

Inflation and Asset Allocation in the U.S. since 1955

- John Mullin, Ph.D.
- Leila Heckman, Ph.D.

Inflation has been remarkably modest and steady in the U.S. over that past two decades, with core CPI inflation averaging 2.0% annually. This placidity contrasts with much of the post-WWII period, which was marked by the “Great Inflation” of the 1960s and 70s and the subsequent deceleration of inflation in the 1980s and 90s.

Continued placidity is the central scenario currently embedded in U.S. fixed income markets. Indeed, the expected rate of inflation implicit in the yields on 10-year Treasury Notes and Inflation Protected Securities (TIPs) stands at roughly 2% (a level that it has closely hovered around for nearly ten years). These expectations represent a “Goldilocks” scenario—not too hot, but not too cold—that may well be the most likely outcome for the U.S. economy over the next five to ten years. Nevertheless, we think it only prudent to examine alternative scenarios that are not so benign.

The purpose of this paper is to draw lessons for U.S. asset allocation based on the full range of inflationary experience during the post-WWII period. The paper focuses on the real returns to U.S. stocks, bonds, and cash during 1955-2018. Some of our key findings are that:

- The excess returns to stocks and bonds are not strongly related to the level of inflation. Rather, the returns are negatively related to the acceleration of inflation
- The correlation between stock and bond returns is more closely tied to the level of inflation than to inflation acceleration
- Like stock-bond correlations, stock and bond return volatilities also appear to be more closely tied to the level of inflation than to inflation acceleration
- The optimal allocation among stocks, bonds, and cash is highly sensitive to expected inflation. With even a modest increase in expected inflation, optimal bond and stock holdings decline substantially

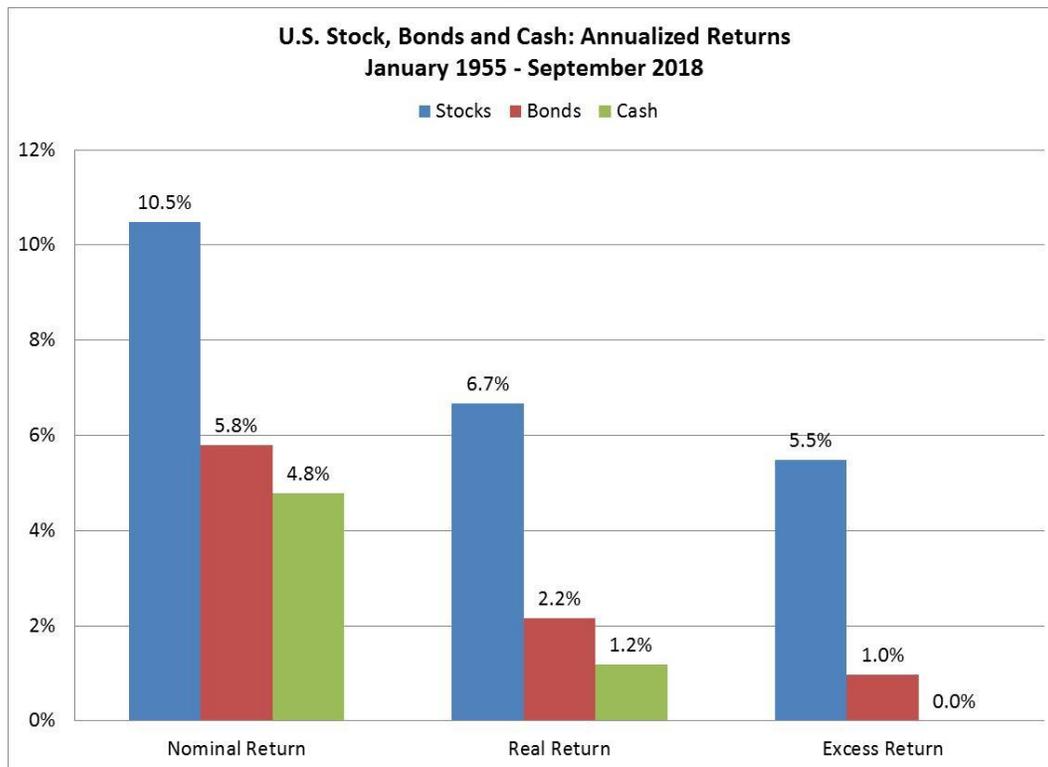
The Returns to Stocks, Bonds, and Cash

Since 1955, stocks have returned an annualized 10.5% in nominal terms. This sounds like a pretty substantial figure. Unfortunately, however, it does not take into account the 3.6% annualized inflation rate over the same period. After taking inflation into account, the real return on stocks was a more modest 6.7%. The real returns on bonds and cash during the same period were 2.2% and 1.2%, respectively. (Note: For the purposes of this paper, stock returns are based on the S&P 500 index, bond

returns are based on the returns to holding 10-year Treasury Notes, and cash returns are based on the one-month effective federal funds rate.)

