

An aerial photograph showing a winding asphalt road that curves along the edge of a dense forest. The trees are in autumn, displaying shades of orange, yellow, and brown. To the right of the road is a calm body of water with a light greenish-blue hue. The sky is a pale, clear blue.

charles
SCHWAB

Investment
Management

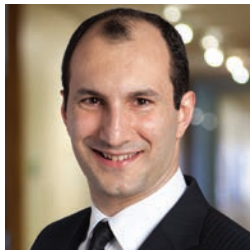
Inflation protection:

The benefits of a diversified
asset-class approach.



Jake Gilliam, CFA, AIF®

Senior Multi-Asset Class
Portfolio Strategist



Emre Erdogan, Ph.D., CFA

Senior Research Analyst,
Multi-Asset Strategies



Natallia Yazhova

Senior Research Analyst

Executive summary

The negative effects of inflation deserve careful consideration. A variety of catalysts can drive up prices on goods and services, creating potentially divergent performance outcomes depending upon the catalyst, rather than generating a consistent set of results that are universally applicable to all asset classes. Charles Schwab Investment Management’s research refutes common misconceptions that commodities and Treasury Inflation-Protected Securities (TIPS) afford comprehensive, one-stop inflation-fighting solutions. Our findings suggest that a thoughtful, multi-asset-class approach to investing for inflation protection is a far more prudent—and potentially rewarding—strategy.



Key takeaways

- **Inflation is an inescapable long-term reality** that erodes purchasing power.
- **Inflation hasn’t always risen slowly** and steadily and it can be caused by a variety of catalysts.
- **The performance of an asset class can vary** depending on the underlying causes of inflation.
- **Neither commodities nor TIPS provide** single-stop inflation protection, based on our research.
- **A thoughtful, well-diversified approach** therefore seems to be the most prudent means to prepare a portfolio for inflation.

Common misconceptions vs. our viewpoints

Challenging the conventional wisdom

Whether caused by “cost-push” or “demand-pull” factors, inflation—and its erosive effects on purchasing power—has been inescapable over time. We have analyzed sources of inflation and how various asset classes have responded since 1982, leading us to challenge the conventional wisdom that certain asset classes are suitable for inflation protection.

Instead of a single-stop solution, our research encourages a diversified investment approach. We believe that investors should address inflation risks in a multi-asset-class manner to limit exposure to unintended risks, while reducing reliance on any single asset class. Common misconceptions regarding inflation and our viewpoints resulting from our research are captured in the following table.

Common misconceptions	Our viewpoints
Commodities are essential inflation fighters	Commodities are risky compared with other asset classes that we studied, and helped in only half of the inflationary environments we examined.
TIPS provide inflation protection in any environment	TIPS were the worst-performing asset class in nearly 20% of the inflationary environments that we sampled.
Stocks and bonds afford poor inflation protection	In nearly one-third of the inflationary environments we researched, stocks and bonds generally outperformed other asset classes that we examined.
All inflation is the same	Inflation is caused by a variety of catalysts, often leading to dramatically different relative performances by asset class.
Money market funds are poor inflation fighters	In approximately 45% of the inflationary environments that we examined, money market funds outperformed inflation.

Based on analyses of various asset class data from January 1, 1982, to December 31, 2017.

What is inflation, and why does it matter?

Purchasing power erosion

Inflation measures changes in the cost of living and in the purchasing power, or value, of money.¹ Specifically, inflation is the rate at which the prices of goods and services are rising, and, correspondingly, purchasing power is falling. For example, if inflation were to rise at a 2% annual pace, something that cost \$100 at the start of a year would instead cost \$102 only one year later and cost more than \$110 after five years with compounding.

