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**Don't Let Inflation Spike
Your Financial Plan: A Goals-
Based Analysis of Purchasing
Power Erosion**

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Don't Let Inflation Spike Your Financial Plan: A Goals-Based Analysis of Purchasing Power Erosion

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KEY FINDINGS

- Inflation shocks, to the extent that they lead to a material deterioration in purchasing power, can put a well-formulated investment plan under normal circumstances into jeopardy if not properly considered.
- Financial plans utilizing investment strategies with larger allocations to risk assets (e.g., stocks and real estate) demonstrate less longer-term sensitivity to inflation shocks.
- Investors with longer time horizons are at relatively lower risk from inflation shocks—with time on their side, they may be more likely to recoup purchasing power losses in more normal market environments.
- Investors that are net savers may be less sensitive to inflation shocks, as additional cash helps to replenish portfolio values during difficult investment periods.
- An asset allocation strategy that appears to only provide a marginally better probability of success in normal environments may see that benefit increase several-fold in extreme inflation scenarios.

ABSTRACT

Inflation rates and expectations have far-reaching effects, influencing asset returns, cash requirements to meet spending needs, and various other aspects relevant to achieving financial goals. To understand the comprehensive impact of inflation shocks, we conducted sensitivity analyses using Monte Carlo simulations for various investor archetypes in a goals-based framework. Results show that larger inflation shocks reduce the likelihood of meeting financial goals. However, several factors influence the degree of sensitivity to inflation shocks, including, but not limited to, asset allocation, time horizon, and net saver status.

One of the lingering reverberations of the COVID-19 pandemic and its associated economic disruptions has been higher-than-normal inflation.¹ High inflation is traditionally caused by imbalances between supply and demand. To that end, there have been several inflationary factors at play since the beginning of 2020. First, supply chain issues led to scarcity in some raw materials and finished goods

¹ “Normal inflation” refers to growth in the price level of a basket of consumer goods and services generally consistent with the Federal Reserve’s price-stability goal over the long term. In practice, 2% is consistent with explicit Fed guidance and general international central bank standards (Bullard 2018).

(Ball et al. 2022). In addition, stay-at-home trends affected consumer preferences for goods over services (Barnes et al. 2022). For example, many spent their money on home improvement initiatives when vacations were out of the question (Baker 2021). Plus, aggressive fiscal stimulus helped boost the spending power of Americans and increased aggregate demand (Jorda and Nechio 2023). On top of that, the war in Ukraine had a destabilizing impact on global commerce (Caldara et al. 2022). When combined, these effects have been a perfect recipe for an inflation shock.

Inflation can have financial implications for households as they face rising costs of living. The natural question investors are asking themselves is how inflation can affect them and their ability to reach their financial goals. Even in normal times, assumptions about the future rate of inflation have been found to be one of the most important factors in determining the feasibility of reaching one's financial goals (Parker 2017).

The comprehensive answer to that question is multidimensional, because inflation can influence a variety of factors that determine the success of an investment plan. For example, prevailing inflation rates and inflation expectations can have implications for expected returns on various asset classes (Phoa 2023). In addition, the cash requirements needed to meet certain goals, such as annual spending or the purchase of a home, should fluctuate with inflation. Also, some sources of future income may be indexed to inflation, such as Social Security. Plus, the thresholds for income and capital gains tax brackets are generally adjusted for inflation over time.

The value of a holistic, goals-based wealth management framework is that it can distill all of these factors down to a concrete, digestible number—the probability of success for reaching one's financial goals (Fowler and de Vassal 2006; Simonato 2023). In an effort to gauge the impact that inflation shocks can have for high-net-worth individuals and families, we use a goals-based investing framework to provide insight on the circumstances under which it may have a material impact on a wealth plan's probability of success. In this sense, the approach is goals-based because it explicitly links portfolio selection to the goals of the investor by measuring the probability that the strategy achieves his or her financial objectives.

The fact patterns for investors, from their goals to their financial means to achieve those goals, can be unique. As a result, we consider several hypothetical types of investors (archetypes) for insight on when and for whom inflation shocks may matter most. We also explore whether there are opportunities for investors to consider changes to their investment and/or wealth-planning strategies to hedge the risks from inflation shocks.

In the following sections, we embark on a comprehensive exploration of the dimensions through which inflation can impact the probability of success. The first section lays out the methodology and underlying assumptions used in the analysis. The second section reviews the insights of the study, laying out the unique fact patterns for each archetype, the resulting probability of success sensitivity tables, and key findings. The final section provides further observations on sensitivity factors that are broadly shared among investors, as well as some of the more situation-specific considerations.