Stock and bond excess returns are measured as the difference between the asset class real returns and the real return to cash. Excess returns are of critical importance to asset allocation. After all, without the prospect of returns in excess of cash, there is no incentive to invest in relatively risky stocks and bonds. Since 1955, the annualized excess returns to stocks and bonds have been 5.5% and 1.0%, respectively (the excess return to cash is zero by definition).

Figure 1



These cumulative return figures mask a great deal of variation between various sub-periods. Figure 2 shows year-over-year inflation during 1955-2018; while Figure 3 shows the real total return indexes for stocks, bonds, and cash. Looking at the figures, several observations can be made:

- On a cumulative basis, stocks substantially outperformed cash over the entire 1955-2018 period. However, stocks underperformed over a long stretch during the 1970s and early 1980s and then again in the 2000s
- Bonds underperformed cash substantially during the inflationary acceleration in the 1960s and 1970s; but bonds substantially outperformed cash thereafter
- The cumulative real return on cash since 2000 has been modestly negative

Figure 2

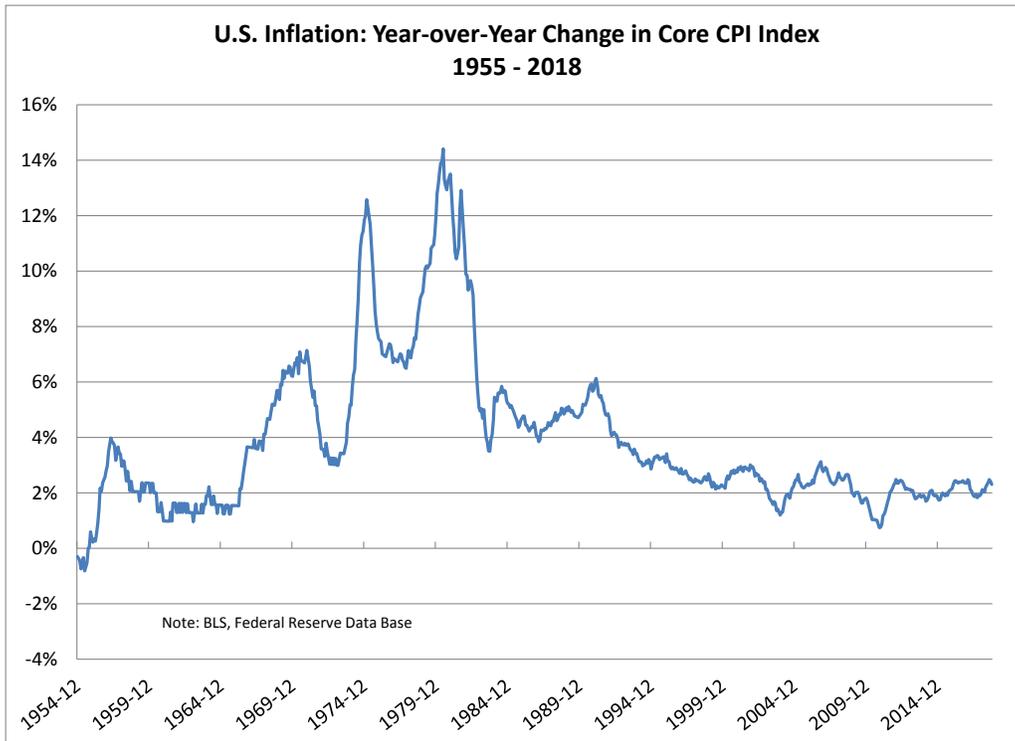
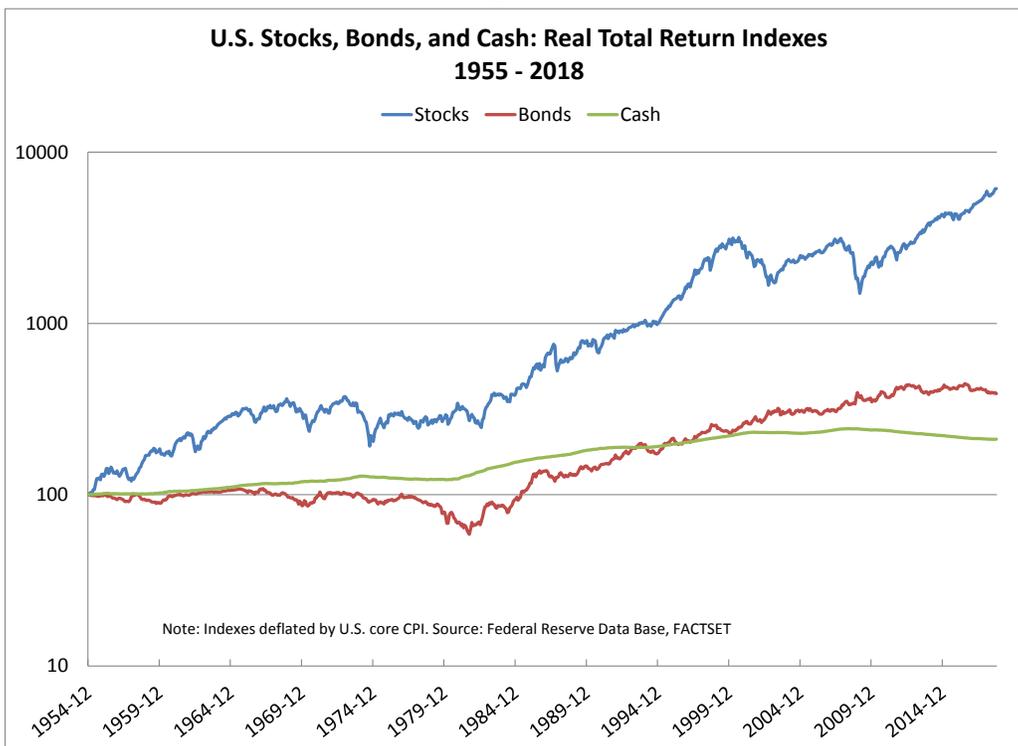


