Working Paper

Monetary Tightening, Financial Markets, and the U.S. Economy

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ABSTRACT

The Federal Reserve has been gradually tightening monetary policy since late 2015. The tightening of monetary policy is motivated by sustained improvements in the labor market and concerns about risks to financial stability due to low interest rates. However, the pace of core inflation is subdued and still below the Fed's target. An examination of past episodes of monetary tightening shows that a gradual pace of monetary tightening does not have an adverse effect on financial markets and the U.S. economy. Stock prices tend to rise despite higher interest rates. The short-term interest rate moves in tandem with the fed funds target rate. The long-term interest rate usually rises with higher short-term interest rates though so less in magnitude. The shape of the Treasury yield curve tends to flatten as monetary policy becomes tighter. Growth in industrial production generally continues amid higher interest rates if effective demand is sustained. Housing activity is sensitive to the mortgage rate but is supported by the improvement in the labor market and economic activity. These empirical regularities associated with a gradual pace of monetary tightening imply that the U.S. economy should continue to expand at a moderate pace this year and possibly beyond. However, there are downside risks to the economic outlook. An inversion of the U.S. Treasury yield curve could be a useful signal of the risk of a slowdown in the business cycle.

Key words: Monetary policy, financial markets, business cycle, interest rates, fed funds target rate, industrial production, U.S. economy

JEL codes: E32, E40, E43, E44, E52, E58

Monetary Tightening, Financial Markets and the U.S. Economy

Highlights

- The Fed has been tightening monetary policy since late 2015
- The stock price index tends to edge higher during monetary tightening despite a higher interest rate because investors expect nominal GDP and dividend payments to grow
- The short-term interest rate moves in tandem with the fed funds target rate
- The long-term interest rate usually rises with the short-term interest rate but less so in magnitude
- The slope of the Treasury yield curve tends to gradually flatten as monetary tightening continues
- Growth in industrial production occurs amid monetary tightening as long as effective demand is resilient
- Housing activity is sensitive to the mortgage rate but a tight labor market and real disposable personal income growth can support residential construction and house price appreciation
- The Fed should continue to gradually tighten monetary policy, but it must be sensitive about risks of a slowdown
- The inversion of the slope of the Treasury yield curve often precedes the onset of a recession

I. INTRODUCTION

The Federal Reserve has been tightening monetary policy since December 2015 by raising its key policy rate, the fed funds target rate (Figure 1). As expected the Fed raised the fed funds target rate to a range of 1.50% to 1.75% at its March 20 meeting, noting that "the economic outlook has strengthened in recent months." The pace of tightening monetary policy has been gradual and restrained. Since December 2015 the Fed has raised the fed funds target rate six times at an incremental pace of 25 basis points each time.

The Fed is expected to continue raising the fed funds target rate several times this year and the next. Though the pace of tightening is expected to be gradual and occur at a measured pace, this has raised concern among investors and the general public about the effects of a tighter monetary policy on financial markets and the real economy. The Fed's balance sheet is still elevated (Figure 2), but investors are uncertain about the consequences of the "normalization" of the central bank's balance sheet as it will require the Fed to trim its $4.5 trillion balance sheet. The Fed is no longer purchasing Treasury issues and mortgage-backed securities. As its holding of older securities reach maturity, the Fed will not replace them with new debt holdings, essentially allowing its inventory of debt securities to decline over time.

This paper examines the effects of tightening monetary policy by assessing what occurred during past episodes of tighter monetary policy, as well as what is happening in financial markets and the economy currently. A gradual pace of monetary tightening works well for the financial markets and the real economy.

I.1 EPISODES OF TIGHTER MONETARY POLICY

Besides the current tightening of monetary policy (late 2015 to present), there are eight distinct episodes of the Fed tightening policy in the past since 1970, including (1) early 1973 to mid-1974, (2) mid-1977 to late 1979, (3) mid-1980 to mid-1981, (4) mid-1983 to mid-1984, (5) early 1987 to mid-1989, (6) early 1994 to mid-1995, (7) mid-1999 to mid-2000, and (8) mid-2004 to mid-2006. History

does not repeat itself but assessing the dynamics of financial markets and the economy during these past episodes of monetary tightening provides insights that can be useful to investors.

I.2 WHY THE FED IS TIGHTENING MONETARY POLICY

As the nation's central bank, the Fed's key mandates are to maximize employment and maintain a stable rate of inflation. The Federal Reserve conducts its monetary policy in light of its mandates. Along with other government agencies, the Fed is also responsible for financial stability.

The Fed's decision to begin to tighten monetary policy is in response to economic conditions, particularly improvements in the labor market, and some concerns about risks to financial stability. The U.S. economy has been adding jobs at a decent pace for the past seven years.[2] The official unemployment rate is quite low, about 4.0% as of Feb 2018. Broader measures of the slack in the labor market, such as the U-6 unemployment rate, have also declined markedly since the Great Recession.[3] However, the rate of core inflation is still restrained, mainly because nominal wage growth has been tepid.

In the aftermath of the Great Recession, the Fed was forced to lower the fed funds target rate to an exceptionally and unprecedentedly low level. Under Ben Bernanke's leadership, the Fed also undertook unconventional policies, such as large-scale asset purchases, and conditionally committed itself to low interest policy for an extended period.

The Fed initiated the start of monetary tightening near the end of Bernanke's tenue. Under Janet Yellen's leadership the Fed continued to gradually raise the

[2] See Akram and Swansen (2017) for an analysis of developments in the U.S. labor market since the Great Recession. Most analysts, such as Aaronson et al (2014), primarily attribute the decline in the labor force participation rate in recent years to demographic changes and in particular to the aging of the population. However, Dantas and Wray (2017) are skeptical of this explanation. They argue that the lower labor force participation rate since the Great Recession is mainly due to the weakness of effective demand rather than the aging of the population. They propose large-scale public sector employment programs to address the deficiency of effective demand and eliminate the pockets of weakness in the labor market.

[3] The U-6 unemployment rate includes those officially unemployed plus all persons marginally attached to the labor force, plus those persons employed part time for economic reasons, as a percent of the civilian labor force. In essence it is composed of the unemployed, the underemployed, and the discouraged workers.

fed funds target rate, albeit at a gradual pace. Yellen was particularly keen to bolster employment. Yellen's assessment proved correct since the U.S. economy has been able to generate sustained job growth and lower the unemployment rate without sparking inflation. However, Jerome Powell, the current Fed Chairman, is modestly hawkish compared to his last two predecessors. Influential Fed Vice Chairman Randall Quarles, and governor-designate Marvin Goodfriend are also more hawkish than most members of the Federal Open Markets Committee (FOMC) in the recent past. Going forward, hence, the FOMC is likely to be more hawkish about potential inflationary pressures and the threats of asset bubbles.

II: THE STOCK PRICE INDEX RISES AMIDST MONETARY TIGHTENING

The stock market tends to do well even though interest rates rise when the Fed tightens monetary policy. Since the beginning of monetary tightening in December 2015, the S&P500 index has surged (Figure 3).

The behaviors of stock price index during the tightening episode in the mid-2000s (Figure 4) and during the tightening at the turn of the century (Figure 5) were quite similar.