METHODOLOGY

To test the sensitivity of hypothetical investors to inflation shocks, we conduct Monte Carlo analyses by using a random sampling of projected market behavior that simulates hundreds of possible paths for major asset classes. The underlying parameters regarding the general behavior of major asset classes (capital market

assumptions), including specific assumptions for the inflation shock periods based on an empirical analysis of the sensitivity of asset classes during higher-than-normal inflation periods, can be found in Exhibit 2. The Monte Carlo simulation then applies a stochastic sampling method, combining Cholesky decomposition with random rate vectors to account for the various interrelationships among asset classes (Burgess 2022).

For each goals-based plan, the output of these Monte Carlo analyses is an array of binary pass/fail results. For each market simulation, if the cash flow needs of the investor deplete the portfolio of all assets at any time during the planning horizon, that simulation is a failure; otherwise, that simulation is a success. The percentage of simulations that result in success is then referred to as the probability of success. This is an intentionally simple measure for assessing the viability of a financial plan and is the fruit of the late Harry Markowitz's imagination. Other measures that seek to refine the prospects for a financial plan may be useful, but are outside the scope of this article (Estrada 2017, 2018).

The analysis seeks to quantify the changes in probability of success around several hypothetical inflation shock scenarios. This includes a baseline (i.e., no inflation shock) for comparison purposes, and two-year shocks of 6%, 9%, 12%, and 15% in consumer price inflation.

For purposes of this analysis, the inflation shock scenarios and their associated capital market assumptions are divided into three distinct periods:

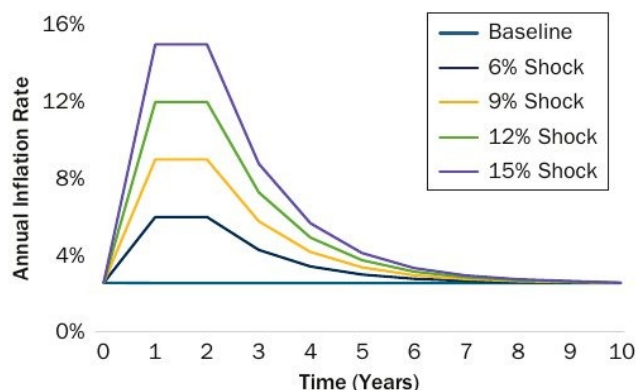
1. An inflation shock,
2. Transition to normal, and
3. Normal.

An "inflation shock" is defined as two straight years of immediate, above-normal inflation and lower-than-normal inflation-adjusted (real) returns for equities and fixed income. The subsequent seven years are characterized by a gradual return of inflation to normal and above-average real returns for equities and fixed income. For all years thereafter, capital market assumptions default to baseline figures. See Exhibit 1 for a full breakdown of assumptions used in the analysis.

Not all investors have the same asset allocation targets for their investment portfolios, with some targeting higher risk/higher return portfolios, and others preferring stability with lower returns. Because asset allocation could be a material factor in gauging sensitivity to inflation shocks, each sensitivity analysis includes six hypothetical portfolios ranging from capital preservation (lower risk, lower return) to growth (higher risk, higher return), with portfolio-specific asset allocations noted in Exhibit 2. For simplicity purposes, the portfolios are constructed with the following underlying assets: equities, fixed income, and cash. In practice, real assets such as commodities futures add a layer of portfolio complexity but can help portfolios hedge against inflation (Bodie 1983). In all portfolios, we assumed annual rebalancing back to target weights.

The variability of circumstances and fact patterns across households is sufficiently wide to warrant a multilens review of sensitivity. To that end, several hypothetical investor archetypes are analyzed through this process, with each meant to be a general representation of a typical high-net-worth investor type. The intention of this article is to provide a targeted examination of the financial dynamics specific to the high-net-worth investor group. This allows for the exploration of factors specific to the complexity of higher levels of wealth. With that said, the analysis also yields generalized insights that would most likely apply to investors of all stripes.

EXHIBIT 1
Capital Market Assumptions Following Inflation Shocks



	Inflation Shock	Transition Back to Normal	Normal
Years	1-2	3-9	10+
Description	2 straight years of above average inflation	Getting back to normal inflation (asset price adj.)	Standard 30yr expectations
Inflation Assumptions	6%, 9%, 12%, 15%	Gradual return to normal	
Capital Market Assumptions	Inflation shock returns	Period of above average real returns	

Baseline	Years 1-2	Years 3-9	Years 10+
Inflation	2.6%	2.6%	2.6%
Equity	8.8%	8.8%	8.8%
Fixed Inc. (TX Client)	3.6%	3.6%	3.6%
Cash (TX Client)	2.0%	2.0%	2.0%
Fixed Inc. (TE Client)	4.6%	4.6%	4.6%
Cash (TE Client)	3.1%	3.1%	3.1%

