

McKinsey Global Institute



November 2013

QE and ultra-low interest rates: Distributional effects and risks

Discussion paper



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Preface

The past five years have been extraordinary ones in the world of monetary policy. The collapsing of a housing bubble in the United States, the failure of a number of major international banks, the near collapse of the euro system, and deep recessions across advanced economies have spurred major central banks to take unprecedented measures that have significantly expanded their balance sheets.

Most knowledgeable observers agree that implementing a range of conventional and unconventional policies at the start of the financial crisis in 2007 helped to avoid a catastrophic failure of the global financial system. In subsequent years, unconventional monetary policies have continued with the aim of spurring credit and liquidity in the economy and supporting economic growth. While there has been extensive analysis of the impact of these policies at a macroeconomic level, our new research seeks to contribute to ongoing discussion about the impact of today's era of ultra-low interest rates and unconventional monetary policies and the risks ahead through a microeconomic analysis of the distributional impact for governments, corporations, banks, households, and the other sectors that make up the global economy.

Specifically, we look at the impact on these groups of interest income and expenses, examine the extent to which ultra-low interest rates have boosted the prices of different asset classes and spurred consumption through a wealth effect, and assess the impact on capital flows to emerging economies. Looking forward, we discuss the potential risks that may arise as central banks begin to unwind these policies and as interest rates rise.

This research was co-led by Susan Lund, an MGI principal based in Washington, DC, and Richard Dobbs, a McKinsey & Company and MGI director who was based in Seoul and is now in London. Tim Koller, an expert principal in McKinsey & Company's Corporate Finance Practice based in New York, was an integral part of the analysis of asset prices. Ari Shwayder, a consultant based in Chicago, led the project team, which included Jan Grabowiecki, Sebastian Jauch, Jemima Peppel, and Johannes Rübby. Additional research assistance was provided by Edgardo Bonilla, Bing Cao, Bin Jiang, Szabolcs Kemeny, and Anthony Lee. Members of the MGI team without whom this would not have happened include knowledge specialist Tim Beacom, senior editor Janet Bush, graphics specialist Marisa Carder, editorial production manager Julie Philpot, external relations coordinator Gabriela Ramirez, and external relations manager Rebeca Robboy.

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This report contributes to MGI's mission to help business and policy leaders develop a deeper understanding of the evolution of the global economy and provide a fact base that contributes to decision making on critical management and policy issues. As with all MGI research, we would like to emphasize that this work is independent and has not been commissioned or sponsored in any way by any business, government, or other institution.

We welcome your feedback on this discussion paper. Please send your comments to QE@mckinsey.com.

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Executive summary

In response to the global financial crisis and recession that began in 2007, the major central banks in a number of advanced economies—in particular, the United States, the United Kingdom, the Eurozone, and Japan—embarked upon an unprecedented effort to stabilize and inject liquidity into financial markets. In the immediate aftermath of the crisis, central bank action was aimed at preventing a catastrophic failure of the financial system. In the years since, central banks have continued to employ a range of conventional and unconventional monetary policy tools to support growth and revive the flow of credit to their economies.

There is widespread consensus that the decision to implement these monetary policies was an appropriate—and indeed necessary—response in the early days of the financial crisis given the magnitude of the economic shock to the global economy. More than five years later, however, central banks are still using conventional monetary tools to cut short-term interest rates to near zero and, in tandem, are deploying unconventional tools to provide liquidity and credit market facilities to banks, undertaking large-scale asset purchases—or quantitative easing (QE)—and attempting to influence market expectations by signaling future policy through forward guidance. These measures, along with a lack of demand for credit given the global recession, have contributed to a decline in real and nominal interest rates to ultra-low levels that have been sustained over the past five years.

Many academic and central bank studies have found that the measures taken by central banks prevented a deeper recession and higher unemployment than would have otherwise been the case. Estimates from macroeconomic models by the US Federal Reserve, the Bank of England, and others show that, compared with a scenario in which no such action was taken, unconventional monetary policies have improved GDP by between 1 and 3 percent, reduced the unemployment rate by about 1 percentage point, and prevented deflation.¹ If the emergency measures employed at the start of the financial crisis did indeed head off an uncontrolled downward spiral of the global financial system, then the macroeconomic value of the damage prevention could be far larger than these estimates indicate.

This paper is our contribution to an ongoing debate about these central bank policies. In particular, our research seeks to shed light on the distributional effects of unconventional monetary policies at the microeconomic level—including the impact on governments, non-financial corporations, banks, insurance companies, pension funds, and households. Although there are always some distributional

1 For a summary of the literature, see *Global impact and challenges of unconventional monetary policy*, International Monetary Fund (IMF) policy paper, October 7, 2013; John C. Williams, “Lessons from the financial crisis for unconventional monetary policy,” presented at a panel discussion at the National Bureau of Economic Research (NBER) Conference in Boston, Massachusetts, October 18, 2013; and Eric Santor and Lena Suchanek, “Unconventional monetary policies: Evolving practices, their effects and potential costs,” *Bank of Canada Review*, spring 2013.

effects from monetary policy, these are likely to be far larger than in normal economic times given the scale of monetary actions in recent years. Specifically, in our research we assess the impact on net interest income for these groups in the United States, the United Kingdom, and the Eurozone, evaluate the effect of low rates on asset prices and any corresponding wealth effect for households, and consider what impact ultra-low rates have had on cross-border capital flows to emerging markets. We conclude with a discussion of potential risks, in the light of this micro research, as either these policies are tapered and interest rates rise, or rates remain low.

Our headline finding is that ultra-low interest rates have produced significant distributional effects if we focus exclusively on the impact on interest income and interest expense. Although governments have borne substantial costs generated by the financial crisis and the resulting recession, ultra-low interest rates prompted by monetary policy have substantially lowered their borrowing costs, enabling them, in some cases, to finance higher public spending to support economic growth. Non-financial corporations have also benefited as the cost of debt has fallen, although this has not translated into increased investment, perhaps because the recession has lowered their expectations of future demand. Households, in contrast, have fared less well in terms of interest income and expense, although the negative impact on household income may be offset by wealth gains from increased asset prices.

Our analysis merits two caveats. In all analysis on the impact of unconventional monetary policies and ultra-low interest rates, we, along with other researchers on the topic, face the challenge of assessing what would have happened if these policies had not been implemented—the so-called counterfactual. This is unknown and indeed unknowable. Nevertheless, we have used a variety of approaches to estimate how the actual outcome would have compared with a situation in which central banks had not acted the way they did. In addition, our microeconomic analysis looks only at the direct impact on specific sectors, not second-order effects across the economy. It seems likely that central bank actions stabilized the financial system, limited the damage from the financial crisis, and dampened the recession, thereby benefiting all actors in the economy. Nonetheless, we believe that examining the microeconomic consequences—even if these were unintended—is useful in understanding the distributional effects and risks of ultra-low rate policies and in shedding light on the future as these policies are reversed.

Our major findings include the following:

- Between 2007 and 2012, ultra-low interest rates produced large distributional effects on different sectors in advanced economies through changes in interest income and interest expense. By the end of 2012, governments in the United States, the United Kingdom, and the Eurozone had collectively benefited by \$1.6 trillion, through both reduced debt service costs and increased profits remitted from central banks. Meanwhile, households in these countries together lost \$630 billion in net interest income, with variations in the impact among demographic groups. Younger households that are net borrowers have benefited, while older households with significant interest-bearing assets have lost income. Non-financial corporations across these countries benefited by \$710 billion through lower debt service costs.

- The era of ultra-low interest rates has eroded the profitability of banks in the Eurozone.² Effective net interest margins for Eurozone banks have declined significantly, and their cumulative loss of net interest income totaled \$230 billion between 2007 and 2012. In contrast, banks in the United States have experienced an increase in effective net interest margins as interest paid on deposits and other liabilities has declined more than interest received on loans and other assets. From 2007 to 2012, the net interest income of US banks increased cumulatively by \$150 billion. Over this period, therefore, there has been a divergence in the competitive positions of US and European banks. The experience of UK banks falls between these two extremes.
- Life insurance companies, particularly in several European countries, are being squeezed by ultra-low interest rates. Those insurers that offer customers guaranteed-rate products are finding that government bond yields are below the rates being paid to customers. If the low interest-rate environment were to continue for several more years, many of these insurers would find their survival threatened.
- The impact of ultra-low rate monetary policies on financial asset prices is ambiguous. Bond prices rise as interest rates decline, and, between 2007 and 2012, the value of sovereign and corporate bonds in the United States, the United Kingdom, and the Eurozone increased by \$16 trillion. But we found little conclusive evidence that ultra-low interest rates have boosted equity markets. Although announcements about changes to ultra-low rate policies do spark short-term market movements in equity prices, these movements do not persist in the long term. Moreover, there is little evidence of a large-scale shift into equities as part of a search for yield. Price-earnings ratios and price-book ratios in stock markets are no higher than long-term averages.
- Ultra-low interest rates are likely to have bolstered house prices, although the impact in the United States has been dampened by structural factors in the market. At the end of 2012, house prices may have been as much as 15 percent higher in the United States and the United Kingdom than they otherwise would have been without ultra-low interest rates, as these rates reduce the cost of borrowing. We based this estimate on academic research using historical data that suggest how housing prices rise as interest rates decline. In the United Kingdom, it is plausible that this relationship holds today. However, in the United States, it is unclear whether the historical relationship between interest rates and housing prices holds today because of an oversupply of housing and tightened credit standards.
- If one accepts that house prices and bond prices are higher today than they otherwise would have been as a result of ultra-low interest rates, the increase in household wealth and possible additional consumption it has enabled would far outweigh the income lost to households. However, while the net interest income effect is a tangible influence on household cash flows, additional consumption that comes from rising wealth is less certain, particularly since asset prices remain below their peak in most markets. It is also difficult today for households to borrow against the increase in wealth that came through rising asset prices.