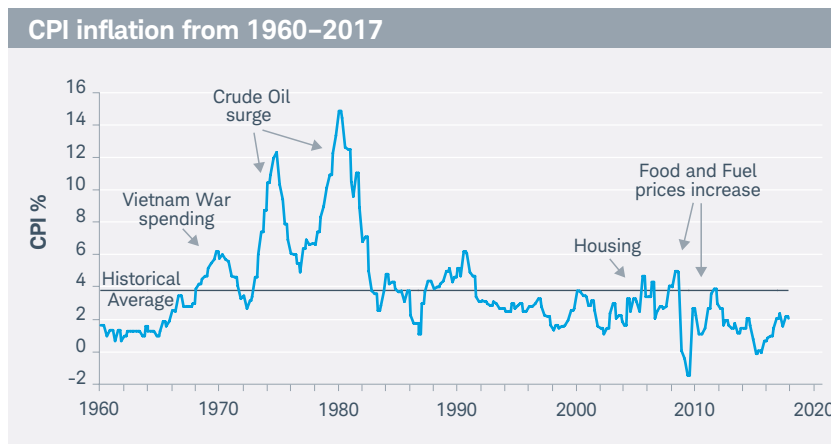
A “healthy” level of inflation

A healthy level of inflation is generally considered necessary. Rising prices for goods and services can reflect improving economic conditions and a

reasonable level of wage growth that often translates into increased consumer demand. This would represent a relatively ideal economic scenario. Yet even a healthy level of inflation such as the one just described has the potential to affect a portfolio’s performance, as well as its future purchasing power.

A wide variety of inflationary catalysts

Unfortunately for investors, U.S. inflation has not always risen at a healthy slow-but-steady pace. The chart at the bottom of this page illustrates this point, showing the movements of the the consumer price index (CPI) since 1960. Importantly for the focus of our research, this period demonstrated that a variety of catalysts can cause inflation and that the performance of an asset class can vary depending upon the underlying source of inflation.



Sources: Bloomberg, CSIM.

Past performance is no guarantee of future results.

Inflation waxes and wanes

Inflation rarely runs along a stable course for long, as illustrated by changes in the CPI since 1960.

Demand-pull inflation

A variety of factors can fuel inflation, as illustrated in the table at the bottom of this page. First, inflation can rise due to increased aggregate demand in an economy. This demand-pull information can be a positive development and may be caused by a reduction in interest rates, wage growth, an increase in government expenditures, tax cuts, a rise in exports, an increase in the quantity of money, and other factors that can potentially elevate aggregate demand (see the demand-pull information chart in the appendix). We have observed that after a long period of historically low interest rates and economic improvements, a demand-pull environment has ultimately emerged.

For perspective on what such an environment might look like, demand-pull inflation was observed in the U.S. during the late 1960s. In 1960, inflation was rising at approximately 2% per year, as measured by the CPI. The CPI continued to increase in subsequent years, reaching approximately 3% by 1966. While this time period illustrated that demand-pull inflation can accompany a reasonable level of economic growth, there's another type of inflation that is less common and frequently more inflationary.

Cost-push inflation

This second main type of inflation is cost-push inflation (see the cost-push inflation chart in the appendix). Historically speaking, cost-push

inflation has usually been caused by an increase in raw materials prices such as oil. Unlike demand-pull inflation, cost-push inflation tends to have disproportionately weighted economic repercussions. We believe that this inflationary scenario merits special consideration and should always be taken into account when attempting to structure a portfolio for long-term success.

One prime example of cost-push inflation was in the U.S. during the late 1970s, when elevated inflation levels were driven by an increase in commodity prices. Specifically, the Organization of the Petroleum Exporting Countries (OPEC) raised the price of crude oil by approximately 400% in 1974. Then, in 1979 and 1980, OPEC raised prices even higher, with a barrel of Brent crude oil surging to approximately \$117, based on March 2015 inflation-adjusted dollars. In response, the CPI surged, peaking at nearly 15% in March 1980. This cost-push inflation, and its primary catalyst, is featured alongside demand-pull inflation in the table below.

Furthermore, sometimes demand-pull and cost-push inflation work in conjunction (see the overlapping inflation chart in the appendix). For example, the CPI increased by a low rate in 2002, around 1%. However, inflation slowly rose to more than 4% by 2006. The increase in inflation during this period was driven by both increases in commodity prices and an increase in aggregate demand.²

Sources of inflation ³	
Demand-pull inflation	Cost-push inflation
Interest rate reductions Increased government expenditures Tax cuts Increased exports Wage increase Increased quantity of money	Commodity supply crises

Inflationary catalysts over time

Asset class responses

To better understand how inflation can affect portfolio returns, we analyzed sources of inflation and their impact on various asset classes. We measured the catalysts for demand-pull and cost-push inflation (summarized in the table on the previous page) in various ways. Demand-pull inflation was gauged as an increase in GDP, but we added wage growth, while measuring supply shock—the primary catalyst for cost-push inflation—as increases in commodity prices concurrent with a faster pace of inflation.