6% Shock	Years 1-2	Years 3-9	Years 10+
Inflation	6.0%	3.1%	2.6%
Equity	2.8%	10.4%	8.8%
Fixed Inc. (TX Client)	2.2%	3.9%	3.6%
Cash (TX Client)	4.3%	2.3%	2.0%
Fixed Inc. (TE Client)	4.0%	4.8%	4.6%
Cash (TE Client)	5.3%	3.4%	3.1%

9% Shock	Years 1-2	Years 3-9	Years 10+
Inflation	9.0%	3.5%	2.6%
Equity	-2.1%	11.7%	8.8%
Fixed Inc. (TX Client)	1.3%	4.2%	3.6%
Cash (TX Client)	6.3%	2.6%	2.0%
Fixed Inc. (TE Client)	3.7%	4.9%	4.6%
Cash (TE Client)	7.3%	3.7%	3.1%

12% Shock	Years 1-2	Years 3-9	Years 10+
Inflation	12.0%	3.9%	2.6%
Equity	-7.1%	13.2%	8.8%
Fixed Inc. (TX Client)	0.3%	4.4%	3.6%
Cash (TX Client)	8.3%	2.9%	2.0%
Fixed Inc. (TE Client)	3.3%	5.0%	4.6%
Cash (TE Client)	9.3%	4.0%	3.1%

15% Shock	Years 1-2	Years 3-9	Years 10+
Inflation	15.0%	4.3%	2.6%
Equity	-12.1%	14.8%	8.8%
Fixed Inc. (TX Client)	-0.6%	4.7%	3.6%
Cash (TX Client)	10.3%	3.2%	2.0%
Fixed Inc. (TE Client)	2.9%	5.1%	4.6%
Cash (TE Client)	11.3%	4.3%	3.1%

NOTES: TE Client refers to taxable fixed income securities such as that representing the Bloomberg U.S. Aggregate Index. TX Client refers to tax-exempt municipal fixed income securities such as that representing the Bloomberg Municipal Bond Index.

EXHIBIT 2**Portfolio Asset Allocation across the Risk Spectrum**

	Capital Preservation	Income with Moderate Growth	Balanced	Growth with Income	Growth with Moderate Income	Growth
Equities	15%	30%	45%	60%	75%	90%
Fixed Income	82%	67%	52%	37%	22%	7%
Cash	3%	3%	3%	3%	3%	3%

In practice, many similar investors may demonstrate unique sensitivities to inflation shocks, but for purposes of seeking generalized insights, the analysis focuses on the following general archetypes:

- Retiree,
- Inheritor,
- Retirement prepper,
- Young business owner,
- Senior executive nearing retirement,
- Divesting business owner, and
- High earner.

Additional information regarding the specific circumstances of each archetype can be found in Exhibits 3–9.

Different pools of assets are tapped to meet spending goals in the following order:

1. Required minimum distributions (RMDs) from retirement accounts,
2. Cash/money market accounts,
3. Taxable investment accounts (excluding low-cost-basis concentrated positions),
4. Retirement accounts (in excess of RMDs), and
5. Low-cost-basis concentrated positions in taxable investment accounts.

RESULTS

Exhibits 3–9 show the results of the inflation shock sensitivity analyses, as measured by the probability of success of each archetype's respective goals-based wealth plan. The main output is a two-dimensional heatmap of probability of success, along the various points in the portfolio risk spectrum and magnitudes of inflation shocks. Given the tendency of asset returns to exhibit fat left tails, it is often impractical to seek 100% probability of success, when values above 85% offer a reasonable likelihood of success (Levy and Duchin 2004).

The analysis conducted for each archetype is hypothetical, whereas sensitivity analyses utilizing the same methodology conducted for actual investors with similar financial circumstances may differ materially and produce results different from those summarized.

The retiree couple (each spouse age 65) is ready to retire immediately and has one goal—to maintain their standard of living. In this case, that includes \$325,000 in

EXHIBIT 3

Retiree

Retiree	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$500,000	Capital Preservation	70%	46%	22%	7%	2%
Age: 65	Investment Account: \$5,000,000	Income w/Moderate Growth	83%	71%	50%	28%	12%
Expenses: \$325,000	Rollover IRA: \$3,000,000	Balanced	89%	83%	65%	48%	28%
	Total: \$8,500,000	Growth w/Income	90%	88%	77%	62%	42%
		Growth w/Moderate Income	90%	89%	83%	71%	54%
		Growth	90%	92%	85%	75%	63%

pretax expense on an inflation-adjusted basis through age 95 (30-year planning horizon). The couple has \$8.5 million in investable assets to meet this goal, which includes a combination of cash savings, taxable investment accounts, and retirement accounts.