² We should point out that other factors are also at work here beyond just low interest rates.

- Ultra-low interest rates appear to have prompted additional capital flows to emerging markets, particularly into their bond markets. Purchases of emerging-market bonds by foreign investors totaled just \$92 billion in 2007 but had jumped to \$264 billion by 2012. This may reflect a rebalancing of investor portfolios and a search for higher returns than were available from bonds in advanced economies, as well as the fact that overall macroeconomic conditions and credit risk in emerging economies have improved. In some developing economies, including Mexico and Turkey, the percentage increases in capital inflows into bonds have been even larger. Emerging markets that have a high share of foreign ownership of their bonds and large current-account deficits will be most vulnerable to large capital outflows if and when monetary policies become less accommodating in advanced economies and interest rates start to rise.

This paper is divided into five chapters. In Chapter 1, we provide a brief overview of central bank measures since the start of the financial crisis. Chapter 2 discusses the impact of central bank action on the interest income and expense of various sectors in advanced economies. In Chapter 3, we assess the effects of central bank action on asset prices and its impact on wealth and consumption. In Chapter 4, we examine the evidence that ultra-low rate monetary policies have prompted a surge in capital flows to emerging economies. Finally, in Chapter 5, we discuss the potential risks that may arise when interest rates begin to rise as well as if they remain at ultra-low levels.

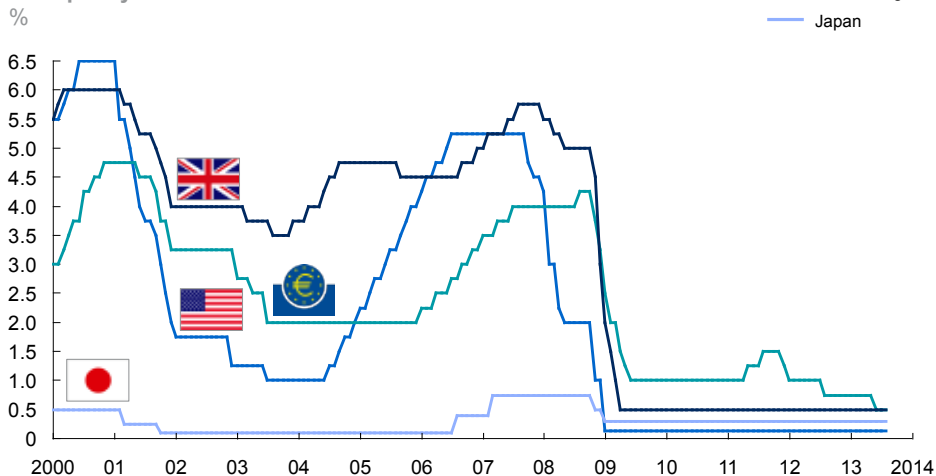
1. Overview of monetary policies since 2007

In the early days of the global financial crisis, in 2007 and 2008, the first priority for central banks was to stabilize the financial system. Then, as the magnitude of the financial crisis and worldwide recession that resulted became clear, they used a variety of tools to support the functioning of the financial system and to foster economic recovery.

In this second phase, the US Federal Reserve, Bank of England, European Central Bank (ECB), and Bank of Japan employed both conventional and unconventional measures that remain in place today. In October 2013, for instance, the Bank of England announced that it was holding the UK base rate at its record low of 0.5 percent and would maintain its stock of assets purchased at £375 billion to support the still-fragile recovery. In the United States, the Federal Reserve, which had been talking in May and June 2013 about “tapering” its monthly asset purchases, surprised markets in September when it said that it would keep these purchases at \$85 billion a month and “await more evidence that progress will be sustained before adjusting the pace of its purchases.” Large-scale asset purchases continue in Japan, too, where the Bank of Japan recently extended its long history of large-scale asset purchases and announced plans to accumulate government bonds at a rate of ¥50 trillion per year, which would more than double its holdings over the next two years.

Conventional central bank policy sets short-term interest rates. To achieve this, most central banks use tools that influence the cost of uncollateralized overnight bank lending in interbank money markets.³ This rate is known as the federal funds rate in the United States, the official bank rate in the United Kingdom, the main refinancing operation (MRO) rate in Europe, and the uncollateralized overnight call rate in Japan, and is used as a basis for many other interest rates in the economy. By adjusting it, central banks seek to influence, via expectations, the slope of the yield curve, and ultimately inflation and overall economic activity. The specific method used to adjust the rate is slightly different in each country. For example, in the United States, the Federal Reserve buys and sells short-term government securities outright, while in the Eurozone the ECB and national central banks use collateralized repurchase agreements with banks, to the same effect. Using these conventional tools at the beginning of the crisis, central banks pushed their short-term policy rates to very low levels (Exhibit 1).

3 This is the interest rate at which banks lend to each other with no collateral, to be repaid the next day.

Exhibit 1**Central banks pushed policy rates to ultra-low levels in 2009 and have held them there since****Main policy rates**

SOURCE: US Federal Reserve; European Central Bank; Bank of England; Bank of Japan; McKinsey Global Institute analysis

Once the policy rate had been pushed to its “zero lower bound,” central banks turned to a range of unconventional monetary policy tools to provide further stimulus to the financial system and economy.⁴ These include providing liquidity and credit market facilities to banks, undertaking large-scale asset purchases (often referred to as “quantitative easing,” or QE), and signaling future policy through forward guidance, as in the following examples.

- **Liquidity facilities.** When the financial crisis began, liquidity in key short-term lending markets quickly dried up, leaving the unsettling possibility that the financial system and payment system could shut down. Central banks stepped in to provide liquidity through short-term lending and set up currency swap lines between central banks in key markets. In the United States, examples of such liquidity facilities include implementing the Term Auction Facility to provide funding to banks, purchasing shares in money market funds, and lending directly to primary dealers. In the Eurozone, the ECB expanded refinancing operations for banks, moving from an auction system to a “full allotment at a fixed rate” model in which banks could borrow unlimited amounts at predetermined fixed prices provided they posted adequate collateral. In the United Kingdom, the Bank of England created the Special Liquidity Scheme to allow banks to swap illiquid securities for government bills. Central banks from a range of major economies also worked together to create swap lines for currencies, ensuring that non-US banks that had borrowed in dollars had access to enough dollar funds to remain solvent.
- **Credit facilities.** Central banks also found that credit from the banking sector to the rest of the economy had diminished, and they therefore stepped in to encourage lending. In the United States, the Federal Reserve took measures that were targeted at specific markets. For example, in 2008 it created programs to purchase 90-day commercial paper, provide liquidity for money

⁴ This “zero lower bound” refers to the fact that the nominal interest rate cannot practically be reduced below zero. Once central banks have lowered the rate to zero, they can no longer use the tool of reducing the short-term interest rate to help boost economic activity.

market funds, and support the issuance of asset-backed securities. In 2011, the ECB undertook enhanced credit support for banks by lengthening its Long-Term Refinancing Operations (LTROs) from three months to three years as well as increasing the amounts available to banks and expanding the assets that it would accept as collateral. The Bank of England created a Funding for Lending scheme that provides incentives and funds to banks and building societies based on their lending performance. Many of the measures taken by central banks, especially early in the crisis, helped from both a liquidity and a credit point of view.

- **Large-scale asset purchases.** Once short-term interest rates were lowered effectively to zero, central banks turned to flattening the yield curve and driving down long-term interest rates by increasing the size of their balance sheets, changing the structure, or both. One mechanism chosen was the large-scale purchases of long-term government bonds and other securities. In the United States, the Federal Reserve used large-scale asset purchase programs in 2008, 2010, and 2012—often called QE1, QE2, and QE3, respectively.⁵ It also employed “Operation Twist,” which focused on trading short-term bills on the Federal Reserve’s balance sheet for long-term bonds. The ECB purchased sovereign debt through its Securities Markets Program and, in August and September 2012, announced an Outright Monetary Transactions (OMT) program that allows it to potentially buy short-term sovereign debt.⁶ The Bank of England has directly purchased £375 billion of UK gilt-edged government securities (gilts) through the Asset Purchase Facility started in 2009. The Bank of Japan announced a program in 2013 to purchase government bonds at a rate of ¥50 trillion per year, which would more than double its holdings over the next two years.
- **Forward guidance.** A reduction in interest rates may have greater impact if market participants believe it is not temporary. To bolster consumer and business confidence and banks’ willingness to lend, central banks have also been issuing “forward guidance” to signal that they intend to keep short-term policy rates low for an extended period. This forward guidance usually comes in the form of statements indicating explicitly the intention to hold rates low for a long period, or setting targets or thresholds for key variables (for example, the unemployment rate) that need to be reached before rate increases are considered. So far, much of the actual guidance given by the US Federal Reserve and the Bank of England has been “conditional”—setting out key variables that they will consider before raising rates. Such statements are not binding, but rather attempts to align market expectations about when rates will change with central bank intentions.