The S&P500 index edged higher in both cases. The stock price index also climbed higher during 1994-1995 tightening episode. The stock price index fell sharply in October 1987 but it recovered by late 1989 despite the tightening of monetary policy.

The phenomenon of a higher stock price index despite a higher interest rate is somewhat counterintuitive since valuation models of stock prices, such as those based on Gordon's (1956) model, would imply that a higher discount rate would entail a lower stock price index. However, investors' expectations of nominal GDP growth and future dividend payments from higher sales and profits usually rise during the upswing phase of the business cycle. The rise in the expected dividends per share and the expected growth rate of dividends from improved marginal efficiency of capital appear to more than offset the

rise in the discount rate, at least initially. Of course, financial asset prices do not keep climbing up and up. Corrections eventually occur.

III. THE SHORT-TERM INTEREST RATE MOVES IN TANDEM WITH THE FED FUNDS TARGET RATE

The short-term interest rate, as measured by the rate on the three-month U.S. Treasury bill, moves in tandem with the fed funds target rate (Figure 6).

Various short-term interest rates are influenced by the Fed's monetary policy. Short-term lending and borrowing by financial institutions are based on the current overnight interbank interest rate and the near-term expectations of overnight interbank interest rate and the Fed's policy path. Often the short-term interest rate tends to lead the fed funds target rate as investors anticipate the Fed's next moves based on incoming information about aggregate demand and inflation and signals from the speeches and pronouncements of policymakers. Nevertheless the short-term interest rate and the fed funds target rate have largely moved in lockstep with each other during bouts of monetary tightening and monetary easing conducted by the Federal Reserve since its inception.

IV: THE LONG-TERM INTEREST RATE USUALLY RISES WITH THE SHORT-TERM INTEREST RATE

The long-term interest rate, measured by the yield on 10-year U.S. Treasury Note, has risen from below 1.50% in mid-2016 to around 2.75% as of mid-March 2018, amid the gradual tightening of monetary policy (Figure 7).

Several theoretical and econometric studies of long-term interest rates in the U.S., such as Akram and Li (2016, 2017a and 2017b), have shown that there is a strong correlation not just between the long-term interest rate and the short-term interest rate but also between the year-over-year percentage point changes in the long-term interest rate and the year-over-year percentage point changes in the short-term interest rate. These correlations appear to hold over both the long horizon and the short horizon. However, sometimes the change in the long-term interest rate can be quite modest. Moreover, the rise in the

long-term interest rate tends to be less so in magnitude than the rise in the short-term interest rate.

During the mid-2000s when the Fed was raising the fed funds target rate, the long-term interest rate did not initially rise (Figure 8).

This is mainly due to continued international financial flows to the U.S. Ben Bernanke, then the Fed Chairman, attributed this to the global savings glut. At most times, the effect of a higher fed funds target rate on the long-term interest rate has been more pronounced. At the turn of the century, when the Fed started raising the fed funds target rate, the long-term interest rate rose noticeably (Figure 9) from just above 4.75% in early 1999 to over 5.80% by early 2000.

The long-term interest rate rose between early 1994 to early 1995 as the Fed was tightening monetary policy. Likewise the long-term interest rate rose in 1973-1974, 1977-1979, 1980-81, 1983-1984, and 1986-1989 as the Fed was tightening monetary policy.

V. THE SLOPE OF THE U.S. TREASURY YIELD CURVE

The slope of the Treasury yield curve, as calibrated by the difference between the yields of the 10-year Treasury Note and the 2-year Treasury Note, is an important indicator of financial conditions and investors' expectations about economic outlook. The slope of the Treasury yield curve has flattened from mid-2015 to early 2018 (Figure 10) as investors expected the Fed to embark on tightening monetary policy and as the Fed began its implementation.

As the Fed started raising the fed funds target rate in 2004-2006, the initially steep slope of yield curve started to flatten. The slope of the curve eventually turned negative (Figure 11).

The same phenomenon occurred in earlier episodes of monetary tightening, such as in 1999-2000, 1987-1989, and 1977-1979. In 1994-1995 and 1983-1985 the slope of the yield curve flattened but it did not turn negative. A negatively sloped yield curve typically precedes a recession by several months (Figure 12).

Statistical testing has shown this to be a reliable indicator of the onset of a recession in the U.S. (Estrella and Mishkin 1996).

VI. INDUSTRIAL PRODUCTION GROWTH AND BUSINESS INVESTMENT

Tighter monetary policy usually does not prevent growth in industrial production (Figure 13) since the Federal Reserve begins to tighten policy usually when either effective demand is strong or inflationary pressures are rising or both.

As long as businesses expect that their sales and revenues will continue to rise, manufacturers meet their incoming factory orders to satisfy the demands of their customers. If effective demand stays solid, producers continue to order capital goods because they believe their output will be sold and their sales will cover costs, generate revenue and earn profits. Similarly businesses continue to hire employees even when the interest rates rise if business can meet and exceed their sales targets and their growth expectations. Higher interest rates do not discourage businesses from borrowing and investing if businesses have a favorable view of the economic outlook and the expected marginal efficiency of capital is greater than the interest rate at which businesses borrow.

VII. HOUSING

Interest rates have an important effect on mortgage financing and housing. The mortgage rate tends to rise when the Fed tightens monetary policy and the long-term interest rate begins to rise. There is a very strong correlation between the 30-year mortgage rate and the long-term interest rate. Year-over-year percentage point changes in the same mortgage rate and the long-term interest rate are also strongly correlated (Figure 14).

However, housing activity, as measured by housing starts, residential building permits, housing construction and house prices, depends not just on the mortgage rate but also on economic activity, households' financial conditions, household formations and demographics, credit standards and the ease of access to credit, and bank lending. In particular, growth in real disposable personal income, the unemployment rate, potential home buyers' confidence

about the near future, households' balance sheets, and bank lending practices determine the level of housing activity in terms of purchases of new and existing houses, home prices, and housing construction.

While a higher mortgage rate can dampen housing activity, if the economy continues to expand, labor earnings rise, the unemployment rate remains low, banks and other financial institutions provide access to credit, and credit conditions are accommodating, housing activity can be well supported. Housing construction in the U.S. remains below its pre-crisis peak (Figure 15).

Even though it has been gradually rising, the pace of housing supply in recent years has stayed below housing demand. This has led to increases in home prices since 2013. A moderate increase in the mortgage rate is unlikely to cause a marked slowdown in housing activity.

VI. MODERATE EXPANSION IS LIKELY TO CONTINUE BUT WITH DOWNSIDE RISKS

The U.S. economy is expected to continue on its path of moderate expansion. It is unlikely that a gradual pace of tighter monetary policy will stifle this expansion. The Fed so far has been quite cautious about tightening monetary policy. Interest rates have been exceptionally low in the U.S. and other advanced countries for an extended period (Akram 2015). Several advanced countries, such as Germany, Switzerland, and Denmark, have even witnessed negative interest rates on their long-term government bonds. Extremely low interest rates for such an extended period penalize lenders, discourage financial intermediation, and can create distortions in the financial system. It may foster asset bubbles.

Policymakers need to normalize interest rates, while supporting effective demand. Since the end of the Great Recession the pace of growth in the major advanced countries, including the U.S., has been tepid and disappointing (Akram 2016). Growth should be supported with appropriate policies that foster job creation, skill formation, and innovation. Policies that promote

infrastructure spending, research and development, international trade, check the rise of income inequality and create financial stability would be beneficial.