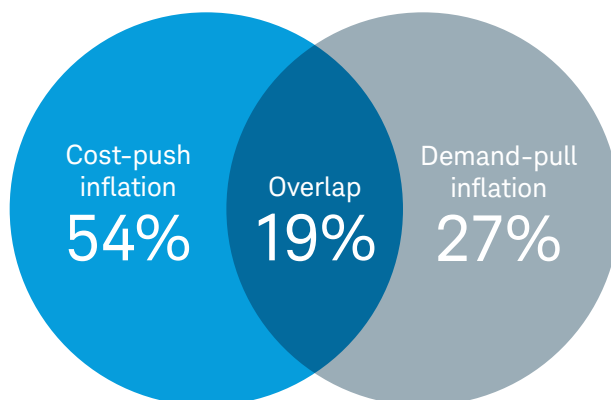
We started our analysis from January 1, 1982, due to data availability, thereby excluding periods that in some instances included abnormally high inflation. Sources overlapped in a few instances, and we closely examined these periods separately. This methodology was chosen because we believe that we are approaching a new era of “controlled inflation,” where many central banks are actively implementing policies to confine rising prices to within targeted zones.

Frequency of inflation catalysts

In the following Venn diagram, we show the proportion of time certain sources of inflation—

measured on a quarterly basis—increased between January 1, 1982, and December 31, 2017 (see the appendix for details).

Frequency of sources in quarterly inflation



Sources: Bloomberg, The World Bank.
Past performance is no guarantee of future results.

Asset class performance

The table below represents best- and worst performing asset classes under different inflationary environments, based on the combination of total returns and Sharpe ratios that we calculated over the previously identified time frames (see the demand-pull, cost-push, and overlapping inflation charts in the appendix).

Asset class performance vs. inflation source			
Asset class performance	Inflation source		
	Demand-pull inflation	Overlap	Cost-push inflation
Best performers	SP500, R2000, ST Bonds, Treasury bills	SP500, R2000, REITs, Treasury bills, EAFE	Commodities, TIPS
Worst performers	Commodities	AGG, TIPS, FX(\$)	FX(\$), Treasury bills

Sources: Bloomberg, The World Bank. See pg. 8 for asset class definitions; see page 10 for definitions of the inflation regimes.