5 QE1 was announced on November 25, 2008, and involved the purchase of \$100 billion in GSE (government-sponsored enterprise) debt and \$500 billion of mortgage-backed securities. QE2 was announced on November 3, 2010, and involved the purchase of \$600 billion in Treasuries. QE3 was announced on September 13, 2012, and involves the ongoing monthly purchase of \$40 billion in mortgage-backed securities. On December 12, 2012, this was expanded to include \$45 billion of US Treasuries.

6 This program was conditional on fiscal consolidation and reform efforts by countries. As of October 2013, no actual purchases had occurred under OMT programs, but most commentators agree that their presence alone has worked to stabilize sovereign debt markets. In spring 2009, the ECB had already intervened in mortgage markets through its covered bond purchase program.

As a result of these measures, the balance sheets of these four central banks collectively increased by \$4.7 trillion from 2007 to the second quarter of 2013 (Exhibit 2). At the time of writing, in late 2013, the balance sheets of the US Federal Reserve and Bank of Japan were still expanding.⁷ To put the magnitude of this shift into context, consider that this increase is so far approximately equal to the annual GDP of the United Kingdom and France combined. Due to the different programs employed by various central banks, the composition of their balance sheets differs significantly (Exhibit 3).

These measures by central banks, together with a lack of demand for credit, have caused yields on both short-term and long-term government bonds to fall dramatically since 2007. The ten-year US Treasury yield has fallen by about 300 basis points, from just over 4.7 percent at the beginning of 2007 to about 1.7 percent at the end of 2012. In the United Kingdom, the decline for this maturity was 300 basis points from a starting point of 4.9 percent in 2007. In the Eurozone, the average ten-year government bond yield fell by 200 basis points over this period from 4.1 percent.⁸ The amount to which these declines have been due specifically to central bank actions, as opposed to other economic factors, is debated. The consensus estimate is that central bank programs in the United States have reduced ten-year Treasury yields by about 65 to 100 basis points, although estimates range as high as 200 basis points. Ben Bernanke, chairman of the US Federal Reserve, has suggested that the impact was 120 basis points.⁹

These declines have changed the cost of credit for most borrowers, because government bond rates are used as the basis for many other interest rates. Moreover, some credit market interventions have targeted specific interest rates, as was the case in the United States, where the Federal Reserve has directly purchased mortgage-backed securities, commercial paper, and other asset-backed securities.¹⁰ Rates on credit and fixed-income products that were not directly targeted have also fallen as investors have shifted their portfolios.¹¹ All in all, borrowing costs have fallen dramatically. In the United States, for example, the average 30-year fixed mortgage rate fell by more than 340 basis points from its high in June 2006 to a nadir in November 2012.

7 The Bank of England is replacing maturing assets that it holds, but, as of October 2013, was not planning to increase its total holdings of assets purchased through QE programs. The ECB balance sheet had begun contracting as LTROs begin to be repaid and a new round of LTROs had not yet been offered as of October 2013. At its peak, in March 2012, there were about €1.1 trillion in LTROs outstanding. By October 2013, this had fallen to about €650 billion.

8 The aggregate Eurozone numbers mask the fact that yields fell more in Germany (a 270-basis-point decline) but went up in periphery countries such as Spain (a 130-basis-point increase).

9 A good review of estimates can be found in *Global impact and challenges of unconventional monetary policy*, IMF policy paper, October 7, 2013; John C. Williams, "Lessons from the financial crisis for unconventional monetary policy," presented at a panel discussion at the NBER Conference in Boston, Massachusetts, October 18, 2013; and Eric Santor and Lena Suchanek, "Unconventional monetary policies: Evolving practices, their effects and potential costs," *Bank of Canada Review*, spring 2013.

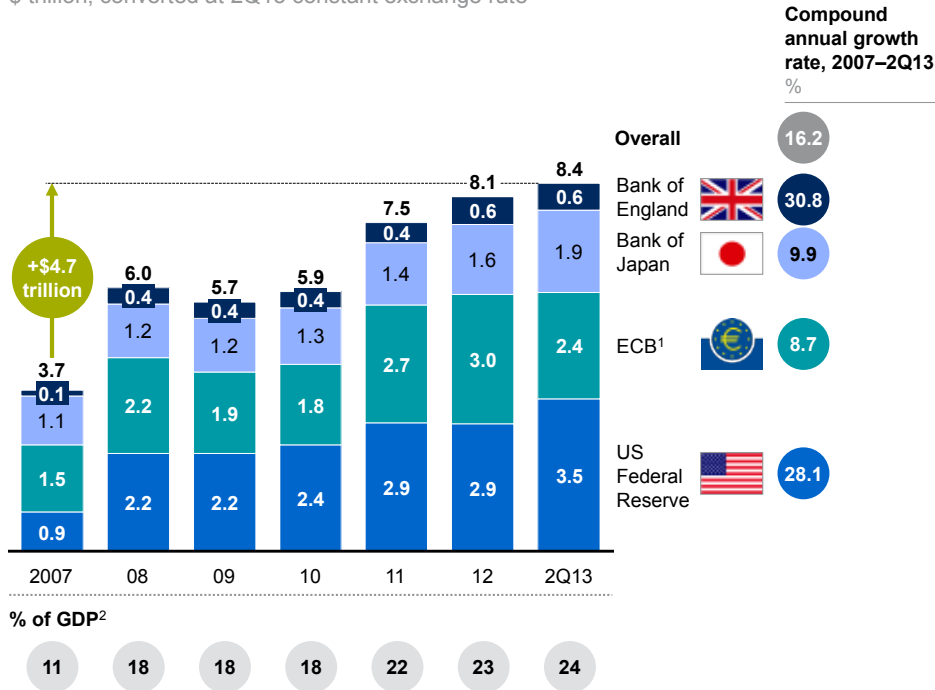
10 For a summary of Fed action, see Brent W. Fawley and Christopher Neely, "Four stories of quantitative easing," *Federal Reserve Bank of St. Louis Review*, January/February 2013.

11 Arvind Krishnamurthy and Annette Vissing-Jorgensen, *The effects of quantitative easing on interest rates: Channels and implications for policy*, Brookings Papers on Economic Activity, fall 2011. The authors investigate a wide variety of channels through which QE1 and QE2 have had an impact on other fixed-income yields.

Exhibit 2

Central bank balance sheets in the United States, the United Kingdom, the Eurozone, and Japan have expanded by \$4.7 trillion since 2007

Total assets on central bank balance sheets (end-of-period values)
\$ trillion, converted at 2Q13 constant exchange rate



1 European Central Bank; excludes gold and foreign currency.

2 Total assets as share of combined GDP.

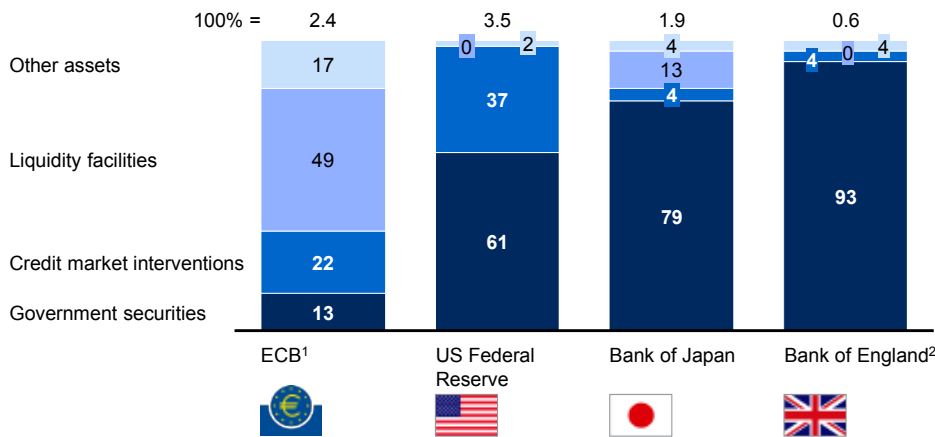
NOTE: Numbers may not sum due to rounding.

SOURCE: US Federal Reserve; European Central Bank; Bank of England; Bank of Japan; McKinsey Global Institute analysis

Exhibit 3

Central banks have used significantly different tools to achieve financial stabilization and monetary stimulus

Central bank balance sheet assets, 2Q13
% of total balance central bank sheet; \$ trillion



1 Includes Eurozone national central banks and the European Central Bank. Excludes gold and foreign currency holdings.

2 Other assets include assets purchased by the Asset Purchase Facility (subsidiary of the Bank of England).

NOTE: Numbers may not sum due to rounding.

SOURCE: US Federal Reserve; European Central Bank; Bank of England; Bank of Japan; International Monetary Fund; McKinsey Global Institute analysis

Large increases in the monetary base of a country relative to that of other countries should, all else being equal, also lead to a depreciation of that country's currency. However, in recent years, it is clear that many factors that affect exchange rates were simultaneously changing, and there is little evidence that QE measures directly affected the exchange rates of advanced economies.¹² Despite the fact that the financial crisis started in the United States, the dollar appreciated significantly against all other major currencies at the beginning of that crisis as investors sought the safety and liquidity of the US Treasury market. In the United Kingdom and Japan, currency depreciations pre-dated central bank QE programs. The pound depreciated by 30 percent from January 2007 to December 2008 on a trade-weighted basis, although that depreciation occurred before the Bank of England began asset purchases.¹³ More recently in Japan, the yen depreciated by 20 percent against the US dollar between December 2012 and April 2013, when the Bank of Japan began asset purchases.