Figure 3



In order to statistically analyze the relationship between inflation and asset class returns, we broke the 1955-2018 period into 5-year sub-periods. For each sub-period, we compared the asset class excess returns to the annualized rate of inflation during the sub-period as well as to the change (or acceleration) in the rate of inflation relative to the previous 5-year sub-period (see Figure 4).

Figure 4

Annualized Inflation and Asset Returns (%)							
Period	Inflation	Infl. Acceleration	Real Returns			Excess Returns	
			Stocks	Bonds	Cash	Stocks	Bonds
Late 50s	2.0	-1.3	13.1	-2.3	0.4	12.7	-2.7
Early 60s	1.3	-0.8	9.2	3.5	1.6	7.6	1.9
Late 60s	3.9	2.6	1.0	-4.1	1.5	-0.5	-5.5
Early 70s	5.7	1.8	-7.5	1.8	1.3	-8.8	0.5
Late 70s	7.8	2.1	6.4	-3.4	-0.7	7.1	-2.7
Early 80s	7.1	-0.7	6.8	3.5	4.7	2.1	-1.2
Late 80s	4.3	-2.9	15.3	9.3	3.3	12.1	6.1
Early 90s	3.8	-0.5	4.7	3.6	1.1	3.6	2.5
Late 90s	2.5	-1.3	25.5	5.6	2.9	22.6	2.7
Early 00s	2.1	-0.3	-4.3	6.1	0.7	-5.0	5.4
Late 00s	2.1	0.0	-1.7	2.5	0.9	-2.6	1.6
Early 10s	1.6	-0.5	13.6	3.7	-1.5	15.1	5.2
Late 10s	2.0	0.4	9.7	-1.9	-1.3	11.0	-0.6
Cumulative (1955 - 2018)	3.6		6.7	2.2	1.2	5.5	1.0

Source: Heckman Global Advisors

Regression analysis based on these 5-year sub-periods showed that excess stock and bond returns were strongly negatively correlated with inflation acceleration but only modestly negatively correlated with the level of inflation.

The negative relationships between excess stock returns and inflation acceleration can be seen graphically in Figure 5, where each point represents the combination of excess stock return and inflation acceleration in a particular 5-year sub-period. Notice how excess stock returns were relatively high in the late 1980s and the late 1990s—periods of decelerating inflation. In contrast, excess stock returns were relatively low in the late 1960s and early 1970s—periods of accelerating inflation.

Figure 6 shows the relationship between excess bond returns and inflation acceleration. Notice that excess bond returns were relatively high in the late 1980s and late 1990s, but distinctly negative in the late 1960s and early 1970s.