The benefits of lower interest rates are fairly limited. Samuelson (1945), cited in Kregel (2014), notes that the banking system and financial institutions can be better off by an increase in interest rates and that higher interest rates need not have an adverse effect on aggregate demand. A healthier banking system would be more likely to engage in lending and supporting fixed business investment even with a higher interest rate provided effective demand is resilient.

A shift away from a regime of low interest rates to a regime of moderate interest rates would increase interest incomes of pensioners, savers, and senior citizens. It would signal a return to improved conditions and stability. Hence, it might be beneficial for aggregate demand (Kregel 2014).

Lower interest rate may have been necessary in the aftermath of the Great Recession, but it was insufficient to generate strong effective demand. Public policies should support expenditure in the private sector and investment in new productive capacity, technologies, and innovation. But the continuation of exceptionally low interest rates is not warranted anymore.

Effective demand rather than the interest rate is the most important driver of economic activity. The Fed, however, needs to be prudent about raising the fed funds target rate and the effects of higher interest on the real economy and financial markets. It has to strike an appropriate balance among its objectives of maximizing employment, achieving in its inflation target, and ensuring financial stability.

The fact that the rate of core inflation is undershooting the Fed's inflation target of 2.0% year over year on personal consumer expenditure (PCE) index gives policymakers substantial leeway and implies that a gradual approach would be better than a shock therapy of abruptly tightening monetary policy. The Fed has to be patient and cautious in the conduct of its monetary policy.

The U.S. economy has been expanding since 2010. This makes the current recovery one of the longest in the history of U.S. business cycles, even though the pace of growth has been subdued and below the historic trend. As note earlier, a negatively sloped yield curve usually precedes the onset of a recession. The Fed must not raise the feds funds target rate too much too quickly. A sharp hike in the fund funds target rate could cause the yield curve to become negatively sloped. At the same time, the Fed must also be vigilant against the risk of inflation so that it is not forced to raise its interest rates suddenly and too quickly. There are downside risks to the outlook for moderate growth to continue. Excessive monetary policy tightening could lead to a slowdown. Protectionism and trade war, domestic political turmoil, tensions and conflicts in international relations (North Korea, Iran, and Russia), and financial contagion are some downside risks to the outlook.

A gradual pace of interest rate hikes is warranted in light of currently available information about wages, capacity at home and abroad, and underlying inflationary pressures. A gradual pace of tighter monetary policy should enable the continued expansion of the U.S. economy this year and beyond. Policymakers admittedly cannot prevent recessions, but they must try to mitigate downside risks. A gradual pace of tightening monetary policy appears to be the wisest choice at this time.

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FIGURES

Figure 1: The Fed Reserve Has Raised the Fed Funds Target Rate Six Times Since December 2015