As we consider the impact that low interest rates have had on the economy, it is important to keep in mind that the declines in interest rates over the past five years are a continuation (and possibly an acceleration) of a steady decline in real interest rates since the early 1980s (Exhibit 4). Various explanations have been offered for this long decline in interest rates, including a reduction in global investment as well as a "savings glut" in Asian nations, other emerging economies, and oil-exporting economies. Whatever the cause, the distributional effects that we describe in Chapter 2 are an intensification of effects that had been occurring over most of the past 30 years.

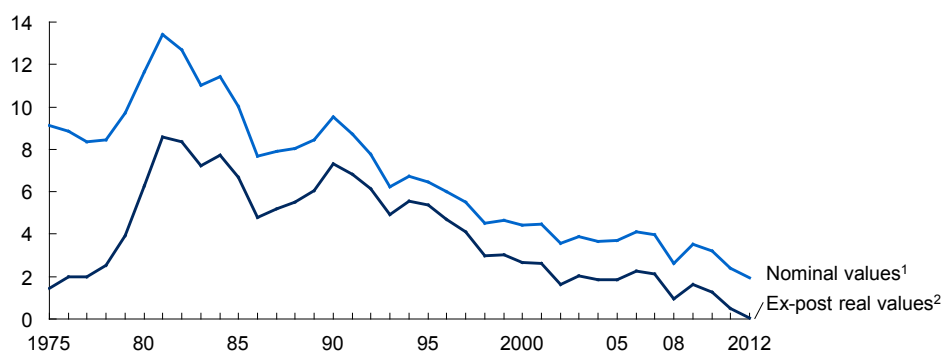
Exhibit 4

Central bank action has come at the end of a 30-year period of declining real and nominal interest rates

Long-term interest rates in developed economies

Yield to redemption on long-term government bonds, 1975–2012

%, GDP-weighted average



1 Ten-year government bonds, where available, for Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, the United Kingdom, and the United States.

2 Ex-post real values calculated as nominal yield on ten-year bonds in current year minus average realized inflation over next ten years. IHS Global Insight inflation estimates used for 2012–22.

SOURCE: International Monetary Fund International Financial Statistics; IHS Global Insight; Bloomberg; Organisation for Economic Co-operation and Development; McKinsey Global Institute analysis

¹² *Global impact and challenges of unconventional monetary policy*, IMF policy paper, October 7, 2013.

¹³ For more on the impact of QE purchases on the dollar and pound, see Michael Joyce, Matthew Tong, and Robert Woods, "The United Kingdom's quantitative easing policy: Design, operation and impact," *Bank of England Quarterly Bulletin*, Q3, 2011; Reuven Glick and Sylvain Leduc, *The effects of unconventional and conventional US monetary policy on the dollar*, Federal Reserve Bank of San Francisco working paper 2013–11, May 2013; and *Global impact and challenges of unconventional monetary policy*, IMF policy paper, October 7, 2013.

2. Distributional effects of interest income and expense changes

The ultra-low interest rate policies of major central banks have had distributional effects through the impact on interest income and expenses of different sectors of the economy. These distribution effects are most likely unintended consequences of central bank policies. Lower rates have reduced interest payments for borrowers but have diminished the interest income of savers. To quantify these effects, we compare the actual interest income and expense of different sectors in 2012 and 2007 and estimate how much was due to changes in interest rates and how much to changes in the interest-bearing assets and liabilities of each sector.¹⁴ Our analysis focuses on the United States, the United Kingdom, and the Eurozone (for a discussion of Japan, see sidebar, “Japan’s experience with ultra-low interest rate monetary policy”).

It is worth emphasizing that we are not discussing the overall impact that central banks’ action has had on their respective economies. Nor are we questioning whether these policies were an appropriate response to the financial crisis. We also do not come to a judgment about the extent to which ultra-low rates resulted from central bank policies or other factors such as weak economic growth. Rather, our focus is on the distributional effects of these ultra-low interest rates on interest income and interest expense. Our analysis excludes possible second-order effects that would occur on other sectors of the economy. We also note that our estimates are constrained by the fact that the counterfactual—the state of the economy had central banks not acted—is unknown. To consider the full set of effects throughout the economy, we would need to build a full structural macroeconomic model, which we chose not to do given the extreme uncertainty about the parameters of such a model in the period in question.

Our analysis shows that governments and non-financial corporations have been very large beneficiaries of ultra-low interest rates because both of these groups have much larger interest-bearing liabilities than they do interest-earning assets, and debt service payments have declined quite substantially (Exhibit 5). The impact on banks has been mixed depending on the region. Banks in Europe have experienced a large decline in net interest margins in this era of ultra-low interest rates, but that has not been the case in the United States. Long-term investors such as pension funds and life insurance companies, as well as households, have lost net interest income because they hold far more interest-bearing assets than liabilities. In Chapter 3, we consider whether possible gains in asset prices could offset the lost income for households, and the impact of low rates on the value of assets and liabilities of pension plans.

14 There is a question about whether 2007 is the most appropriate base year to use for this analysis. We chose it because it represents the position that most economic players were in just before the full financial crisis hit. However, if some sectors had been able to foresee trouble and started moving assets around in anticipation, then our analysis would incorrectly estimate the impact on them. See the technical appendix for details of our estimation methodology.

Japan's experience with ultra-low interest rate monetary policy

Japan's financial crisis began in the early 1990s; since then, the stock market and real estate prices have declined by 80 percent. The Bank of Japan cut the policy rate to 0.5 percent by 1995 and adopted an official zero-interest rate policy in 1999. In 2001, it began large-scale asset purchases of government bonds and other assets. In April 2013, the Bank of Japan embarked upon another round of asset purchases with the intention of purchasing up to ¥50 trillion of government bonds a year in an attempt to increase inflation to 2 percent. If that happens, the Bank of Japan would double its bond holdings within two years.

Although many people refer to the period from the early 1990s to the early 2000s as Japan's "lost decade," academic studies support the view that the Bank of Japan policies helped to prevent a worse recession.¹⁵ Still, these monetary policies have had significant income implications for different sectors of the economy. Japan's government debt has grown to 238 percent of GDP. Interest payments on this debt are estimated at ¥25 trillion in 2013. Each 100-basis-point increase in interest rates would raise that amount by ¥11 trillion. If interest rates reached the level of the United States in 2007, Japan's government debt service costs would absorb 53 percent of the government's 2012 budget.

As in other advanced economies, Japanese corporations hold more interest-bearing liabilities than assets, although the gap in Japan is much narrower than in other countries. The ratio of liabilities to assets held by Japanese corporations has declined from 1.9 in 1998 to 1.2 in the first quarter of 2013, a level much lower than that of their US, UK, or Eurozone counterparts. They appear to have been hoarding cash and/or are reluctant to undertake new investment. Total investment in 2012 was 21 percent of GDP, down from 33 percent in 1990. Total debt financing is almost 35 percent lower in 2013 than it was 15 years previously, despite the low interest rate environment.

Japanese households have borne much of the cost of ultra-low interest rates. In 2013, households had ¥963 trillion of directly held interest-bearing assets, compared with ¥357 trillion in interest-bearing liabilities. Almost 90 percent of interest-bearing assets are in deposit accounts. With government bond yields averaging less than 2 percent, Japanese households have earned very little on their savings for well over a decade. Because household liabilities are relatively small, they have not benefited as much from lower-cost credit.

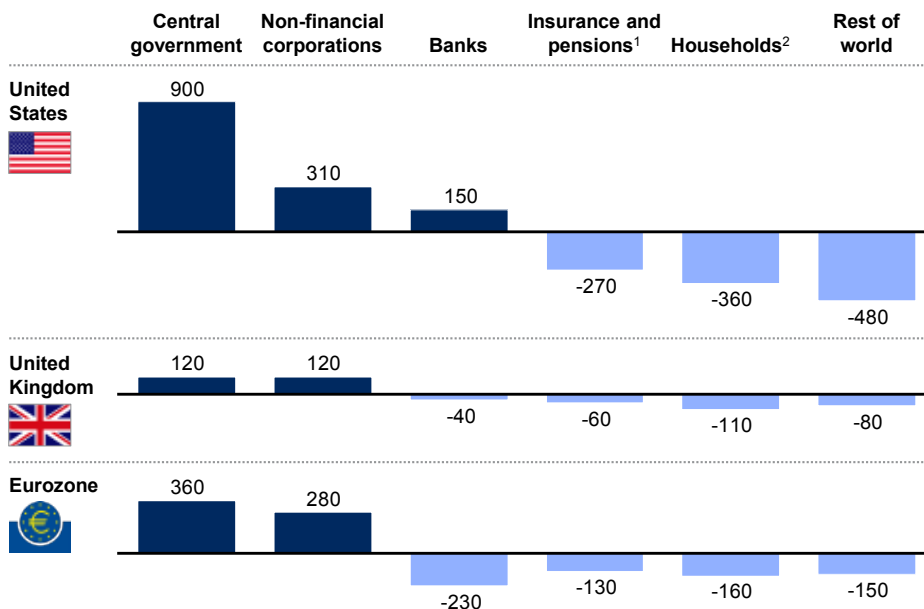
Japan's life insurance industry has been particularly hard hit by low interest rates. New individual life policies fell by 57 percent from 1993 to 2010—in part reflecting an aging population—and profits declined by 69 percent. Banks suffered from declining net interest margins. Margins on loans were down 37 percent from 1992 to 2012, prompting a shift to fee-based products, cuts in expenses, changes to pricing guidelines, and improvements in loan portfolios and risk measurement systems. Perhaps as a result—and also because of continued weak demand—loan volumes have decreased while deposits have increased, causing banks to increase their holdings of government bonds as a share of their total assets.