In the baseline scenario (assuming no immediate inflation shock), which is a broad representation of each portfolio's ability to meet the spending goals of the retiree in normal times, the optimal asset allocation sits anywhere between a growth with income and growth portfolio from a purely quantitative perspective given those portfolios contain the highest probability of success among the various options. With that said, retirees would fare almost as well with most other asset allocation options, though the capital preservation portfolio is likely on the borderline of a comfortable likelihood of achieving their goals.

Introducing inflation shocks brings a specific type of risk to the forefront—risk to purchasing power. The first observation here is that inflation shocks generally reduce the odds of meeting financial goals, with larger shocks having a more pronounced effect on probability of success. However, that effect is not uniformly distributed across the risk spectrum—portfolios with more risk assets (i.e., stocks) demonstrate less sensitivity to those shocks than their less risky counterparts dominated by fixed income/bond allocations. This reflects the fact that assets with higher expected returns (risk assets) have the potential to compound returns at a higher rate over the long term and make up for any impairment to purchasing power in the short term. In addition, equity investments are essentially claims on the real assets that underlie company balance sheets, so they should behave as solid inflation hedges over the long term (Siegel 2014).

Another dimension of risk to consider is the sequence of returns. The timing of an event with material implications for an investment portfolio can be important for investors with discrete, time-sensitive spending goals (Basu et al. 2013). In the retiree's case, the retirement spending goal occurs coincident with the inflation shock, impairing the spending power of the portfolio just as funds are needed from it to pay for living expenses.

In some sense, this sensitivity analysis reveals crucial truths about investing in portfolios that many would traditionally characterize as "lower risk." Take, for example, the capital preservation portfolio, 85% of which is made up of cash and fixed income investments. If measuring risk in terms of the expected volatility of its returns, this portfolio is likely the lowest risk option across the risk spectrum. However, this portfolio is most exposed to the risks associated with an inflation shock. This leads to the observation that it can be costly not to have sufficient exposure to risky assets under the most extreme inflation shock scenarios.

EXHIBIT 4

Inheritor

Inheritor	Investable Assets	Probability of Success				
		Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living Age: 45 Expenses: \$200,000	Cash: \$200,000					
	Investment Account: \$3,500,000					
	401k: \$300,000					
	Total: \$4,000,000					
	Capital Preservation	45%	29%	18%	11%	4%
	Income w/Moderate Growth	74%	59%	46%	33%	23%
	Balanced	85%	75%	66%	55%	44%
Growth w/Income	89%	84%	77%	69%	59%	
Growth w/Moderate Income	90%	87%	82%	76%	70%	
Growth	91%	89%	86%	81%	74%	

These insights can help inform proper portfolio selection. Consider a scenario in which the retiree has chosen the growth with moderate income allocation. In this case, the financial plan could weather a 12% inflation shock with a 71% probability. That just so happens to be a roughly similar probability of success to the capital preservation allocation in the no shock scenario. This basically means that retirees could be just as well off if inflation runs at a hot 12% rate for two straight years, as long as they maintain their growth with moderate income asset allocation.

The results of this analysis can also be helpful for determining the circumstances under which investors may benefit most from an explicit inflation hedge in their portfolio. There are a handful of asset classes that have empirically demonstrated an ability to perform exceptionally well in periods of higher-than-normal inflation, such as commodities and commodity-producing equities (Twomey et al. 2011; Jennings 2012). If altering the asset allocation of retirees' financial plan is not easily feasible due to factors such as large embedded capital gains, they might consider layering in a nominal allocation to those asset classes to hedge inflation risk.

The inheritor couple is relatively young (each spouse age 45) and would like to maintain their standard of living (\$200,000 in pretax expenses) in retirement, beginning at age 65. Until retirement, they earn wage income of \$200,000 per year. The couple has \$4 million to meet this goal, which sits mostly in a taxable investment account, as well as a cash savings account and 401(k).

In the baseline scenario, it is clear even before the consideration of risks from inflation shocks that portfolio selection is an important decision for the inheritor. This archetype is not a net saver, so they need to rely on their inheritance alone to fund retirement. Asset allocations in the balanced-through-growth portfolios are needed to eclipse an 80% probability of success. With 20 years until retirement age, they have a relatively long time horizon, which they will need to use to their advantage, given their lack of net savings to meet goals. Given the size of their assets and their spending goals, it is important that they take sufficient risk in their portfolio so their investments have a reasonable likelihood of sufficient growth until they retire.