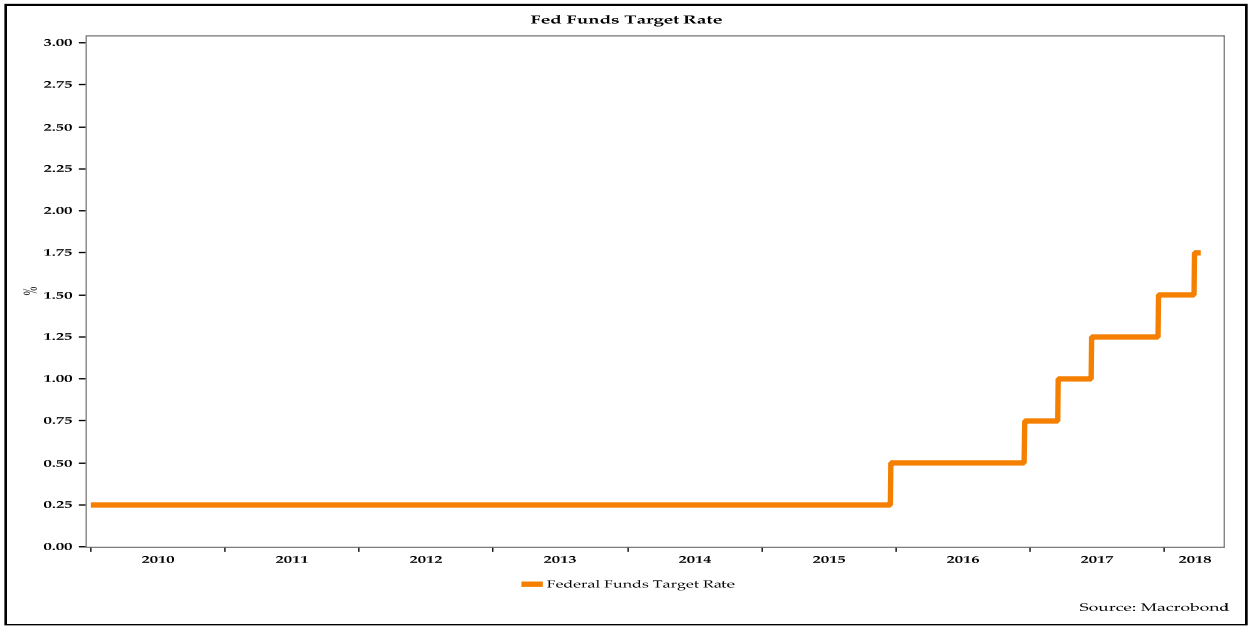

Figure 2: The Fed's Balance Sheet Remains Elevated

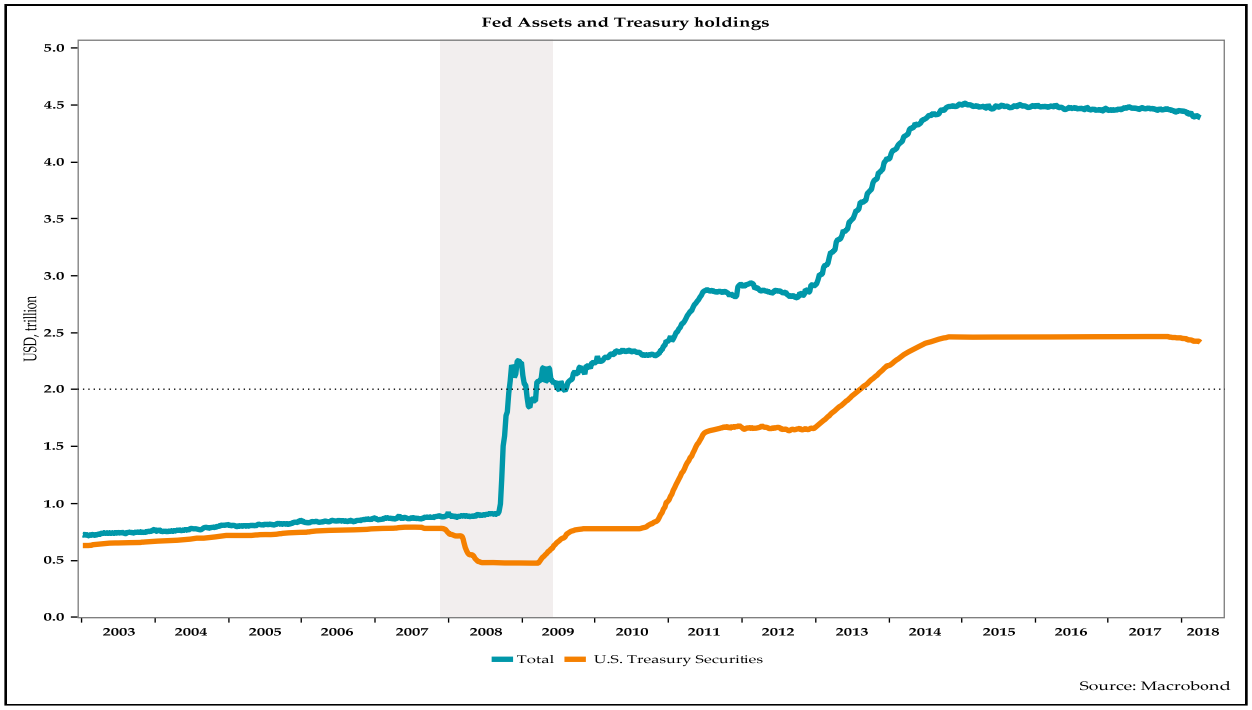

Figure 3: The Evolution of the Stock Market Since Late 2015 — the Beginning of Monetary Tightening

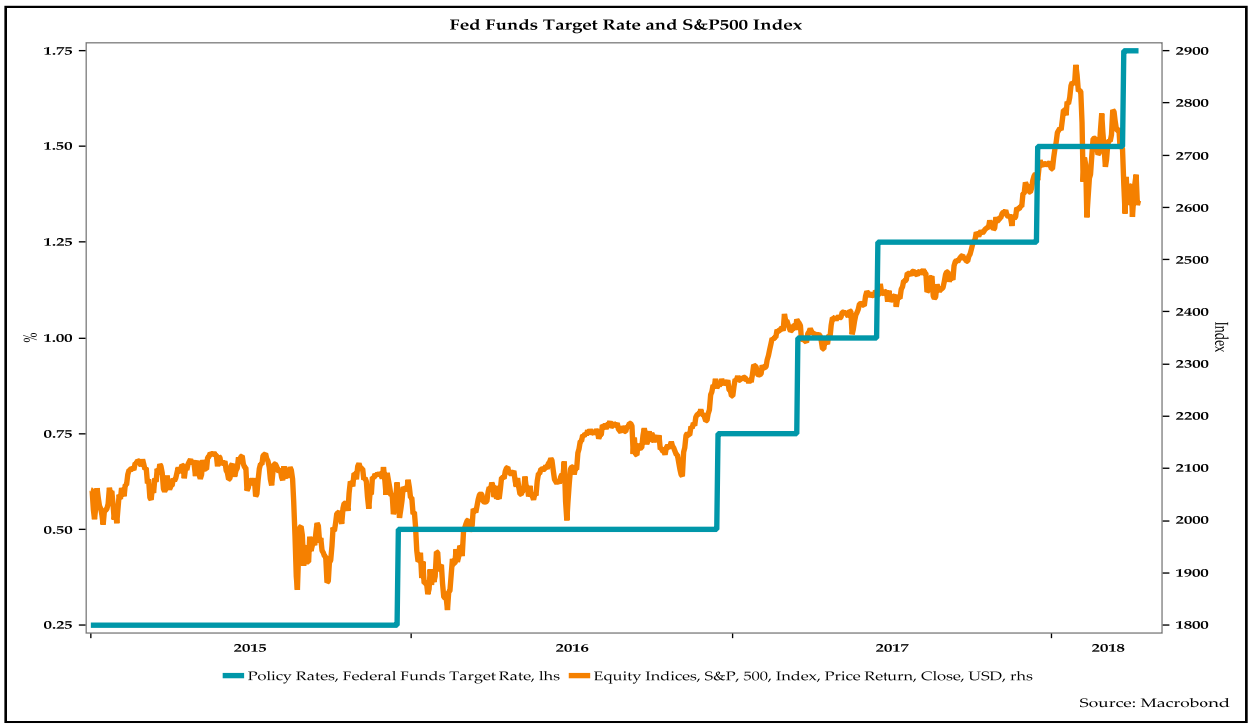

Figure 4: The Behavior of the Stock Market During the Fed Tightening, 2004-2006

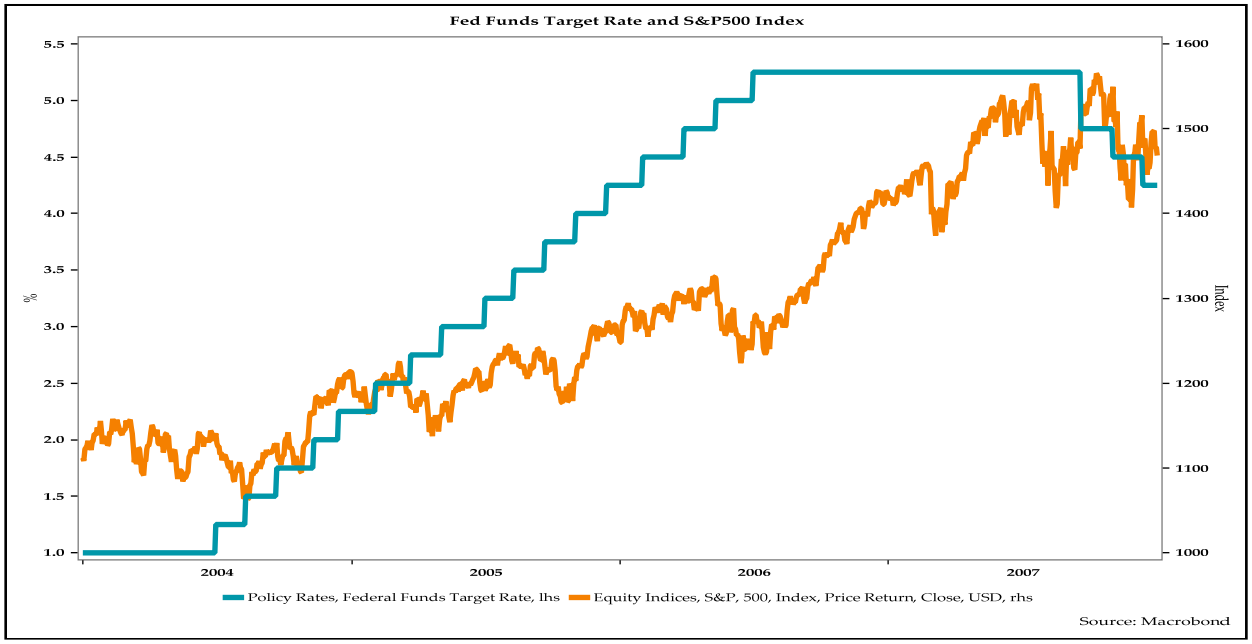

Figure 5: The Behavior of the Stock Market During the Fed Tightening at the Turn of the Century, 1999-2000