Figure 5

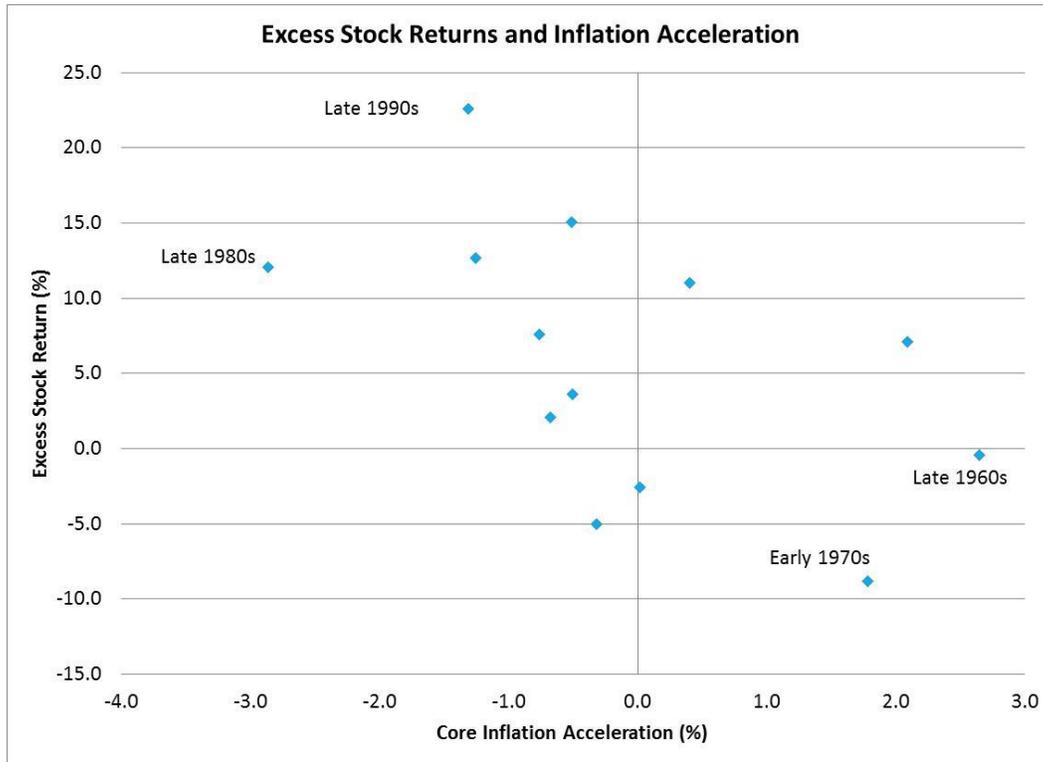
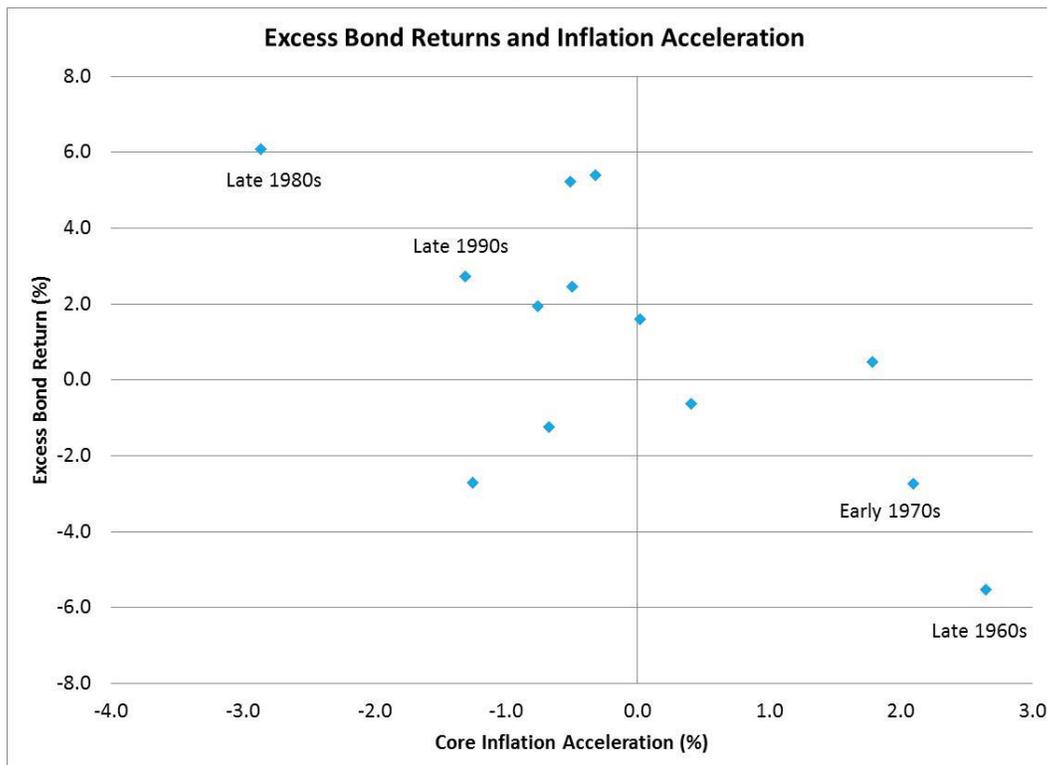


Figure 6



We next turned to the relationship between inflation (both its level and rate of acceleration) and stock-bond correlations and volatilities. Looking at the same 5-year sub-periods, we found that return correlations and volatilities had a tighter link to the level of inflation than to the acceleration of inflation.