15 A review of the literature can be found in Hiroshi Ugai, "Effects of the quantitative easing policy: A survey of empirical analyses," *Monetary and Economic Studies*, volume 25, number 1, March 2007.

Exhibit 5**The impact of lower interest rates is directionally the same for different sectors across advanced economies, except for banks**

Estimated cumulative change in net interest income, 2007–12

\$ billion, converted at constant 2012 exchange rate



1 Includes only defined-benefit pension plans and guaranteed-rate life insurance policies.

2 Household numbers include non-profits, defined-contribution pension plans, and variable-rate life insurance policies.

SOURCE: US Federal Reserve; McKinsey Corporate Performance Analysis Tool; Standard & Poor's; US Treasury Department; Bankrate; Eurostat; Bank of England; Bloomberg; European Fund and Asset Management Association; International Monetary Fund; UK Debt Management Office; European Central Bank; McKinsey Global Institute analysis

LOWER INTEREST PAYMENTS HAVE IMPROVED GOVERNMENT FINANCES

Central governments have experienced significant costs due to the financial crisis, both directly through the cost of financial sector bailouts and stimulus spending, and indirectly through lost tax revenue and rising fiscal deficits during the recession.¹⁶ Nevertheless, they have benefited from being able to finance these additional costs and their current borrowing at extremely low rates. Over the past five years, we calculate that the interest paid by central governments in the United States, the United Kingdom, and the core Eurozone countries was dramatically lower than it would have been.¹⁷ In the United States, the effective rate paid on all outstanding government debt fell from 4.8 percent in 2007 to 2.4 percent in 2012. In the United Kingdom, it declined from 5.1 percent to 3.2 percent. In the Eurozone overall, it decreased from an average of 4.5 percent to 3.3 percent despite the fact that, within the Eurozone, government bond yields rose dramatically in Greece, Italy, and Spain. We estimate that even if debt levels had stayed at 2007 levels, declines in effective interest rates alone have reduced debt service payments of governments in 2012 by \$155 billion in the United States, \$20 billion in the United Kingdom, and \$130 billion in the Eurozone compared with 2007.

¹⁶ In our definition of central government, we exclude state and local governments.

¹⁷ By core Eurozone, we mean all member states that have adopted the euro apart from Greece, Ireland, Italy, Portugal, and Spain.

Central governments have also received additional income from the expansion of central bank balance sheets since 2007. As we have discussed, the central banks in the United States, the United Kingdom, the Eurozone, and Japan have increased their balance sheets by \$4.7 trillion since 2007. Any profit generated each year by these additional assets is then remitted to the respective central governments. In the United States, the Federal Reserve began its substantial asset purchase program in 2008, and therefore profits have been accumulating since 2009. Between 2009 and 2012, profits remitted to the US Treasury totaled \$291 billion, of which we estimate that around \$145 billion—or half—came from the expansion of balance sheets.¹⁸

Taking lower debt service payments and the interest earned on expanded central bank balance sheets, we find that the benefit to governments since 2007 has totaled just over \$1 trillion for the United States, \$365 billion for the Eurozone, and \$170 billion for the United Kingdom.¹⁹ This is the equivalent of around 4 to 8 percent of total government debt, depending on the country or region (Exhibit 6). In the United States, the benefit to the government is equivalent to one year's annual federal deficit at the peak of the crisis. The potentially greater spending that this has enabled is one means by which ultra-low rate monetary policies may have boosted GDP relative to what might have happened.²⁰

If central banks were to indefinitely continue rolling over the assets they have purchased as part of QE operations, the profit earned from interest on those assets (net of any interest payments the central bank makes) would be an ongoing source of income for their respective governments. The present value of this stream of interest payments would be the value of the increase in central bank balance sheets due to asset purchases, assuming that these were priced at market value. In the United States, the Federal Reserve purchased \$2.1 trillion of additional assets between the end of 2007 and 2012. If the assets were rolled over, allowing the expansion of the central bank's balance sheet to remain, this would be equivalent to reducing outstanding US government debt by nearly 20 percent. However, if central banks allow the securities on their balance sheets to mature without replacing them and their balance sheets contract, the additional asset purchases would be of only temporary benefit to the government.

In the Eurozone, the impact on governments in periphery countries may be much larger than that suggested by our methodology.²¹ Although bond rates have increased since the financial crisis started, the relevant comparison is not necessarily 2007 but rather what borrowing costs would have been had the ECB not acted. It is possible that some Eurozone member states could not have borrowed at any rate, would have defaulted on government debt, and possibly

18 See the technical appendix for details of our estimation methodology.

19 We net out the lower interest income earned on government holdings of interest-bearing assets, but these are small relative to the size of their debt in most countries.

20 In addition, academic research suggests that government spending has a larger-than-normal impact on GDP precisely when nominal interest rates are close to the so-called zero lower bound. See Lawrence Christiano, Martin Eichenbaum, and Sergio Rebelo, "When is the government spending multiplier large?" *Journal of Political Economy*, volume 119, number 1, February 2011; Michael Woodford, "Simple analytics of the government expenditure multiplier," *American Economic Journal: Macroeconomics*, volume 3, number 1, January 2011; and Olivier Blanchard and Daniel Leigh, *Growth forecast errors and fiscal multipliers*, IMF working paper number 13/1, January 2013.

21 By periphery, we mean Greece, Ireland, Italy, Portugal, and Spain.

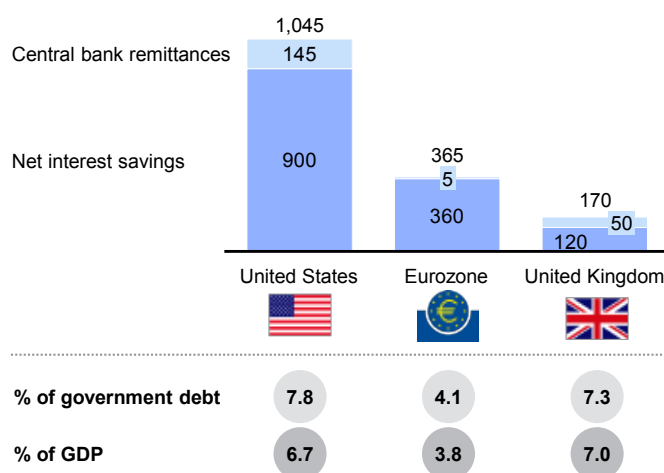
would have been forced to abandon the euro—all of which could have entailed much larger economic costs.

Exhibit 6

Low interest rates and increased remittances from central banks have cumulatively saved governments \$1.6 trillion

Estimated cumulative savings 2007–12

\$ billion, converted at constant 2012 exchange rates



SOURCE: US Federal Reserve; US Treasury Department; UK Office for Budget Responsibility; Bank of England Asset Purchase Facility Fund Limited; Eurostat; European Central Bank; McKinsey Global Institute analysis

NON-FINANCIAL CORPORATIONS HAVE ALSO BENEFITED SIGNIFICANTLY FROM LOW INTEREST RATES

Non-financial corporations have much larger amounts of interest-bearing liabilities (in the form of bonds or bank loans) than interest-earning assets (including their growing cash balances). In the United States, these companies had \$15 trillion in debt liabilities in 2012 compared with only \$6 trillion in interest-earning assets.²² Therefore, ultra-low interest rates have had a net positive effect, significantly reducing corporations' debt service costs and allowing them to issue new debt at very low rates.

In the United States, commercial-paper markets froze at the onset of the crisis, and the Federal Reserve began direct purchases of commercial paper to provide liquidity and allow these markets to keep operating. This enabled corporations not just to issue debt at low rates but to issue debt at all. Holding their balance sheets constant at 2007 levels, we calculate that the decline in interest rates lowered US companies' 2012 net interest expenses by \$94 billion compared with 2007. Additionally taking into account changes in balance sheets, this amounts to a cumulative benefit of \$310 billion since 2007. This increased corporate profits by 5 percent in 2012 and accounted for just over 20 percent of the growth in their profits since 2007. Companies in the Eurozone and the United Kingdom experienced similar effects. European non-financial corporations' net interest payments were \$76 billion lower in 2012 than in 2007, and UK corporations' net interest payments were \$31 billion lower. This increased annual earnings by about 3 percent in the Eurozone and 5 percent in the United Kingdom, cumulatively amounting to \$280 billion and \$120 billion, respectively.

²² In the United States we consider all non-financial businesses including non-corporate business entities.