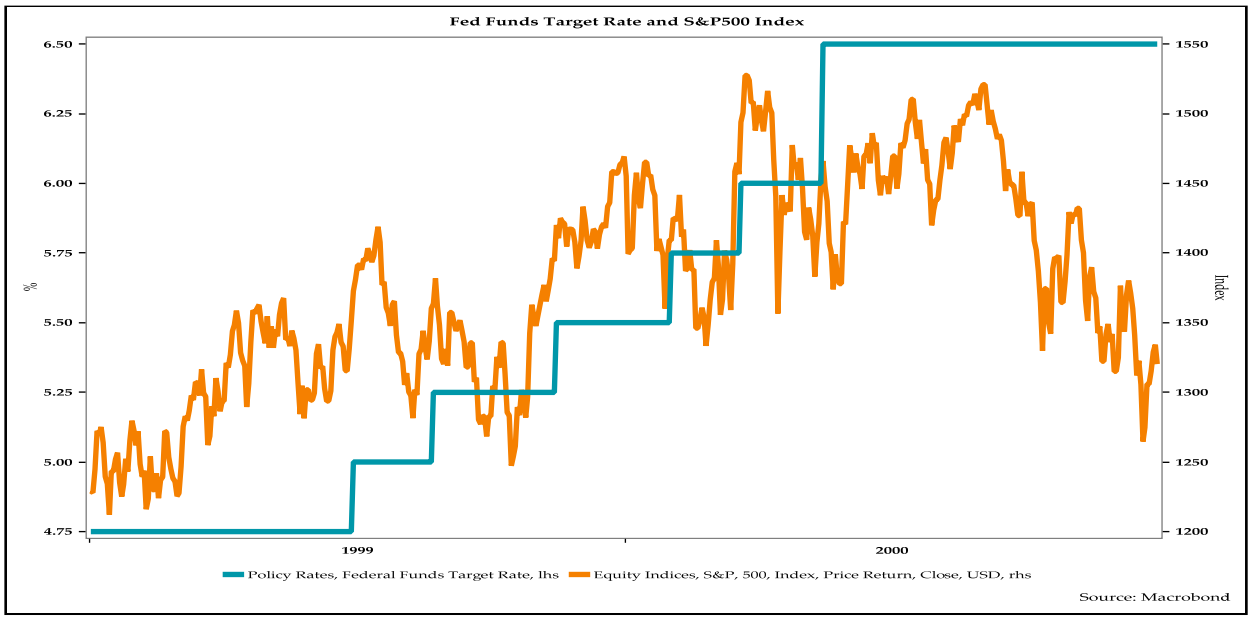

Figure 6: The Short-Term Interest Rate Rises in Tandem with the Fed Funds Target Rate

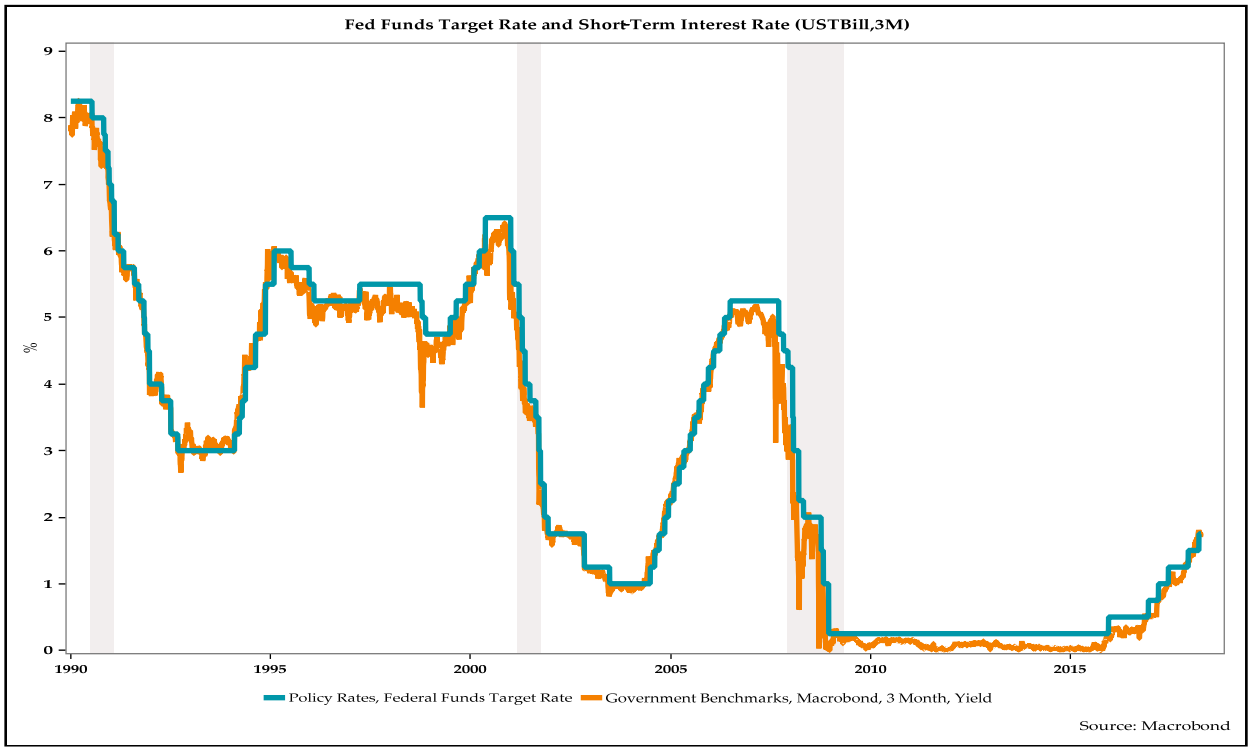

Figure 7: The Long-Term Interest Rate Has Risen Since mid-2016 As the Fed Embarked on Tightening Monetary Policy