Figure 7

Annualized Inflation and Asset Correlations, Volatilities (%)					
<u>Period</u>	<u>Inflation</u>	<u>Infl. Acceleration</u>	<u>Stock/Bond Correlation</u>	<u>Stanard Deviations</u>	
				<u>Stocks</u>	<u>Bonds</u>
Late 50s	2.0	-1.3	-24.3	12.0	4.0
Early 60s	1.3	-0.8	8.7	12.4	2.6
Late 60s	3.9	2.6	20.9	11.9	5.7
Early 70s	5.7	1.8	32.9	17.2	7.5
Late 70s	7.8	2.1	37.9	14.4	6.5
Early 80s	7.1	-0.7	33.5	15.3	13.7
Late 80s	4.3	-2.9	21.6	17.7	9.5
Early 90s	3.8	-0.5	57.2	12.4	7.0
Late 90s	2.5	-1.3	16.5	13.9	6.8
Early 00s	2.1	-0.3	-35.3	16.3	8.4
Late 00s	2.1	0.0	-11.9	16.0	8.4
Early 10s	1.6	-0.5	-55.8	13.0	6.9
Late 10s	2.0	0.4	-35.6	10.0	5.7
Cumulative (1955 - 2018)	3.6		9.4	14.4	7.6

Source: Heckman Global Advisors

Figure 8 shows the relationship between the stock-bond return correlation and the level of inflation. Notice that the stock-bond correlation exceeded 20% in each of the sub-periods in which inflation exceeded 3%. During sub-periods with inflation less than 3%, the stock-bond correlation was negative on average, ranging between -60% and +20%.

Figure 8

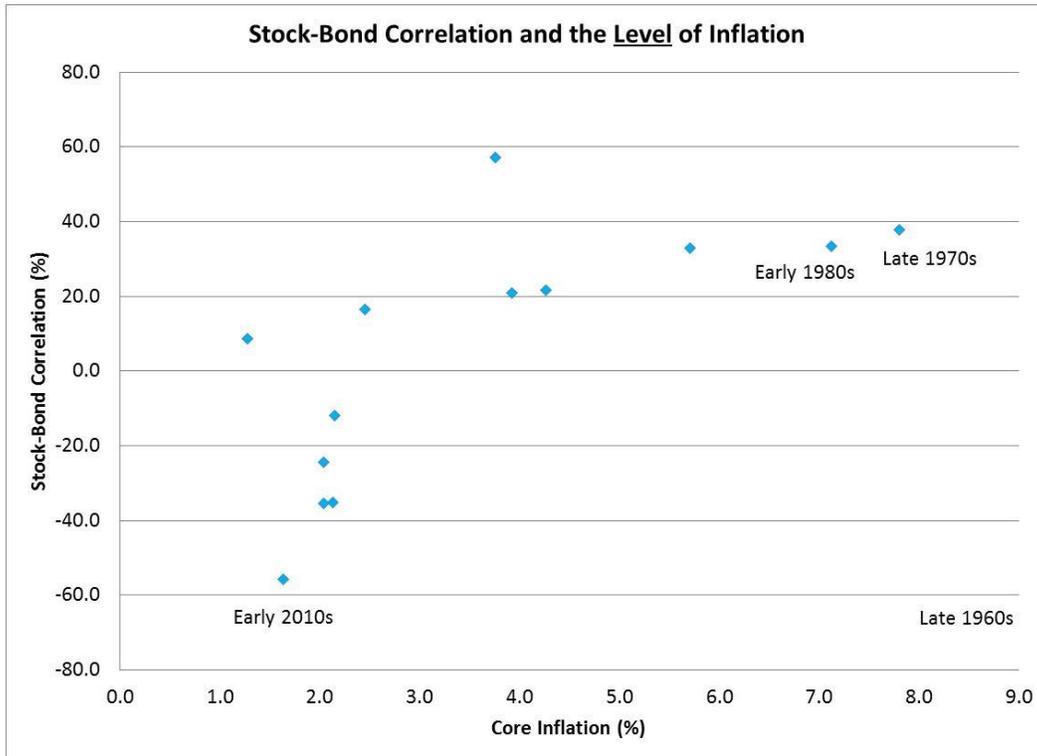


Figure 9 graphs the relationship between stock return volatility and the level of inflation. Interestingly, the range between the lowest stock volatility (10.0% in the late 2010s) and greatest stock volatility (17.7% in the late 1980s) was rather modest. Nevertheless, there does appear to be a positive (albeit modest) statistical relationship between stock volatility and the level of inflation.