The risks to probability of success from inflation shocks are directionally similar—portfolios with more risk assets demonstrate less sensitivity to those shocks than their less risky counterparts dominated by fixed-income/bond allocations. Assuming inheritors choose a growth-with-moderate-income allocation, their goals-based plan could withstand a 15% inflation shock with a 70% probability. That is right around the same likelihood of success as the income-with-moderate-growth portfolio in the no shock scenario, meaning inheritors may be just as well off if inflation runs at a hot

EXHIBIT 5

Retirement Prepper

Retirement Prepper	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$500,000	Capital Preservation	68%	46%	30%	16%	8%
Age: 55	Investment Account: \$10,000,000	Income w/Moderate Growth	84%	74%	58%	42%	27%
Income: \$650,000	401k: \$4,500,000	Balanced	89%	84%	73%	60%	47%
Expenses: \$600,000	Total: \$15,000,000	Growth w/Income	91%	90%	82%	73%	61%
		Growth w/Moderate Income	91%	90%	86%	80%	71%
		Growth	92%	93%	89%	82%	76%

15% rate for two straight years, as long as they maintain their growth-with-moderate-income asset allocation.

In relative terms, the inheritor couple appears less sensitive to inflation shocks than does the retiree. For example, both couples have the same probability of success under growth-with-moderate-income asset allocation strategies. However, the retiree's probability of success in the 15% inflation shock scenario falls to 54%, whereas the inheritor's falls to 70%. This likely owes to the longer time horizon of the inheritor, which reduces sequence of return risk from an immediate inflation shock. An extra 20 years' time until assets need to be drawn down to support spending allows returns to compound in more normal market environments for longer to offset the short-term impairment to purchasing power.

The retirement prepper couple (each spouse age 55) are late-career professionals earning a combined \$650,000 per year. They anticipate retiring at age 65 and have one goal—to maintain their standard of living up to and through retirement. This includes \$600,000 in pretax expenses on an inflation-adjusted basis through age 95. The couple has \$15 million in investable assets, including cash savings, taxable investment accounts, and retirement accounts.

Under the baseline conditions with no inflation shocks, the retirement preppers face a reasonable likelihood of reaching their financial goals with most asset allocation options, with the exception of the capital preservation portfolio.

As with the other archetypes, the asset allocation strategies with more risk assets demonstrate lower sensitivity to inflation shocks than their less risky counterparts. However, relative to the other archetypes, the retirement prepper appears to be one of the least sensitive to inflation shocks, as some portfolios generate a greater than 80% probability of success, even in the 12% inflation shock scenario. This reduced sensitivity is likely due to the combination of a longer time horizon (10 years until investments will need to fund the spending goal) and the fact that the retirement prepper is a net saver, which helps to replenish portfolio values during difficult investment periods.

The results for the retirement prepper offer interesting insight into portfolio selection when, at face value, multiple options appear interchangeable. For example, the balanced, growth-with-income, growth-with-moderate-income, and growth portfolios each have a roughly 90% probability of success in the baseline scenario. From a purely quantitative perspective, the retirement prepper should be largely indifferent among those three, based off that information alone. Knowing nothing else, they may ultimately choose the growth-with-income portfolio because it has the lowest expected

EXHIBIT 6

Young Business Owner

Young Business Owner	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$200,000	Capital Preservation	12%	6%	3%	1%	1%
Age: 40	Investment Account: \$1,250,000	Income w/Moderate Growth	39%	26%	19%	14%	10%
Income: \$1,000,000	IRA: \$1,700,000	Balanced	64%	51%	44%	37%	30%
Expenses: \$450,000	Business: \$5,000,000	Growth w/Income	77%	68%	62%	56%	50%
	Total: \$8,150,000	Growth w/Moderate Income	83%	78%	73%	68%	63%
		Growth	85%	83%	80%	76%	72%

EXHIBIT 7

Senior Executive Nearing Retirement

Senior Executive Nearing Retirement	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$500,000	Capital Preservation	88%	74%	56%	41%	39%
Age: 60	Conc. Stock: \$10,000,000	Income w/Moderate Growth	89%	83%	67%	56%	42%
Income: \$1,000,000	Investment Account: \$7,500,000	Balanced	91%	88%	76%	63%	48%
Expenses: \$850,000	Rollover IRA: \$7,00,000	Growth w/Income	92%	91%	83%	72%	56%
	Total: \$25,000,000	Growth w/Moderate Income	92%	93%	87%	77%	65%
		Growth	93%	94%	88%	81%	71%

volatility. However, the consideration of inflation sensitivity adds a new dimension to that decision process, because moving up the risk spectrum to the growth-with-moderate-income or growth portfolio could help offset the risk posed by inflation shocks.