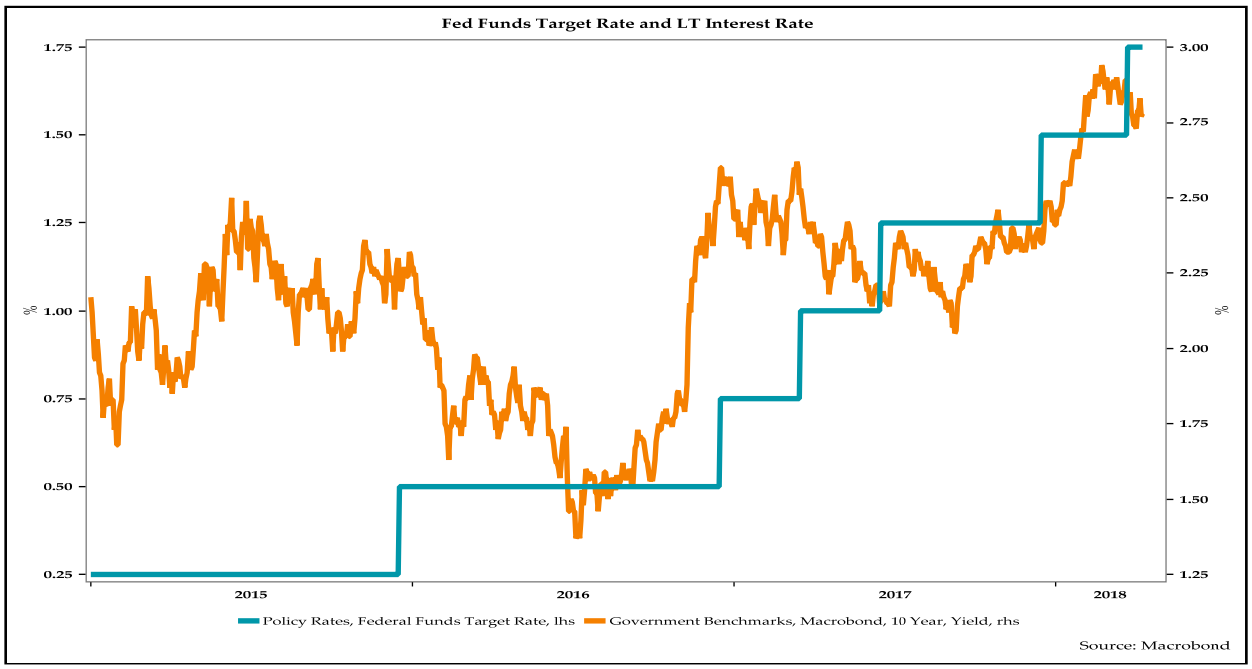

Figure 8: During Mid-2000s, the Long-Term Interest Rate Did Not Rise Much Even Though the Fed Tightened Monetary Policy Substantially

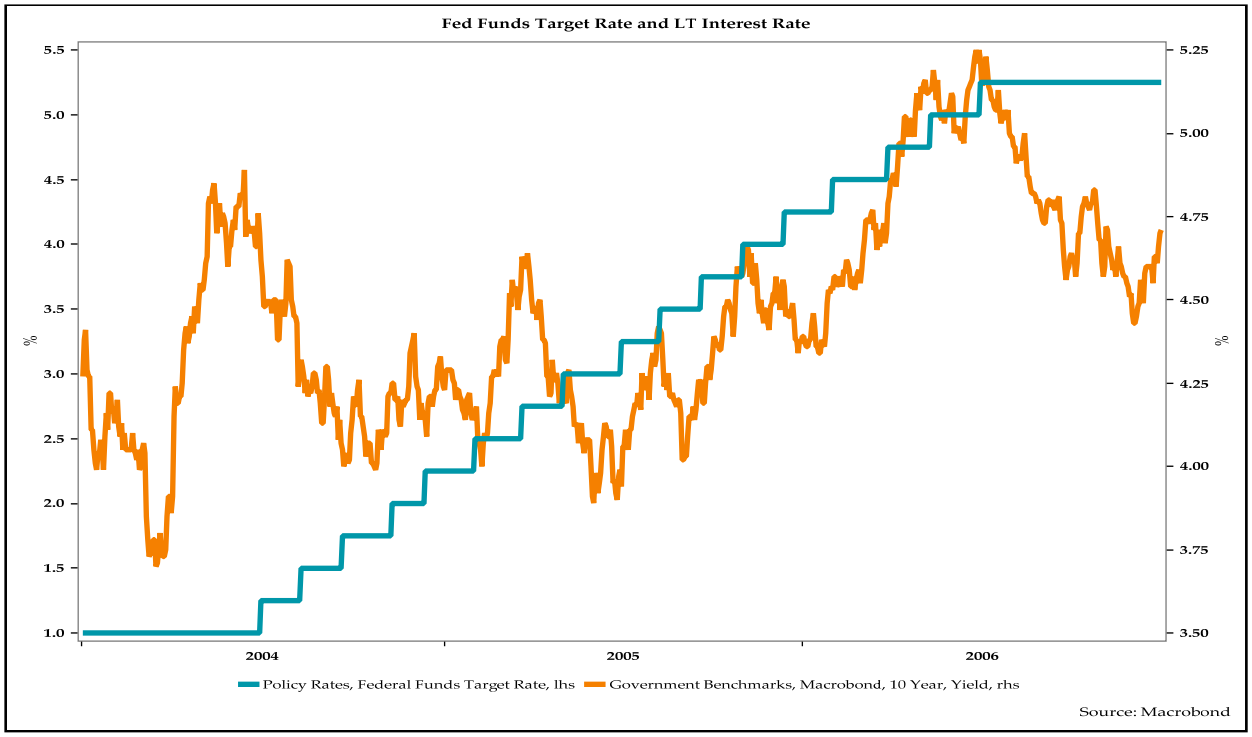

Figure 9: The Long-Term Interest Rate Rose at the Turn of the Century When the Fed was Tightening Monetary Policy

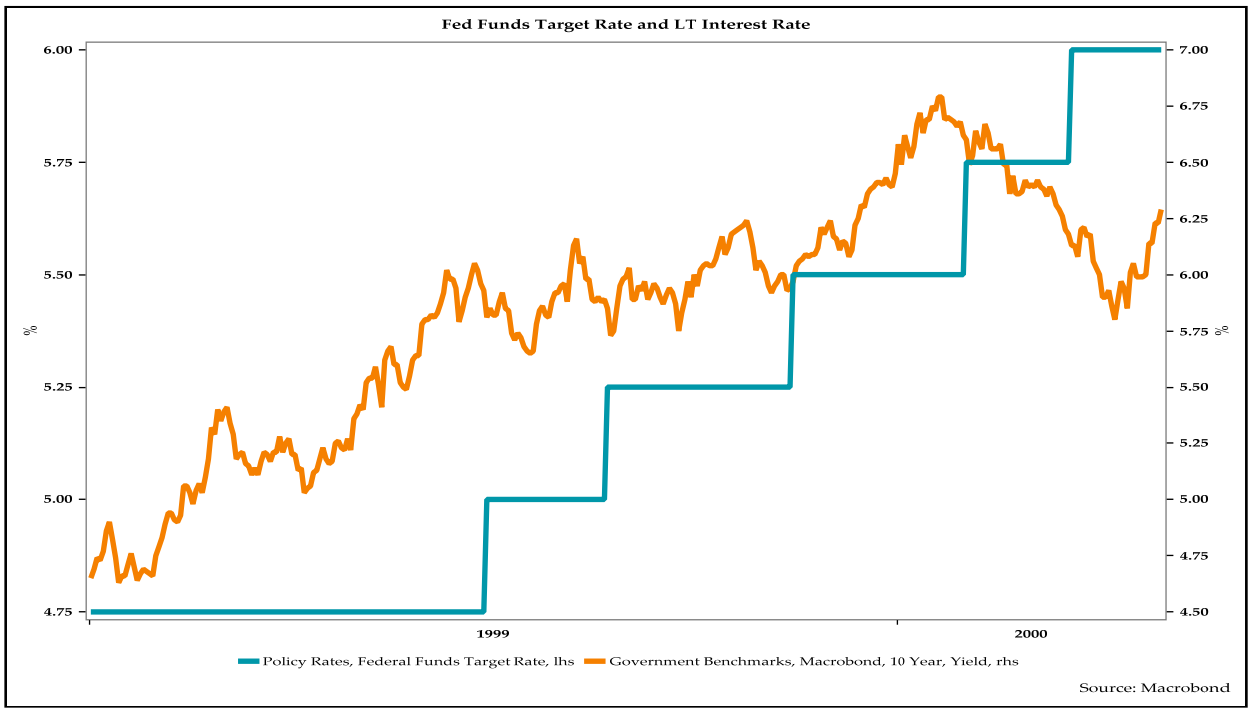

Figure 10: The Evolution of the Slope (2s/10s) of U.S. Treasury Yield Curve Since 2015

