also needs to take into consideration its risk based capital requirements and risk tolerance.

Investment income

Some inflation protective investments, such as commodities and equities, do not have coupon or dividend income, or have very uncertain dividend income. TIPS coupon yield is lower than most other fixed income securities. Therefore, the investment protective strategy might bring about a give-up on book yield, or higher volatility in investment income.

Risk tolerance

Different companies have different risk tolerances and may not use the same risk measurement metrics. Different measurements and risk tolerances will lead to different strategies. A company with a higher risk tolerance will prefer more commodities and equities, while a company with a lower risk tolerance will gravitate toward TIPS and Floaters.

Inflation risk exposure for life insurance companies

While the majority of inflation's impact on P&C company profitability is tied to the adverse growth in claim payments, Life insurance companies suffer in a different manner.

Investment portfolios of life companies are heavily weighted toward fixed income investments such as government and corporate bonds, and residential and commercial mortgages. These investments typically pay fixed rates of interest with maturities much longer than those typically held by P&C companies. As the capital markets react to inflation acceleration, market interest rates will rise and will impair the market value of these longer-term fixed income investments. Depending on the timing of the investment purchases, the unrealised loss position of the life insurer's portfolio will grow, leading ultimately to realised losses if and when the company needs to sell assets.

On a statutory accounting basis, realised losses are absorbed by the Interest Maintenance Reserve (IMR) and there is no loss in the company's capital position. However, if there are enough realised losses that deplete the IMR, company capital will be adversely impacted which may impair a company's ability to write new business. On a GAAP accounting basis, losses will flow through to the company income statement, and income and capital will suffer. On an economic basis, the economic value of the company will depend on the duration management of both sides of the balance sheet. If the duration of the assets is shorter than the duration of the liabilities, the market value of the assets will fall less than the market value of the liabilities such that the net surplus position may actually benefit. However, if the reverse is true and the asset duration is longer than the liabilities, the economic value of the company may fall. Prudent Asset-Liability Management (ALM) is crucial in measuring and understanding this dynamic.

Beyond duration analysis, convexity calculations that measure the way durations change, given changes in interest rates, also may negatively impact a life company's surplus position. Life companies typically "sell options" on both sides of the balance sheet. For instance, on the liability side, they give policyholders the right to lapse their policies when interest rates rise, which may cause the company to sell assets just when market values have been impaired. On the investment side, life companies often make investments that allow for the return of funds to the company when interest rates fall, requiring reinvestment in a lower yielding environment. The net effect is that life companies typically suffer when there are large swings in interest rates, regardless of the direction of the rate changes. Rapidly rising interest rates in an increasing inflation environment are no exception.

Like P&C companies, life companies are exposed to increasing expenses during inflationary periods. Unlike P&C companies that may have some ability to reprice annual renewable policies during times of increasing expense pressure, life policies often require long-term fixed contracts which are priced using certain fixed inflation assumptions. When actual inflation deviates from these initial assumptions, life companies have a limited ability to recoup higher realised expense charges.

While the inflation risks to life companies are not insignificant, the exposure is measurably less than that of P&C companies. Life company investments may suffer and expenses may increase, but most life liabilities are predetermined and are not subject to large increases in claim payments as inflation accelerates.

Conclusions

Over longer time periods, inflation can be the greatest risk faced by P&C insurance companies. Given today's monetary environment, this inflation risk may be preeminent. Asset classes that perform well during periods of accelerating inflation are limited, and those that exist have very different characteristics and need to be managed within an insurance company context. Conning's inflation protection approach, using inflation-sensitive asset classes, combines quantitative Strategic Asset Allocation modelling capabilities with insurance asset management experience. We believe the right blend of strategic assets with expert investment management can lead to optimal enterprise performance.

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