The young business owner couple are early-career professionals (each spouse age 40) with a combined wage income of \$1 million per year. They would like to retire in 25 years (age 65) and maintain their standard of living up to and through retirement (\$450,000 pretax spending, adjusted for inflation). The couple has \$8.15 million in assets, including cash savings, taxable investment accounts and retirement accounts, but their balance sheet is dominated by a \$5 million stake in a closely held business.

Before considering the impact of inflation shocks, it is obvious that the young business owners' asset allocation is extremely important. In the baseline scenario, the likelihood of success for their financial plan spans a 73% chasm, with a 12% probability for the capital preservation portfolio and 85% odds for the growth portfolio. As big net savers with a long time horizon, it is crucial that they select an asset allocation with aggressive growth prospects to meet their spending goals.

Portfolios on the higher end of the risk spectrum again demonstrate lower sensitivity to inflation shocks. The only reason the capital preservation portfolio has one of the lowest differences in probability between the baseline and 15% inflation shock scenarios is that probabilities are capped on the downside at 0%. The need to

EXHIBIT 8

Divesting Business Owner

Divesting Business Owner	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$250,000	Capital Preservation	59%	29%	11%	3%	1%
Age: 65	Investment Account: \$6,500,000	Income w/Moderate Growth	76%	54%	31%	15%	6%
Expenses: \$650,000	SEP IRA: \$2,250,000	Balanced	84%	68%	49%	31%	16%
	Business Installment Sale Note: \$10,000,000	Growth w/Income	87%	78%	63%	44%	28%
	Total: \$19,000,000	Growth w/Moderate Income	88%	82%	71%	56%	40%
		Growth	88%	86%	76%	65%	52%

take sufficient risk should outweigh any concerns from young business owners over inflation. Incidentally, choosing a higher risk portfolio satisfies both concerns over inflation and general asset sufficiency for their spending.

The senior executive nearing retirement couple (each spouse age 60) earns a combined \$1 million per year and anticipates retiring in five years. During retirement, they would like to maintain their standard of living, which includes \$850,000 in pretax expenses grown at inflation over time. The couple has \$25 million in investable assets, with a large share of those assets held in a concentrated position of low-cost-basis stock, which is assumed to behave like a typical US small cap stock carved out from the rest of the portfolio.

In the baseline scenario, this couple is in relatively solid shape for meeting their financial goals. The probability of success for their goals-based wealth plan is above 85%, regardless of the asset allocation strategy that they choose.

Although all the asset allocation variants appear to deliver a satisfactory result for senior executives nearing retirement in the baseline, consideration of the risks associated with inflation shocks might inform them of the benefits of a higher risk allocation. For example, the capital preservation and growth-with-income portfolios have roughly similar probabilities of success in the baseline (88% and 92%, respectively). In contrast, those two portfolios have 41% and 72% probabilities of success in the 12% inflation shock scenario.

A key consideration is the couple's large, concentrated position in a small-capitalization stock. In the short run, during inflation shocks, small-caps often behave poorly, relative to their larger counterparts (Kelly 2003). However, the broad class of small-cap stocks has a solid track record of outpacing inflation over the long run—in fact, US small caps have outperformed inflation in every decade since the 1930s (as measured by the Russell 2000 Index and the U.S. Consumer Price Index). Of course, this is not the case for every small-cap stock, so the sector-, industry-, and company-specific circumstances of the concentrated position could have a significant impact on the results of this sensitivity analysis. Companies with strong pricing power or businesses tied to the sale of natural resources or other real assets may be expected to be among the stronger performers in periods of higher-than-normal inflation. Others that operate in competitive industries with little pricing power may behave comparatively worse.

The divesting business owner couple (each spouse age 65) is ready to retire immediately and has recently sold a closely held business. That sale was structured with a 10-year installment sale note, which spreads the proceeds over multiple years rather than all upfront. The couple's goal is to maintain their standard of living through

EXHIBIT 9

High Earner

High Earner	Investable Assets	Probability of Success					
			Inflation Shocks				
			Baseline	6%	9%	12%	15%
Goal: Retire at 65, maintain stand. of living	Cash: \$1,000,000	Capital Preservation	74%	55%	37%	22%	11%
Age: 60	Investment Account: \$35,000,000	Income w/Moderate Growth	86%	77%	62%	47%	30%
Income: \$2,000,000	Rollover IRA: \$10,000,000	Balanced	90%	87%	75%	61%	48%
Expenses: \$1,500,000	Total: \$46,000,000	Growth w/Income	91%	91%	84%	74%	61%
Irrevocable Trusts: \$25,000,000		Growth w/Moderate Income	92%	90%	86%	79%	70%
		Growth	91%	93%	89%	84%	75%

retirement of \$650,000 pretax annual spending adjusted for inflation. They have \$19 million in assets, which includes a cash account, taxable investments, and retirement accounts, though the installment note represents roughly half of their assets, valued at \$10 million.