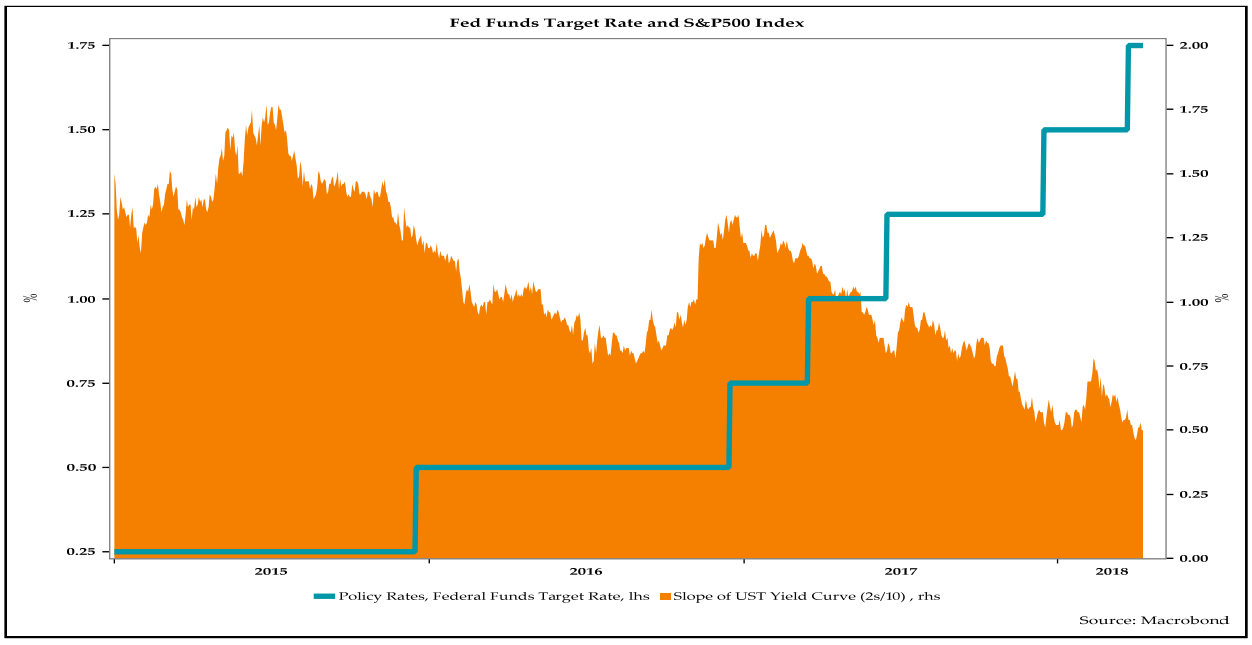

Figure 11: Evolution of the Slope of the U.S. Treasury Yield Curve During the Fed's Monetary Tightening from mid-2004 to mid-2006

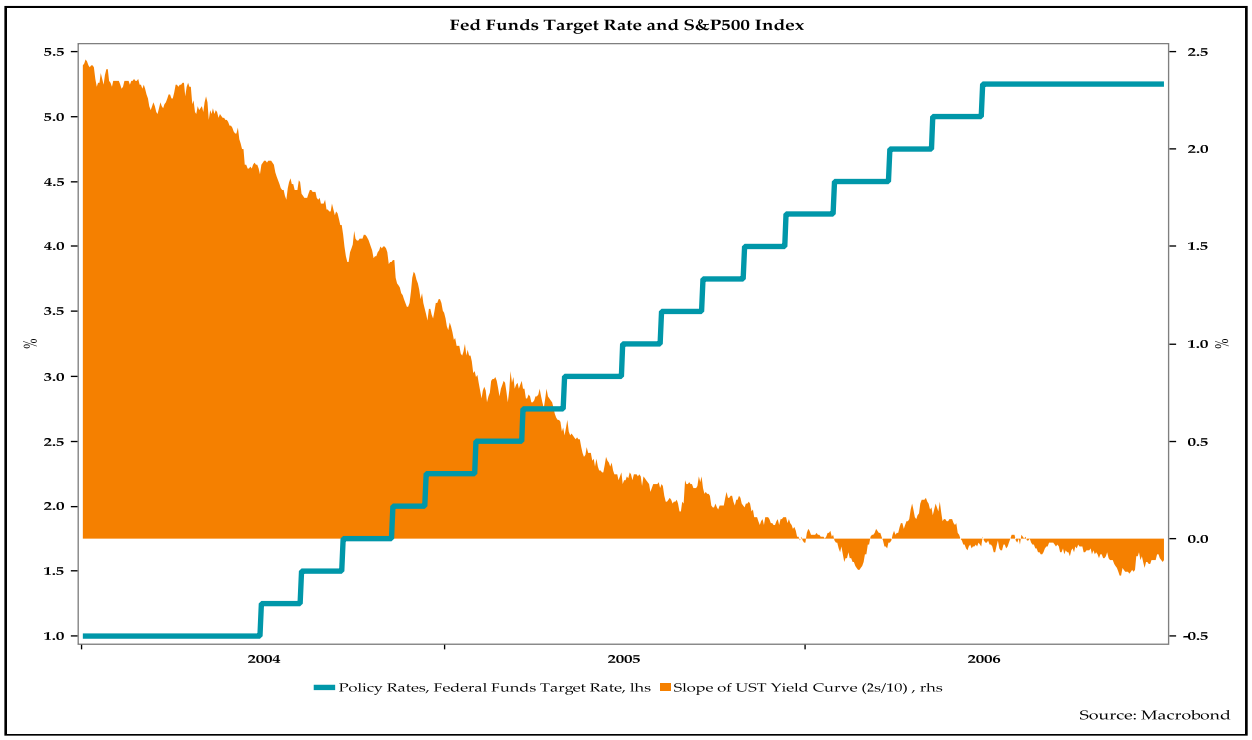

Figure 12: A Negatively Sloped Treasury Yield Curve Has Proven to be a Useful Leading Indicator of a Forthcoming Recession in the U.S.