However, not all companies have been able to benefit to the same extent from lower interest rates. Large corporations have secured particularly large benefits because they are able to issue bonds in debt capital markets and have continued to be able to access bank loans. However, many small companies across advanced economies—and even some larger ones in Eurozone periphery countries—have not been able to access lower-cost credit because they have been more reliant on bank loans for financing.

BANKS IN EUROPE HAVE SEEN A LARGE DECLINE IN MARGINS, BUT THIS HAS NOT BEEN THE CASE IN THE UNITED STATES

Between 2007 and 2012, the overall net interest income of US banks increased by \$85 billion, or 28 percent. In contrast, UK banks' net interest income declined slightly, by 1 percent, while Eurozone banks' net interest income fell significantly, by 25 percent. Several factors explain the difference in net interest income across regions, not all of which are a result of ultra-low interest rates.

In the United States, the difference between the interest rate paid on bank liabilities (mainly deposits but also debt) and the interest rate received on bank assets (mainly loans but also other financial assets held on the balance sheet)—the effective net interest margin—increased by 63 basis points between 2007 and 2012 (Exhibit 7). This reflects a steep drop in rates paid to depositors from an average effective deposit rate of 3.4 in 2007 to just 0.5 in 2012 (Exhibit 8). In other words, US banks were able to reduce the interest rate offered on checking and savings accounts to near zero levels and yet were still able to retain sufficient deposits. In fact, total deposits in US banks actually increased over this period, most likely due to a flight to safety in a volatile time for finance, as well as increased household savings. On the asset side of bank balance sheets, the effective interest rate received on loans has declined by less—only 180 basis points. US banks have also benefited from the fact that they securitize the majority of their loans and earn fees from loan origination, rather than holding the loans on their balance sheets.²³ This reduces their overall sensitivity to interest rate changes.

²³ Between 2007 and 2012, 54 percent of the outstanding stock of US loans was securitized.

This is starkly different from the United Kingdom and the Eurozone, where only 20 percent and 8 percent, respectively, of the outstanding stock was securitized. That said, there has been a large decline in private sector securitization of new loans in the United States over the past five years, although securitization of mortgages by the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) has increased.

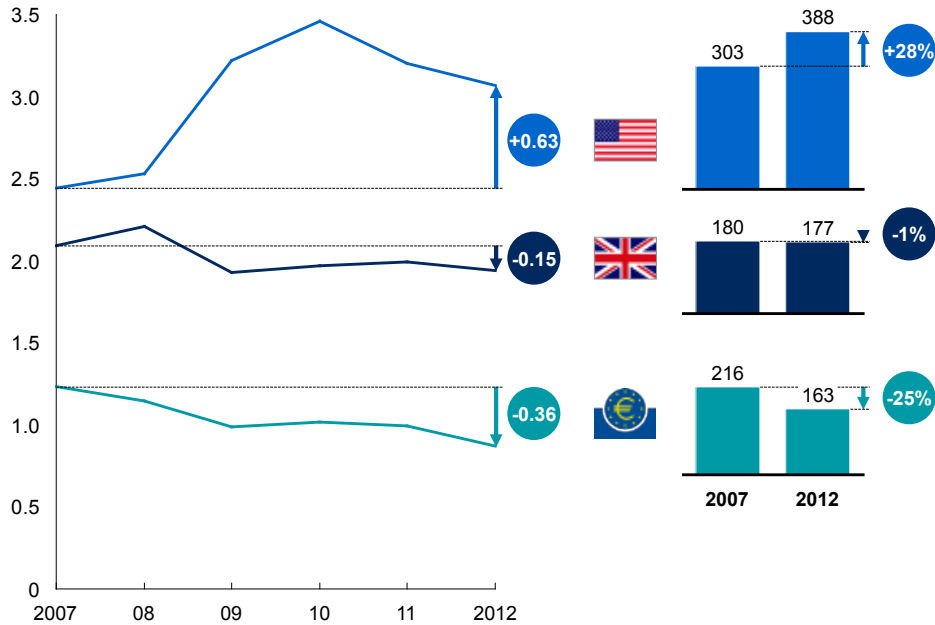
Exhibit 7

Effective interest margins have increased for US banks but fallen for UK and Eurozone banks

- United States
- United Kingdom
- Eurozone

Banks' effective interest margins—spread between effective rate received on assets and paid on liabilities
%, annual values

Banks' net interest income
\$ billion



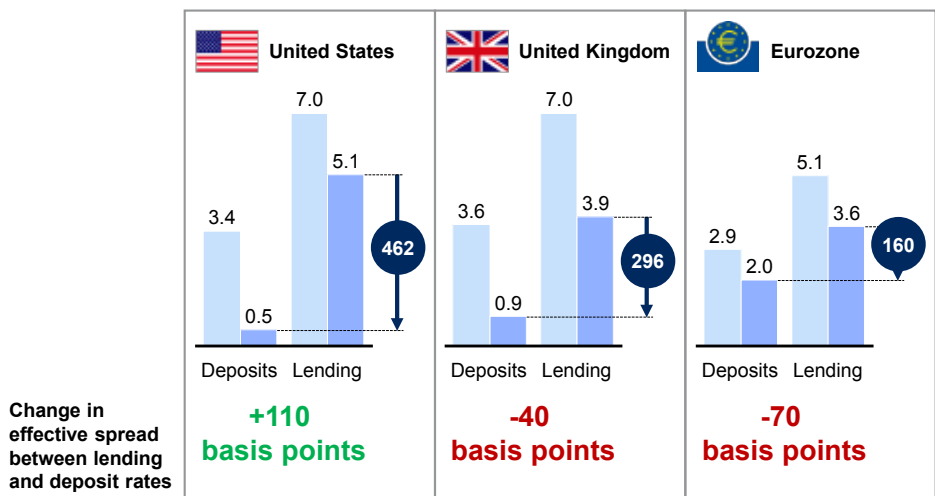
SOURCE: Federal Deposit Insurance Corporation; Eurostat; Bloomberg; McKinsey Global Institute analysis

Exhibit 8

US bank effective lending margins have improved, but those of the United Kingdom and Eurozone have fallen

Effective rates paid/received on deposits and loans
%

- 2007
- 2012
- Spread (basis points)



SOURCE: US Federal Reserve; Federal Deposit Insurance Corporation; Bankrate; McKinsey Corporate Performance Analysis Tool; Bank of England; Eurostat; European Central Bank; Bloomberg; McKinsey Global Institute analysis

In the Eurozone, banks have not experienced such favorable conditions. The deposit rates of Eurozone banks were already lower than those in the United States or the United Kingdom prior to the global financial crisis. In addition, Eurozone banks have made efforts to increase their deposit base since the start of the financial crisis in order to shift away from wholesale funding sources and were therefore reluctant to drop deposit rates to the levels seen in the United States or the United Kingdom. The effective interest rate paid on deposits in the Eurozone eased back only from 2.9 percent in 2007 to 2.0 percent in 2012. However, the effective interest rate Eurozone banks have received on loans declined much more sharply, from 5.1 percent in 2007 to 3.6 percent in 2012, as large European corporate borrowers put pressure on banks to pass on the decline in interest rates.²⁴

Within the Eurozone, banks in different regions have fared very differently. In Italy, Greece, and Portugal, banks have experienced a large increase in their net interest margins. One reason is that lending rates have not declined as much, reflecting increased macroeconomic risk. In addition, about 60 percent of the ECB's LTRO funds have gone to banks in Italy and Spain, which have used a substantial share of that money to purchase government bonds with high yields. As a result, the balance sheets of banks in Spain and Italy have changed, with government securities increasing from 6 percent of Spanish banks' total loans and securities in 2007 to 14 percent in 2012, and from 15 percent of those in Italy in 2007 to 18 percent in 2012. As a percentage of total loans and securities, these increases in government securities holdings have been offset by declines in holdings of loans to households and corporations. In Germany and France, by contrast, net interest margins have declined.

While the ECB's provision of liquidity to troubled banks may have prevented bankruptcies during the crisis, some in the industry worry that, in the long term, this approach will have the unintended consequence of delaying much-needed industry restructuring.²⁵

LIFE INSURANCE COMPANIES FACE SIGNIFICANT CHALLENGES FROM LOW INTEREST RATES

Life insurance companies around the world generally offer two types of savings products: variable-rate policies and guaranteed-rate policies. The terminology differs slightly by country. However, in general variable-rate (or unit-linked) policies are those through which customers put money in an account, and the amount they receive in retirement is linked to the change in the underlying value of the investments they chose. In the case of fixed- or guaranteed-rate policies, the insurance company offers the policyholder a fixed—or at least a minimum guaranteed—rate of return on the money invested. For the purposes of this report, we look at variable- and fixed-rate insurance plans separately. Variable-rate plans,

24 Corporations in the Eurozone rely much more heavily on bank loans than those in the United States, where a much larger portion of corporate debt financing takes place through bond issuance. This means that corporations have more bargaining power when it comes to negotiating loan rates with Eurozone banks.

25 The Herfindahl–Hirschman index (a measure of concentration in an industry) increased in the United States over this period by 16 percent, while it rose by only 5 percent in the Eurozone. This comparison may not be completely accurate, however, since the Eurozone does not have a completely integrated banking system.

where the risk of lower interest rates is borne by the household, are included in our analysis of households. We discuss fixed-rate plans here.²⁶

In much of Europe, and particularly in countries such as Germany and Austria that have tax subsidies for such policies, guaranteed-rate life insurance products are the standard vehicle used by households for saving for general purposes and for retirement. In these countries, more than 80 percent of life insurance premiums are written for plans of this type. By contrast, in the United States fixed-rate plans are less common, and only 45 percent of life insurance premiums are written on such plans.