Before considering the impact of inflation shocks (i.e., the baseline scenario), the selection of an appropriate asset allocation appears to be an important one. The balanced portfolio and those above it on the risk spectrum are needed to generate a probability of success greater than 80%, suggesting that divesting business owners need to take sufficient risk in their investments to meet their spending goals.

The divesting business owner appears to be the most sensitive to inflation shocks of all the archetypes considered in this analysis. For example, even the most aggressive growth portfolio dips to a 52% probability of success in the 15% inflation shock scenario. The reason for this is the structure of the business sale. By spreading the proceeds of the sale over a 10-year period via an installment note, they essentially have a very large bond security constituting most of their net worth. The fixed payments from bonds and bond-like holdings hold up poorly in periods of higher-than-normal inflation, as those fixed payments see progressive deterioration in their purchasing power. The alternative is an upfront sale with all proceeds delivered immediately. Although this may generate a large tax bill in the year of sale, it allows the divesting business owner to reinvest the proceeds in a diversified portfolio of assets that may be better positioned to deliver real returns.

If investors are considering selling a business and are worried about the risk of an inflation shock in the near term, there may be situations where they are better off with an upfront sale, rather than issuing a business sale installment note (Zwick and Jurinski 1999). If an installment sale is unavoidable, a nuanced approach to the structure of the installment note may be helpful. If the terms of the note include an adjustment of the loan principal for inflation similar to the mechanics behind Treasury Inflation Protected Securities (TIPS), this may reduce some of the risk behind an immediate inflation shock after the initiation of the note.

Alternatively, if the divesting business owners have already gone through with their sale and issued an installment note, they may be a good candidates for including an explicit inflation hedge in their portfolio to offset that exposure.

The high earner couple (each spouse age 60) earns \$2 million wage income per year and has pretax expenses of \$1.5 million. They would like to retire in five years (age 65) and maintain their standard of living up to and through retirement on

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EXHIBIT 10

Asset Allocation Sensitivity Ranking by Archetype

	Archetype	Years Until Retirement	Net Saver?
Most Sensitive	Young Business Owner (-63%)	25	Yes
	Large Inheritor (-46%)	20	No
	Divesting Business Owner (-29%)	0	No
	Retirement Prepper (-24%)	10	Yes
	Imminent Retiree (-20%)	0	No
	High Earner (-17%)	5	Yes
Least Sensitive	Senior Executive Nearing Retirement (-5%)	5	Yes

an inflation-adjusted basis. They would like to make a lump sum charitable gift at retirement of \$5 million and \$100,000 in annual qualified charitable distributions (QCDs), which can be a tax-preferred method for philanthropic spending, from each starting at age 70½ (Geisler and Harden 2019). The couple has \$46 million in assets, held mostly in taxable investment accounts, with some in cash savings and retirement accounts, as well. Outside of their estate, they have \$25 million in irrevocable trusts.

In the baseline case, the higher earner has a greater than 85% probability of success across most of the risk spectrum, with the exception of the capital preservation portfolio. This highlights the couple's need to maintain some traditional investment risk in order to meet their goals.

These insights can help inform proper portfolio selection. Assuming the high earner has chosen the growth-with-income allocation, their financial plan could weather a 12% inflation shock with a 74% probability. That just so happens to be the same probability of success for the capital preservation allocation in the no shock scenario. This basically means that high earners could be just as well off if inflation runs at a hot 12% rate for two straight years as long as they maintain their growth-with-income asset allocation.

Compiling some of this information into a standard framework can be helpful to reveal underlying trends among the different archetypes. Even before considering the impact of inflation shocks, the probabilities of success for the archetypes demonstrate varying degrees of sensitivity to the asset allocation decision, as demonstrated in Exhibit 10. The archetypes are sorted from most/least sensitive to the asset allocation decision, as measured by the difference in probability of success between the capital preservation and growth portfolios in the baseline scenario. The exhibit also includes relevant information on each archetype's time horizon and net saver status.

The young business owners appear to be the most sensitive to the asset allocation decision. A significant portion of their wealth is tied up in a closely held business, which for purposes of this analysis does not include a liquidity event to fund expenses related to their goals. As a result, the burden of achieving those goals falls on the rest of their assets. The young business owners must rely on the long-term compounding of a portfolio with sufficient risk, especially given they are also the archetype with the longest time horizon.

The large inheritors are not a net saver, so they need their inheritance alone to fund their retirement. This archetype also has the second longest time horizon, so they also must rely on compounding returns to reach their goals.