Separating fact from fiction

What our research revealed

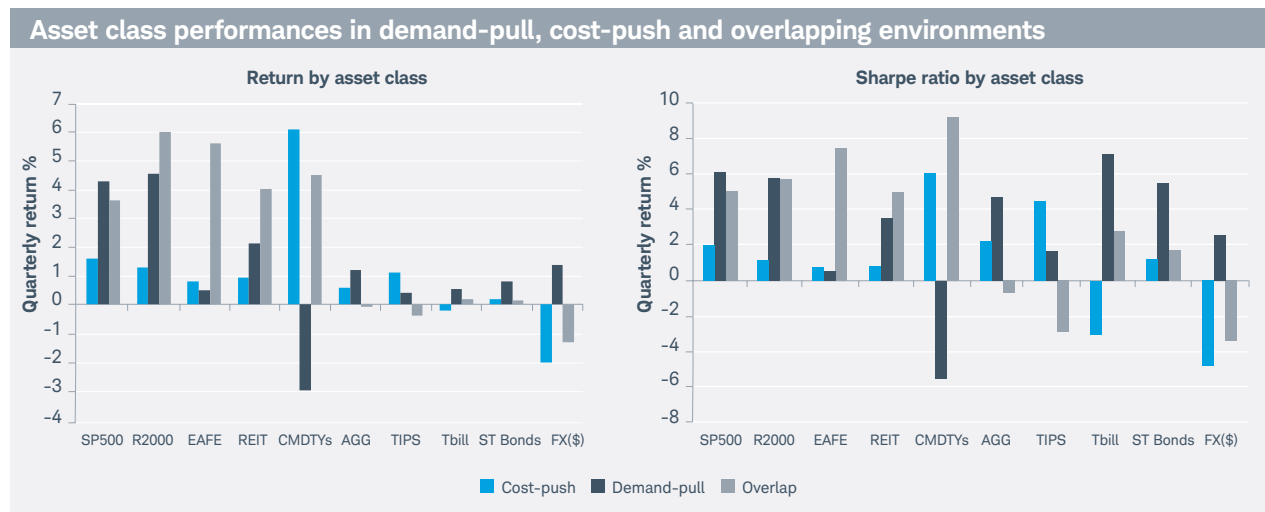
Commodities have traditionally been considered an important part of an effective inflation preparation plan. However, our research shows that including commodities in a portfolio when an economy is experiencing healthy growth can introduce additional risk that we believe is not always offset by improved returns. Approximately one-third of the time, investors would have been better off investing in several other asset classes, instead. In fact, equities and fixed income securities generally would have provided a more balanced solution—a particularly important consideration for risk-averse investors—while outperforming commodities in particular, as demonstrated in the charts below. These charts display asset class performance under the inflation regimes that we identified, as well as their relative risk according to Sharpe ratio calculations.

During cost-push environments, commodities performed quite well, as shown in the chart below. However, this isn't surprising given that increases in the prices of the asset class itself drove inflation during these periods. TIPS, REITs, and the S&P 500 Index also performed relatively well.

Additionally, we identified some time periods where a mix of demand-pull and cost-push inflation had occurred. In these environments, the data was unable to clearly identify which set of inflationary forces represented the bigger driver of rising prices. However, the data did reveal that a well-diversified mix of asset classes would have generated solid returns, as the chart on return by asset class below demonstrates. TIPS, one of the asset classes traditionally used to hedge inflation, were the worst performers in these environments.

The benefits of diversification

Taking all of our findings into account, we concluded that some asset classes traditionally recommended as inflation hedges might be quite risky under certain circumstances, especially when used as standalone solutions. Conversely, several asset classes believed to be poor performers—like equities and bonds—held up remarkably well under certain scenarios, depending upon the inflationary catalysts. More importantly from our perspective, none of the asset classes that we sampled performed well under all inflationary scenarios.



Sources: Morningstar, Bloomberg, The World Bank, CSIM. Data from 01/01/1982 to 12/31/2017.
Past performance is no guarantee of future returns.

Conclusion

Our research demonstrates that a thoughtful, well-diversified approach is the most effective means to prepare for inflation. A variety of catalysts can fuel inflation, and these catalysts may be categorized into demand-pull or cost-push environments, or some combination of the two. Although each of these scenarios resulted in rising overall prices during the periods that we sampled, our studies suggest that the nature of the underlying inflation itself plays a material role in determining asset class performance. Contrary to some widely held beliefs, TIPS and commodities are not comprehensive solutions, illustrating that standalone investment strategies may not be sufficient in today's constantly evolving marketplace.

In addition, money market funds and bonds—which many believe are ineffective during inflationary environments—proved to be effective inflation-fighting vehicles under certain conditions. These collective findings revealed that none of the major asset classes that we sampled were perfect standalone inflation fighters under all scenarios.