Due to low interest rates, life insurance companies that rely heavily on fixed-rate policies are facing a squeeze between the guaranteed return rates they have committed to pay their customers and the low rates of return they are receiving from their investments in today's market. They face several major threats in the years ahead.

The first relates to the creation of value from new business written. Because current guaranteed rates on new products are quite low (1.75 percent in Germany), insurance companies are struggling to attract new customers, but they continue to bear the fixed costs of their sales force and new business processing teams. Customers are looking for other investment options with higher returns or are simply holding their savings as cash while they wait for guaranteed rates to rise. If customers think that low rates are a temporary phenomenon, then they delay investing. If enough new policies are not written, the industry will shrink—a dynamic observed in Japan over the past 15 years.

The second threat is declining profitability if low interest rates continue. Many life insurance policies are written for 40 or even 50 years. Because insurers often cannot find assets to directly match that duration, they are exposed to falling interest rates. Today, these insurance companies' portfolios contain a significant proportion of bonds bought before the crisis that are still earning relatively high returns. However, as these bonds mature and companies reinvest the proceeds at the current low rates, the return on their portfolios will begin to drop. The current guaranteed rate offered by German life insurers of 1.75 percent is already above the ten-year government Bund at 1.54 percent (Exhibit 9).²⁷ This means that investing in the Bund while paying customers the minimum rate would lead to a loss.²⁸ Insurers are trying to mitigate this problem by seeking alternative, higher-yielding investments and introducing new products. However, most companies have strict internal limitations on the share of assets that can be invested in higher-risk products, and the higher-yield products have higher default risks. If the ultra-low interest rate environment were to persist for an additional five years or more, many insurers may find that they have to restructure their portfolios dramatically or be forced out of business. In Japan, the pre-tax profits of life insurance companies have dropped by around 70 percent over the past 15 years due to ultra-low interest rates.

26 For insurance plans with a minimum guaranteed rate of return, households also lose out from lower interest rates as returns in excess of the minimum decline or disappear.

27 This guaranteed rate is a maximum set by regulators, but in practice it is the rate that all insurers offer.

28 German life insurers hold about 9 percent of their total assets in government securities, a much larger share than insurers in other countries hold. In contrast, US life insurers hold only 5 percent of total assets in government bonds.

Exhibit 9**German government bond yields have dropped below the guaranteed return for life insurance policy holders**

Interest rate
%



SOURCE: Datastream; McKinsey Insurance Database Germany; Assekurata; McKinsey Global Institute analysis

Finally, given that the majority of their assets are in fixed-income securities whose value is marked to market, life insurers would be vulnerable if interest rates were to start rising very rapidly, leading to a significant decline in the market value of their fixed-income portfolios.

HOUSEHOLDS IN AGGREGATE HAVE LOST NET INTEREST INCOME, BUT THE IMPACT VARIES ACROSS DEMOGRAPHIC GROUPS

Households are overall net savers in the United States and Europe, with more interest-bearing assets than liabilities.²⁹ This may come as a surprise if we compare only the value of households' savings accounts, mutual funds, and other directly held financial assets, and the amount they owe on their mortgage, credit cards, and other forms of debt. Households also hold significant wealth in defined-contribution retirement plans and variable-rate insurance policies and annuities. To obtain a complete picture of the household financial assets affected by lower interest rates, we consider all interest-bearing assets and liabilities of households, whether they are in the form of deposits, money market mutual funds, variable-rate life insurance policies, or bonds held in defined-contribution retirement accounts. Taking everything into account, households in the United States, the United Kingdom, and the Eurozone all hold more interest-bearing assets (for example, deposits and bonds) than liabilities (for example, debt). Ultra-low interest rates have therefore lowered household interest income on assets more than they have reduced debt service payments. However, this is an aggregate effect. Within households, the impact depends on demographic factors such as the age profile and income level of each household.

²⁹ In this report we follow national accounting standards and take "households" to refer to individual households as well as non-profits and some small personal businesses. We also consider assets held in defined-contribution pension plans, such as 401(k) plans in the United States, as well as in variable-rate life insurance policies. These two holding vehicles are ones where all interest rate risk is borne by the household.

In the United States, compared with 2007, households' net loss of interest income in 2012 was about \$55 billion, holding assets and liabilities at 2007 levels. From 2007 to 2012, they cumulatively experienced a loss of \$360 billion in net interest income, taking both interest rate and balance sheet changes into account. We find a smaller effect in the United Kingdom and the Eurozone, where households have lost a cumulative total of around \$110 billion and \$160 billion, respectively. One reason for a smaller loss of income in the United Kingdom and the Eurozone is that most mortgages have variable interest rates, and therefore declining rates translate automatically into lower debt service payments for households. Variable-rate mortgages account for about 70 percent of all mortgages in the United Kingdom, compared with only around 20 percent in the United States. Mortgages are the largest portion of household debt, and a drop in interest rates in the United Kingdom immediately cuts payments for the majority of borrowers. In the United States, households must refinance fixed-rate mortgages in order to take advantage of lower interest rates. Despite recent growth in refinancing, tightening credit standards and the increasing number of mortgages with negative equity have limited the number of US households that have been able to take advantage of lower interest rates.³⁰

As we have noted, these estimates take into account assets that households hold indirectly through defined-contribution retirement plans and variable-rate life insurance products. While taking this approach means that we can see a true picture for households overall, it may not represent how households perceive the way they have fared in the low interest rate environment. In the United Kingdom, if we exclude pension and life insurance reserves, households have lost much less. The cumulative net interest loss is about \$15 billion over the past five years, compared with \$110 billion if we look at direct and indirect holdings. For the Eurozone, excluding indirect holdings leads to a loss of \$50 billion compared with a total loss for direct and indirect holdings of \$160 billion. In the United States, a much larger percentage of households' interest-earning assets are held directly (in savings accounts, money market accounts, or mutual funds). Therefore, excluding pension and life insurance plans reduces the loss only to about \$300 billion for US households compared with a total of \$360 billion.

The impact of lower interest rates varies considerably across age groups. In the United States, we find that households headed by younger people (under age 45) are net debtors and have therefore benefited from lower interest rates. Household heads age 35 to 44, on average, have \$1,700 more income to spend each year because of lower interest rates (Exhibit 10). Older households are generally net holders of interest-earning assets, and they have therefore lost net interest income. Household heads aged 75 and over lost an average of \$2,700 a year in income. Across income percentiles in the United States, the richest 10 percent own about 90 percent of net financial assets.³¹ It is this group whose net interest income has fallen, while other income groups have seen minimal change. The Bank of England has also discovered from survey data that older and wealthier households hold the largest share of household assets. Eighty percent of assets

30 At the end of 2012, new mortgages for home purchases were down 76 percent compared with the end of 2007, while new refinances were up 15 percent. A mortgage is considered "underwater" or in negative equity when the amount owed is greater than the assessed value of the house. Banks will typically not refinance a loan when this is the case because the collateral they take (the house) would not be enough to cover the loan principal.

31 Net here means total household financial assets minus total financial liabilities.

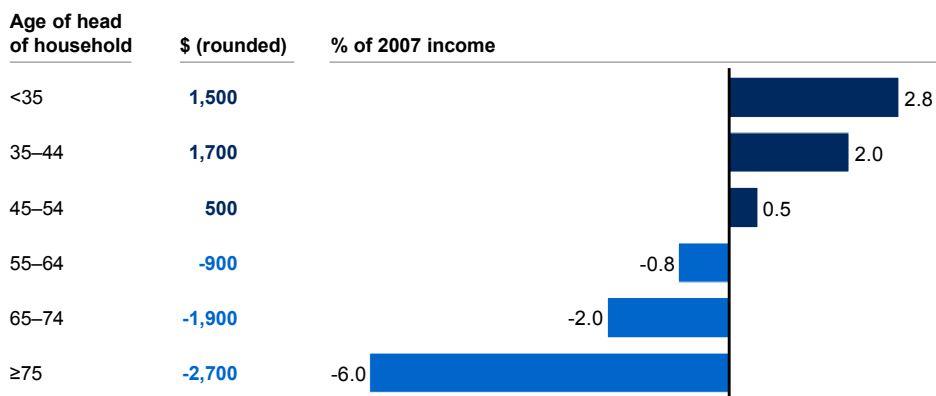
are held by those over age 45, and the top 5 percent by income hold around 40 percent of total assets.³²

Exhibit 10

In the United States, the net interest impact has been positive for younger households but negative for older households



Annual net interest impact for average household



NOTE: Because data are based on reported measures of assets from consumer surveys, totals do not fully align with those reported in aggregate US Flow of Funds data and do not include non-profits and other personal businesses incorporated into the household measure in Flow of Funds data.

SOURCE: US Federal Reserve Survey of Consumer Finances and Flow of Funds; Bankrate; Federal Deposit Insurance Corporation; US Treasury Department; Bloomberg; McKinsey Global Institute analysis

³² *The distributional effects of asset purchases*, Bank of England, July 12, 2012.