Figure 10 graphs the relationship between bond return volatility and the level of inflation. The relationship between bond volatility and inflation is stronger (and more statistically significant) than the relationship between stock volatility and inflation.

Figure 9

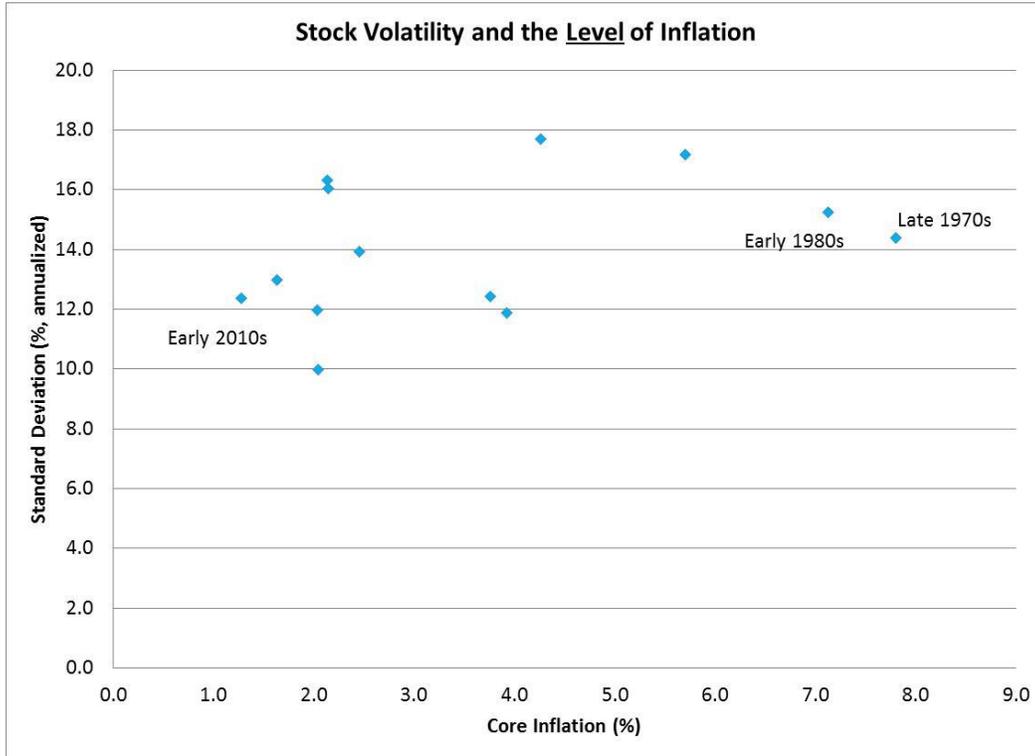
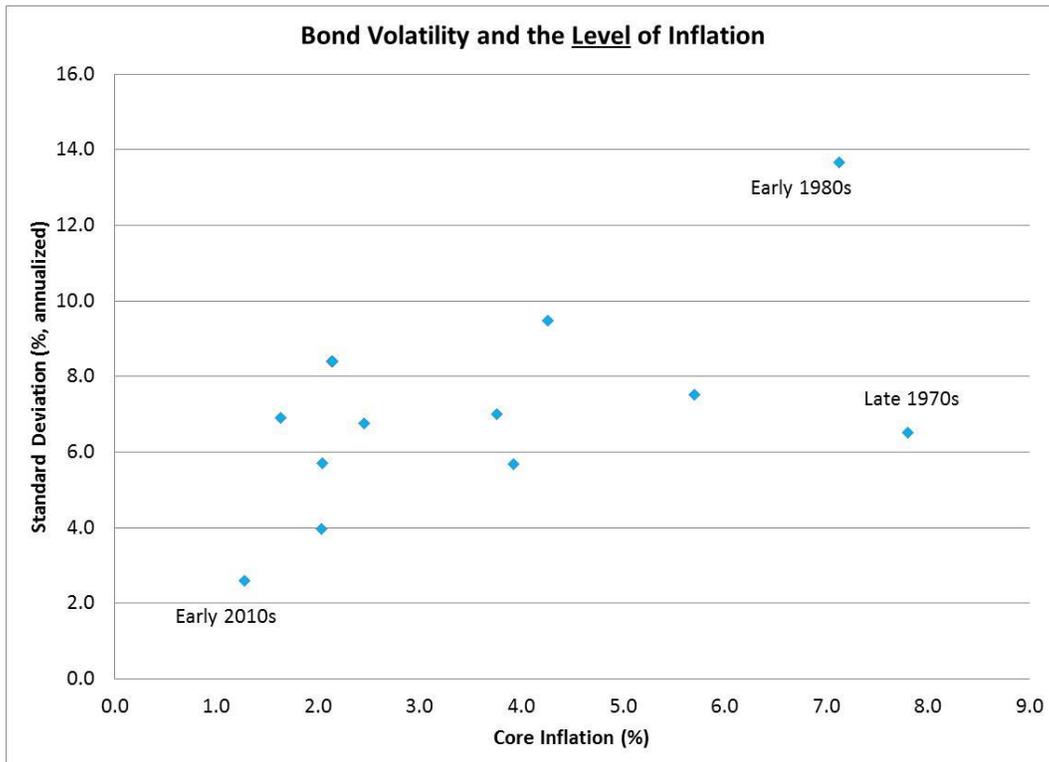