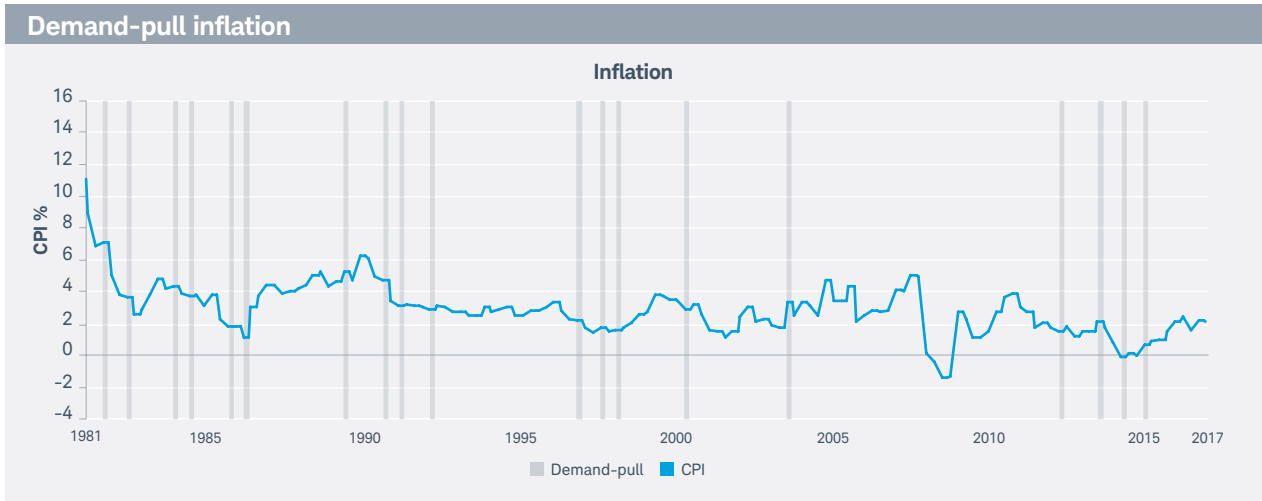
If the goal is to achieve better long-term results than can be generated by TIPS or commodities alone, then a well-diversified approach to investing—one that includes allocations to traditional assets such as stocks, bonds, and cash—should be considered.

Appendix

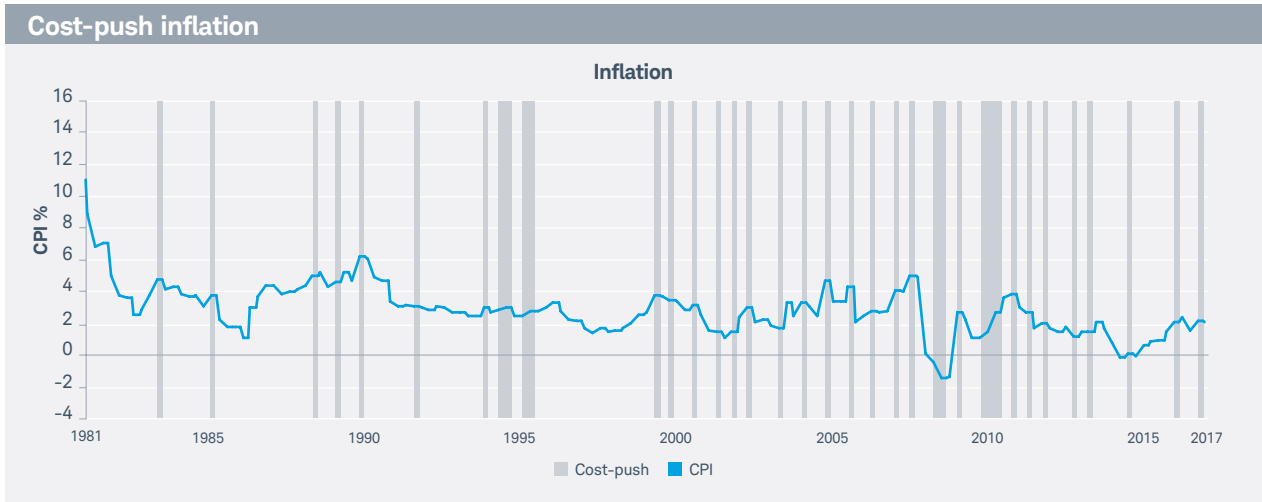
Indexes we used:

Asset Class	Index
SP500	S&P 500® Index (Total Returns)
R2000	Russell 2000 Index (Total Returns)
EAFE	MSCI EAFE (Total Net Returns)
REIT	FTSE EPRA NAREIT Developed NR
Commodities	Bloomberg commodity index total return (DJ UBS Commodity Index TR)
AGG	Bloomberg Barclays U.S. Aggregate Bond Index TR
TIPS	Bloomberg Barclays U.S. Treasury TIPS TR
ST Bonds	Bloomberg Barclays U.S. Govt/Credit 1–3 Yr. TR
FX(\$)	US Dollar Index Spot

Appendix (cont'd)



Source: Charles Schwab Investment Management; Bloomberg. Data from 01/01/1982 to 12/31/2017.
Past performance is no guarantee of future returns.