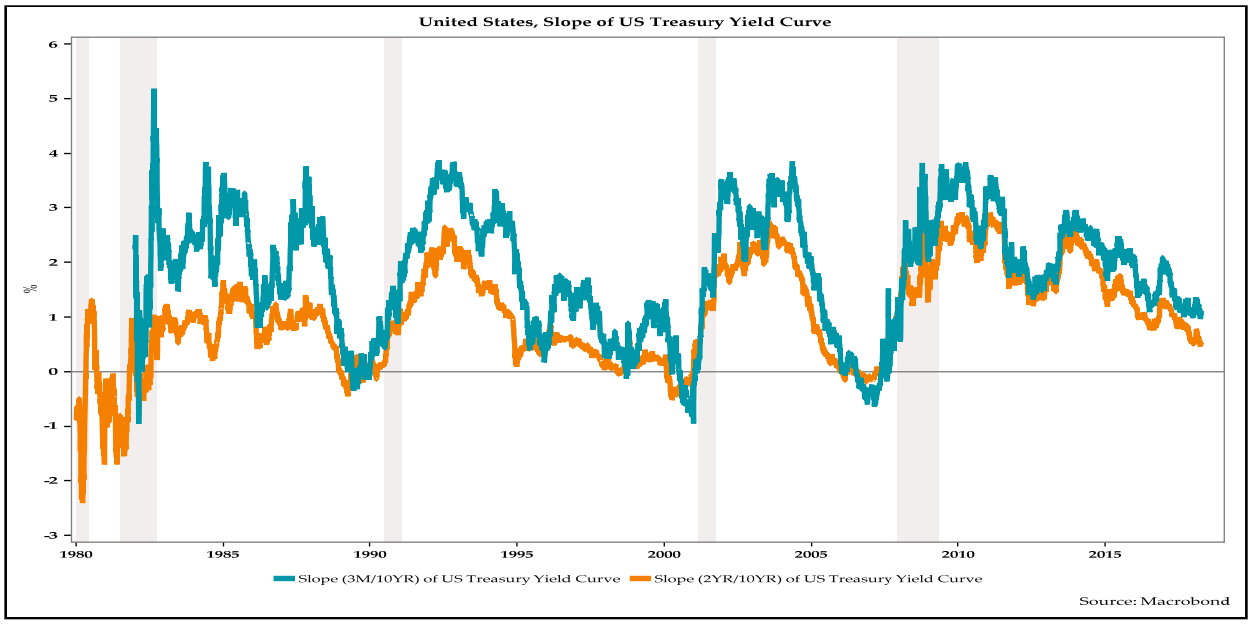

Figure 13: Higher Fed Funds Target Rate Does Not Prevent the Growth of Industrial Production

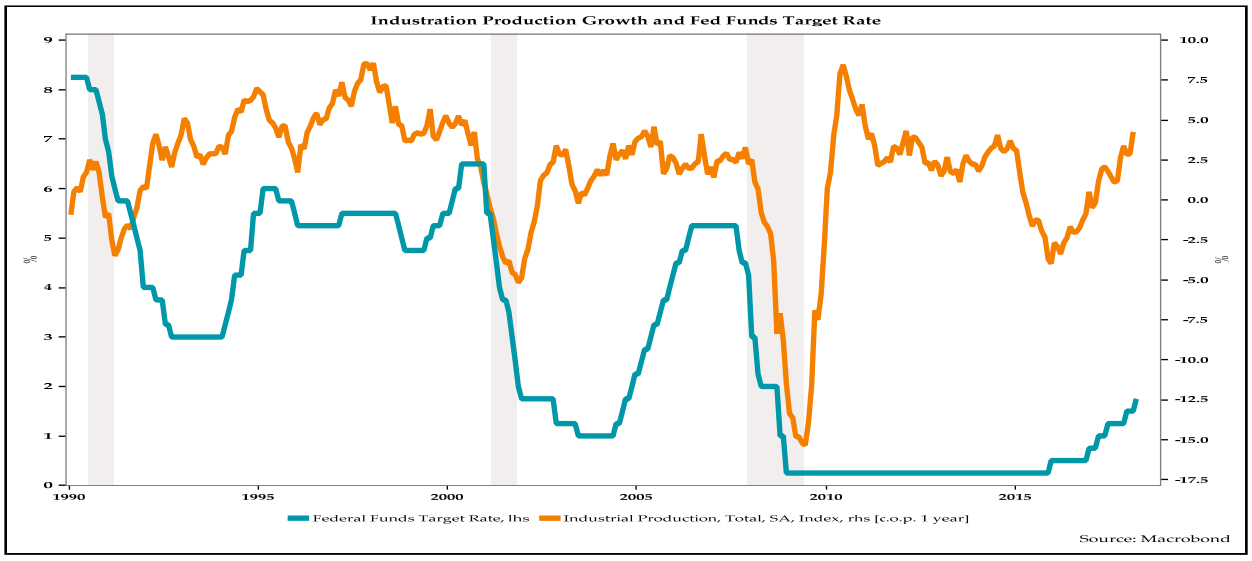

Figure 14: Changes in the Mortgage Rate are Strongly Correlated with Changes in the Long-Term Interest Rate

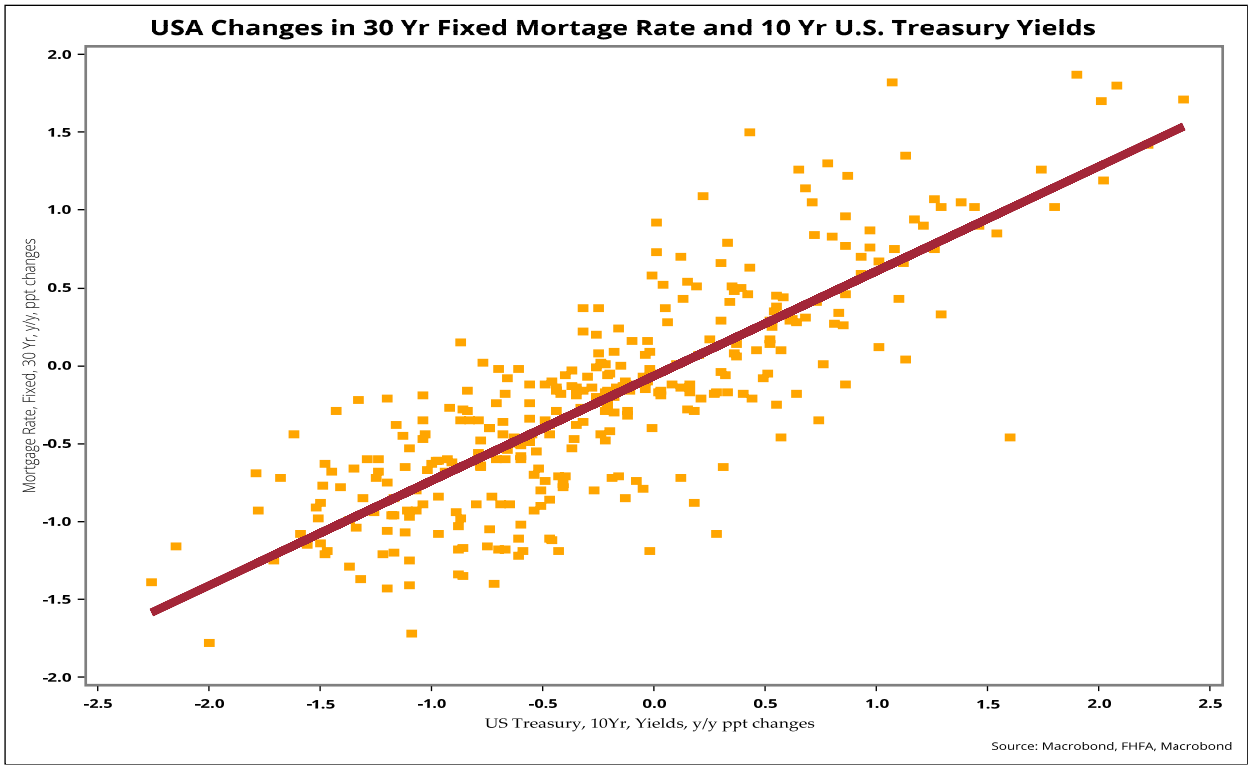

Figure 15: Housing Construction Activity Has Gained But It Remains Well Below Its Peak Prior to the Great Recession