Figure 10



Intuitive Explanation of Results

We find these results to be intuitive. It makes sense that excess stock and bond returns would be more sensitive to the acceleration of inflation than to the level of inflation. In theory, *ex-post* asset returns reflect new information, and changes in the level of inflation are arguably a reasonable proxy for unexpected (or surprise) inflation during the period of analysis. Unexpected inflation would impact bond returns negatively by increasing the expected future path of short-term interest rates (that is, via the expectations hypothesis). Unexpected inflation would impact stock returns negatively by decreasing the expected stream of real earnings (due to the anticipated effects of future anti-inflationary monetary policy).

It also makes sense for stock-bond correlations and volatilities to increase with the level of inflation. Inflation is rarely a source of concern in a low inflation environment. During the early 2010s, for example, there was little worry that inflation would accelerated markedly. The much bigger concern was that the global economy would fall back into recession. In such an environment, positive growth news is generally good for stocks but bad for bonds. Hence, we observe the -55.8% stock-bond return correlation during the early 2010s.

However, in a high inflation environment such as the late 1970s, inflation is in the forefront of everyone's mind. In such environments, news of inflationary acceleration is unambiguously negative for bonds (due to interest rate expectations) and may also be negative for stocks (due to the anticipated future output costs associated with the eventually reversal of high inflation). During such periods, stock-bond correlations tend to be relatively high (or at least not negative).

Implications for Asset Allocation

We now come to the question: What are the implications of various prospective inflation scenarios for optimal allocation across stocks, bonds, and cash? To gain some insight into this matter, we assumed a "calibration scenario" in which:

1. Inflation and inflation acceleration are equal to their averages across sub-periods: 3.6% and *minus* 0.1% respectively
2. Asset return moments are equal to their averages across sub-periods: The expected excess stock return equals 5.3%, the expected excess bond return equals 1.0%, the stock-bond correlation equals 5.1%, stock volatility is 14%, and bond volatility is 7.1%.

Based on these assumptions about expectations, we choose (or back into) a risk aversion parameter that is consistent with an optimal stock allocation of 60% (assuming a quadratic utility function that is linear in portfolio expected return and variance). This “calibration scenario” is shown in the first row of Figure 11.

We then proceed by adjusting assumption #1 regarding inflation, which in turn changes the asset return figures of assumption #2, based on our estimation of the relationship between inflation and asset return moments (expected excess returns, correlations, and volatilities).

Our base case scenario is the one that we think is the most likely: Inflation remains at 2.0% over the next five years, which represents zero acceleration. In this scenario, expected stock and bond excess returns are quite close to their historical averages. However, the stock-bond correlation of -12% is lower than the historical average, because inflation of 2.0% is quite a bit below the 3.6% historical average. Largely due to this lower correlation, the optimal bond holdings are 51% (which is higher than the 42% allocation based on the “Calibration Scenario” in which we used average historical return moments).

A key insight is gained by examining what happens if we shift to a scenario in which we expect inflation to accelerate. Expected excess stock and bond returns decline substantially, as do the optimal allocations to stocks and (especially) bonds (see Figure 11). Indeed, in the scenario where inflation accelerates to 3.0%, the expected excess bond return becomes negative, as does the optimal allocation to bonds.