Source: Charles Schwab Investment Management; The World Bank. Data from 01/01/1982 to 12/31/2017.
Past performance is no guarantee of future returns.

Appendix (cont'd)

Asset class returns are from Morningstar except the FX(\$) which is from Bloomberg. All of the returns used in this paper are quarterly excess returns over the inflation rate for the respective period.

REITs index returns are from the Wilshire U.S. REIT Index before 02/28/2005 and from FTSE EPRA NAREIT Developed NR after 03/01/2005.

Commodity index returns are from S&P GSCI Total Return CME before 12/31/1990 and from Bloomberg commodity index total return (DJ UBS Commodity Index TR after 01/01/1991).

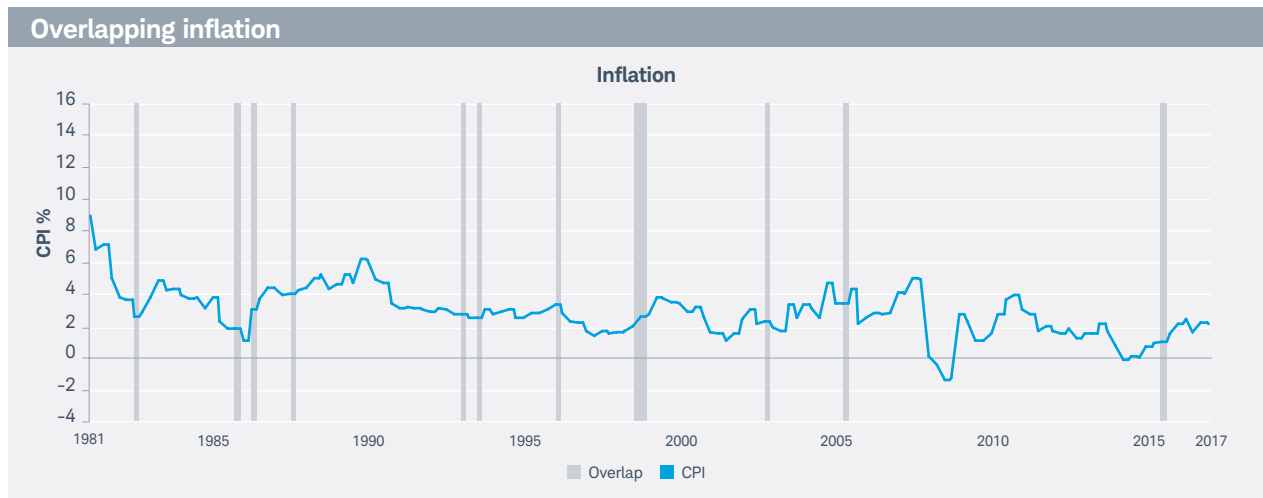
Definition of the inflation regimes:

Inflation is measured by quarterly change in seasonally adjusted CPI. Source: Bloomberg.

Increase in aggregate demand is measured by the quarterly increase in seasonally adjusted real GDP. Source: Bloomberg.

Changes in commodity prices are the average price change of an equally weighted price changes of energy, non-energy (beverages, food, raw materials, fertilizers, metals and minerals) and precious metals. Source: The World Bank.

Change in wages is the change in the inflation adjusted Wage & Salary from the GDP report U.S. Nominal Dollars SAAR. Sources: Bureau of Economic Analysis and Charles Schwab Investment Management.



Sources: Charles Schwab Investment Management; Bureau of Economic Analysis. Data from 01/01/1982 to 12/31/2017.

Past performance is no guarantee of future returns.