The divesting business owners have a substantial portion of their assets in the form of a business installment note, which is essentially a large fixed income security if viewed as part of a comprehensive asset allocation. Although this archetype has the shortest time horizon, they need the rest of their portfolio to offset the implicit asset allocation decision made when they traded their business for an installment sale note.

Exhibit 11 ranks the archetypes based on how sensitive they are to inflation shocks, quantified by the average change in probability of success from the baseline

EXHIBIT 11**Inflation Sensitivity Ranking by Archetype**

	Archetype	Years Until Retirement	Net Saver?
Most Sensitive	Divesting Business Owner (–48%)	0	No
	Imminent Retiree (–37%)	0	No
	Senior Executive Nearing Retirement (–28%)	5	Yes
	High Earner (–23%)	5	Yes
	Retirement Prepper (–22%)	10	Yes
Least Sensitive	Large Inheritor (–22%)	20	No
	Young Business Owner (20%)	25	Yes

to 15% inflation shock scenarios for the growth-with-income, growth-with-moderate-income, and growth portfolios. These portfolios were specifically chosen because probabilities are naturally bound by a 0–100% range. Including portfolios on the lower end of the risk spectrum can be misleading, because in some instances those portfolios had a low probability of success in the baseline scenario to begin with, which might artificially make their sensitivity appear lower.

It appears the divesting business owner is the most sensitive to the most extreme inflation shock scenario. The interest payments on the business installment note immediately begin to lose their purchasing power due to the inflation shock.

Beyond that, there are several trends that are informative of the factors that drive each archetype's sensitivity to inflation shocks. First, there appears to be a high degree of negative correlation between probability of success in inflation shocks and time horizon. Those that appear less sensitive tend to have more years until retirement spending is needed from their assets. More years of compounding returns appear to make up for the loss of purchasing power from an inflation shock. In fact, the sensitivity is ranked in lockstep with the number of years until retirement.

The large inheritor is the sole archetype on the lower end of sensitivity that is not a net saver. Net savers generally appear less sensitive, as fresh capital infusions can help portfolios offset their purchasing power impairment. Time to retirement and net saver status are likely correlated variables though, as early-career investors are usually in the asset accumulation phase of their lives.

CONCLUSIONS

What conclusions can be drawn from this sensitivity analysis? Following are 10 important observations, ranging from those that are broadly applicable to some that may be more scenario-specific.

General Observations

- Inflation shocks, to the extent that they lead to a material deterioration in purchasing power, can put a well-formulated investment plan, under normal circumstances, into jeopardy if not properly considered.
- Financial plans utilizing investment strategies with larger allocations to risk assets (e.g., stocks) demonstrate less longer-term sensitivity to inflation shocks. With typically higher expected returns, risk assets have compounding returns to make up for impairments to purchasing power.
- Investors with longer time horizons are at relatively lower risk from immediate inflation shocks via sequence of returns—with time on their side, they may

be more likely to recoup purchasing power losses in more normal market environments.

- Investors that are net savers may be less sensitive to inflation shocks, as additional cash helps to replenish portfolio values during difficult investment periods.
- An asset allocation strategy that appears to only provide a marginally better probability of success in normal environments may see that benefit increase several-fold in extreme inflation scenarios.

Scenario-Specific Observations

- If altering the asset allocation of a financial plan to hedge the risk of inflation is not easily feasible due to factors such as large embedded capital gains, investors might consider layering in a nominal allocation to inflation hedging asset classes (e.g., commodities and resource equities).
- Under certain conditions, the importance of getting the asset allocation decision correct in normal times outweighs the risks posed by inflation shocks, though both problems may have a similar solution—more portfolio risk.
- Traditionally, investors faced with virtually identical probabilities of success among various asset allocation strategies might choose the one with the lowest expected volatility. The counterargument to that logic may be that higher volatility portfolios can help hedge another dimension of risk—that is, the risk of material inflation shocks.
- Investors with large concentrated stock positions should expect their ability to weather inflation shocks to depend on the nature of the business of which they own such a large share. Companies with strong pricing power or businesses tied to the sale of natural resources or other real assets may be stronger performers in periods of higher-than-normal inflation.
- If inflation is a material outstanding risk, in some situations, those divesting from a closely held business may be better off with an upfront sale, rather than issuing a business sale installment note, which tends to behave like a large fixed-income security vulnerable to losses of purchasing power. Individual situations may vary and investors should consider consulting tax and estate planning professionals for the best course of action.

A goals-based investing framework provides a way to tangibly measure the sensitivity of holistic wealth plans in an easily understood metric—the probability of success. It is important for investors to understand how their financial plan can be exposed to the adverse impact of inflation shocks. For some investors, it may not have a material impact on the likelihood of achieving their financial goals. For others, the risks associated with inflation shocks may be cause for proactive change to an investment and/or wealth plan.

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