Figure 11

Asset Allocation Scenarios								
	Inflation	Inflation Acceleration	Expected Excess Returns		Stock-Bond Correlation	Optimal Allocations		
			Stocks	Bonds		Stocks	Bonds	Cash
Calibration Scenario	3.6%	-0.1%	5.3%	1.0%	5.1%	60%	40%	0%
Prospective Scenarios:								
Base Case Scenario	2.0%	0.0%	5.0%	0.9%	-12.4%	63%	51%	-14%
Inflation increases to 2.5%	2.5%	0.5%	3.7%	0.1%	-6.8%	46%	3%	51%
Inflation increases to 3.0%	3.0%	1.0%	2.3%	-0.7%	-1.2%	30%	-36%	106%

Source: Heckman Global Advisors

Important Disclosures:

This material has been prepared and issued by DCM Advisors, LLC (DCM), a registered investment advisor, for distribution to market professionals and institutional investor clients only. This document has been prepared for informational purposes only and is not a solicitation of any offer to buy or sell any security, commodity, futures contract or instrument or related derivative (hereinafter "instrument") or to participate in any trading strategy. Any such offer would be made only after a prospective participant had completed its own independent investigation of the instrument or trading strategy and received all information it required to make its own investment decision, including, where applicable, a review of any prospectus, prospectus supplement, offering circular or memorandum describing such instrument or trading strategy.

This material does not provide individually tailored investment advice or offer tax, regulatory, accounting or legal advice. The securities discussed in this material may not be suitable or appropriate for all investors. Prior to entering into any proposed transaction, recipients should determine, in consultation with their own investment, legal, tax, regulatory and accounting advisors, the economic risks and merits, as well as the legal, regulatory and accounting characteristics and consequences of the transaction. You should consider this material among other factors in making an investment decision. This information is not intended to be provided and may not be used by any person or entity in any jurisdiction where the provision or use thereof would be contrary to applicable laws, rules or regulations. Any securities referred to in this material may not have been registered under the U.S. Securities Act of 1933, as amended, and, if not, may not be offered or sold absent an exemption therefrom.

The information contained herein is intended for informational purposes only and has been obtained from sources believed to be reliable, but is not necessarily complete and its accuracy cannot be guaranteed. The comments contained herein are opinions and may not represent the opinions of DCM and are subject to change without notice. It should not be assumed that any recommendations incorporated herein will be profitable, will equal past performance or will achieve same or similar results. The country allocations recommended herein are solely those of the Heckman Global Advisors (HGA) division of DCM and may differ from those of other business units of DCM. The countries mentioned herein are covered by our proprietary top-down country allocation model and are included, together with any rankings and/or weightings, for illustrative purposes only. The representative countries and related information are subject to change at any time and are not intended as a specific recommendation for investment. Foreign securities can be subject to greater risks than U.S. investments, including currency fluctuations, less liquid trading markets, greater price volatility, political and economic instability, less publicly available information, and changes in tax or currency laws or monetary policy. These risks are likely to be greater for emerging markets than in developed markets. Certain investments may invest in derivatives, which may increase volatility of its net asset value and may result in a loss.

Model, back-tested or hypothetical performance information and results do not reflect actual trading or asset or fund advisory management and the results may not reflect the impact that material economic and market factors may have had, and can reflect the benefit of hindsight, on HGA's decision-making if HGA were actually managing client's money. Any reference to performance information that is provided gross of fees does not reflect the deduction of management or advisory fees. Client returns will be reduced by such fees and other expenses that may be incurred in the management of the account. Advisory fees are described in Part 2A of Form ADV of DCM and its affiliated individuals may, from time to time, own, have long or short positions in, or options on, any securities discussed herein. Nothing contained herein constitutes an offer to sell or a solicitation of an offer to buy any security or an interest in any Dinosaur Capital Management LLC investment vehicle(s). Any chart, graph, or formula should not be used by itself to make any trading or investment decision.

Morgan Stanley Capital International (MSCI) indexes are unmanaged market capitalization-weighted indexes. The indexes do not reflect transaction costs or management fees and other expenses. MSCI index returns are calculated with dividends reinvested. Unlike the indices, the strategies described are actively managed and may have volatility, investment and other characteristics that differ from the benchmark index.

Source: MSCI. Pursuant to our agreement with MSCI, the MSCI information may only be used for your internal use, may not be reproduced or re-disseminated in any form and may not be used to create any financial instruments or products or any indices. The MSCI information is provided on an "as is" basis and the user of this information assumes the entire risk of any use it may make or permit to be made of this information. Neither MSCI, any of its affiliates or any other person involved in or related to compiling, computing or creating the MSCI information (collectively, the "MSCI Parties") makes any express or implied warranties or representations with respect to such information or the results to be obtained by the use thereof, and the MSCI Parties hereby expressly disclaim all warranties (including, without limitation, all warranties of originality, accuracy, completeness, timeliness, non-infringement, merchantability and fitness for a particular purpose) with respect to this information. Without limiting any of the foregoing, in no event shall any MSCI Party have any liability for any direct, indirect, special, incidental, punitive, consequential or any other damages (including, without limitation, lost profits) even if notified of, or if it might otherwise have anticipated, the possibility of such damages.