Bibliography

- 1. What is inflation** and how does the Federal Reserve evaluate changes in the rate of inflation?
Current FAQs. [Online] Federal Reserve, April 30, 2014. [Cited: January 5, 2015.]
http://www.federalreserve.gov/faqs/economy_14419.htm.
- 2. U.S. Bureau of Labor Statistics.** Monthly Labor Review. April 2014.
<https://www.bls.gov/opub/mlr/2014/article/one-hundred-years-of-price-change-the-consumer-price-index-and-the-american-inflation-experience.htm> (accessed 02/14/18).
- 3. Parkin, Michael.** Economics. s.l.: Addison Wesley-Pearson, 2007.



Emre Erdogan, Ph.D., CFA

Senior Research Analyst, Multi-Asset Strategies

About the author

Emre Erdogan is a Senior Research Analyst for Charles Schwab Investment Management, Inc. (CSIM). He is responsible for designing and implementing asset allocation models for Schwab's multi-asset strategies. His role includes researching strategic asset allocation, maintaining and enhancing glide paths for Schwab's target date funds, and strengthening portfolio construction and risk management capabilities.

Mr. Erdogan earned a Master of Science and a Doctorate in Operations Research from Columbia University and a Bachelor of Science in Industrial Engineering from Middle East Technical University, Turkey. He is a CFA® charterholder.



Natalia Yazhova

Senior Research Analyst

About the author

Natalia Yazhova is a Senior Research Analyst for Charles Schwab Investment Management, Inc. (CSIM). She is responsible for developing and maintaining quantitative models and software to support CSIM's multi-asset strategy funds.

Ms. Yazhova earned a Master of Science in Computational Finance from Carnegie Mellon University, Tepper School of Business, and a Bachelor of Technology in Computer Information Systems from the Globe Institute of Technology.



Jake Gilliam, CFA, AIF®

Senior Multi-Asset Class Portfolio Strategist

About the author

Jake Gilliam is a Senior Multi-Asset Class Portfolio Strategist for Charles Schwab & Co., Inc. supporting Charles Schwab Investment Management Inc.'s (CSIM) Asset Allocation and Sub-Advisor Oversight Committees. He contributes to strategic decisions for all multi-asset class portfolios as well as several single asset-class portfolios managed by CSIM and for the Schwab Bank Collective Trust Funds. He works closely with the Chief Investment Officers, Portfolio Managers, Research, and Sub-Advisor Oversight teams on a frequent basis. Mr. Gilliam also represents CSIM's multi-asset class strategies to the institutional marketplace, clients, and the media.

Mr. Gilliam earned a Bachelor of Business Administration in Finance from Ohio University, and is a board member of the Ohio University College of Business Finance Advisory Council. He is a CFA® charterholder and a member of the CFA Society of Cleveland. He has earned the Accredited Investment Fiduciary® (AIF) designation, awarded by the Center for Fiduciary Studies, University of Pittsburgh. He holds Series 7 and 66 licenses.

Charles Schwab Investment Management

As one of the nation's largest asset managers, our goal is to provide investors with a diverse selection of foundational products that aim to deliver consistent performance at a competitive cost.

Past performance is no guarantee of future results.

There are many other ways of measuring inflation. For simplicity, we focused on the CPI in this white paper.

The opinions expressed are subject to change without notice, and are not intended to serve as investment advice, a recommendation, offer, or solicitation to buy or sell any securities, or recommendation regarding specific investment strategies. Information and data provided have been obtained from sources deemed reliable, but are not guaranteed. CSIM makes no representation about the accuracy of the information contained herein, or its appropriateness for any given situation. Some of the statements in this document are forward looking and contain certain risks and uncertainties. The views expressed are subject to change without notice based on economic, market, and other conditions. Past performance is no guarantee of future results.

Schwab Bank Collective Trust Funds are maintained by Charles Schwab Bank, trustee of the Funds, and are available for investment by certain retirement plans. CSIM provides non-discretionary advisory services to the Collective Trust Funds.

CSIM and Charles Schwab & Co., Inc. are separate but affiliated companies and subsidiaries of The Charles Schwab Corporation.

©2018 Charles Schwab Investment Management, Inc. All rights reserved. IAN (0218-8KGU) MKT101401-00 (02/18)

00208012

For more insights, visit us at schwabfunds.com



Investment Management