3. The impact of ultra-low interest rates on asset prices is inconclusive

There has been significant discussion in the press and in the academic literature about whether central bank efforts to lower interest rates have increased the prices of assets such as equities, real estate, and bonds, thereby boosting household wealth and stimulating spending, consumer and business confidence, and the broader economy.

In this chapter, we review the theory and the empirical findings of the literature on this question and offer some new analysis. We focus on how the observed fall in average nominal and real interest rates from 2007 to 2012—of about 280 basis points in the case of ten-year US Treasuries—might have increased asset prices.³³ Increases in bond prices are merely the flip side of falling interest rates, creating apparent gains for investors who mark their bond portfolios to market, but we find little evidence that ultra-low interest rate policies have boosted equity prices in the long term. In the United States, the evidence on whether action by the Federal Reserve has lifted the housing market is also unclear, because it is difficult to disaggregate the impact of these measures from other forces at work in the market. However, it seems plausible that Federal Reserve policies are hastening the housing market recovery. In the United Kingdom, central bank policies have a more direct impact on housing prices because of the preponderance of variable-rate mortgages. As is the case throughout this report, our analysis is based on a comparison with what would have happened without unconventional monetary policies—which, by necessity, is an estimate.

In the case of households, even modest assumptions about asset price increases due to ultra-low interest rates imply very significant additional consumption if we believe that such households are confident enough to spend more on the basis of these gains. However, we question whether this wealth effect has, in reality, been significant.

BOND PRICES HAVE RISEN

The clearest relationship between interest rates and asset prices is in the bond market. Although some economists argue that central bank bond purchases merely displace other buyers in the market, a number of academic studies have found that official bond buying has had a direct impact on bond yields and prices.³⁴ In the United States, the aggregate bond index was about 37 percent

33 This is the change between the average rate in 2007 and the average rate in 2012.

34 See, for example, Arvind Krishnamurthy and Annette Vissing-Jorgensen, *The effects of quantitative easing on interest rates: Channels and implications for policy*, Brookings Papers on Economic Activity, fall 2011; James D. Hamilton and Jing Cynthia Wu, "The effectiveness of alternative monetary policy tools in a zero lower bound environment," *Journal of Money, Credit, and Banking*, volume 44, 2012; Joseph Gagnon et al., "The financial market effects of the Federal Reserve's large-scale asset purchases," *International Journal of Central Banking*, March 2011; Eric T. Swanson and John C. Williams, *Measuring the effect of the zero lower bound on medium- and longer-term interest rates*, Federal Reserve Bank of San Francisco working paper, January 2013; and Michael Joyce, Matthew Tong, and Robert Woods, "The United Kingdom's quantitative easing policy: Design, operation and impact," *Bank of England Quarterly Bulletin*, Q3, 2011.

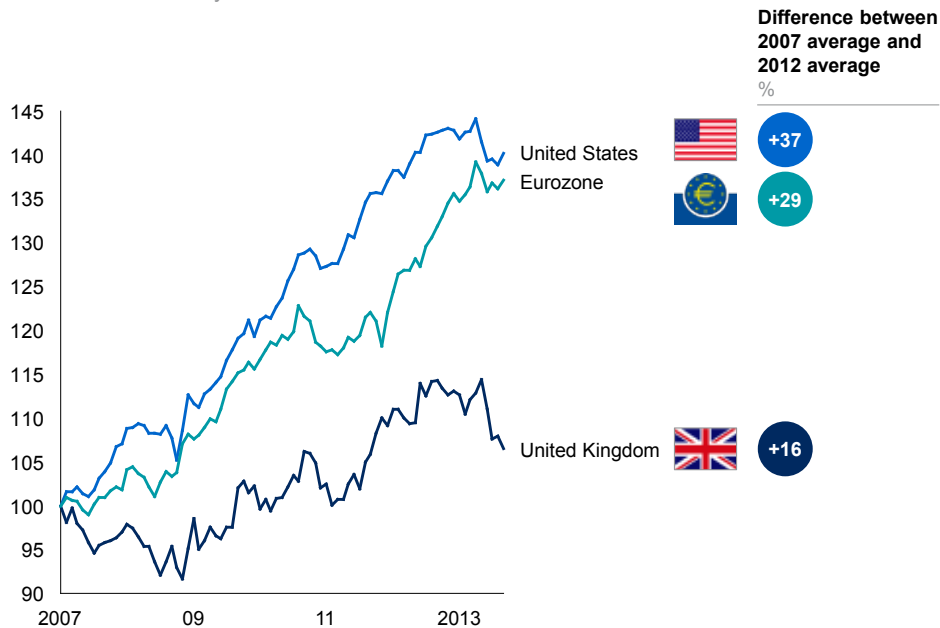
higher on average in 2012 than in 2007. In the United Kingdom, the bond index increased by about 16 percent; in the Eurozone, it was up by about 29 percent (Exhibit 11). On a mark-to-market basis, the value of sovereign bonds in the United States, the United Kingdom, and the Eurozone increased by \$10.8 trillion, and the value of corporate bonds outstanding rose by \$3.0 trillion.

Exhibit 11

Bond prices rose significantly across advanced economies

Bond price indexes¹

Index: 100 = January 2007



¹ Barclays aggregate total return indexes in local currency.

SOURCE: Datastream; Bloomberg; McKinsey Global Institute analysis

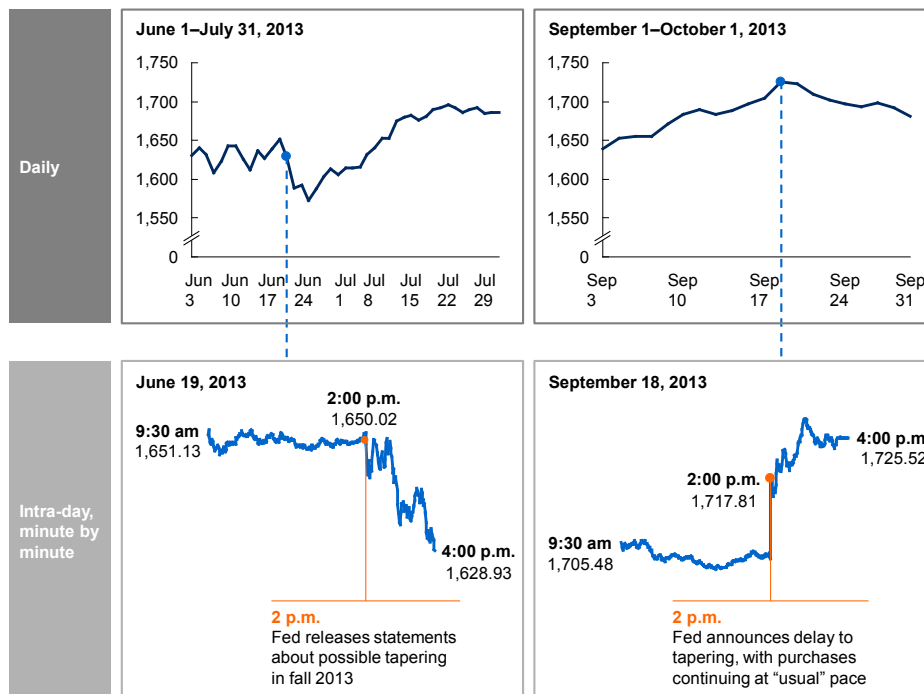
If these bonds are held to maturity by investors, the coupons and final payment received would not change. However, most institutional investors, insurance companies, pension funds, and mutual funds are required by regulation to mark the value of their portfolios to market frequently. This means that a rise in bond prices represents a boost to the value of their assets. Households observe this effect in their mutual fund and retirement fund statements. At the end of this chapter, we discuss the impact this may have on household wealth and consumption.

THE IMPACT OF ULTRA-LOW INTEREST RATES ON EQUITY PRICES MAY NOT BE AS SIGNIFICANT AS MANY OBSERVERS ASSUME

The media have paid a great deal of attention to the impact that central bank announcements on their QE programs have on daily movements in stock prices. This scrutiny is understandable given that there have been significant market reactions to unanticipated announcements regarding the expansion or possible tapering of central bank asset purchases. For example, the S&P 500 fell by about 1 percent in a day in response to the Federal Reserve's remarks about tapering on June 19, 2013, and jumped by about 1 percent in a day in response to its statement on September 18, 2013, about delaying tapering (Exhibit 12).

Exhibit 12**The S&P moved sharply after Federal Reserve announcements on tapering, but reversed those moves over following weeks**

S&P 500 index

SOURCE: Bloomberg; *Wall Street Journal*; McKinsey Global Institute analysis

However, there is no clear empirical evidence that such daily stock price movements persist over the longer term. A daily movement of 1 percent is well within the normal daily variation of the stock market. It also appears that the market reverts to trend in the weeks or months after the announcement. Academic research on the announcement effect of ultra-low rate policies is inconclusive, and some studies do not find any announcement effects at all in the medium term.³⁵ These findings are similar to other “event studies” on stock prices. For instance, research into the effect of an announcement that a company is to be included in a stock index shows that there is a temporary boost to the price of that company’s stock. However, this has proved to be a short-term phenomenon—the price reverts within a few weeks or months.³⁶

In theory and all else being equal, ultra-low rates could boost equity prices in the longer term in several ways. First, by lowering the discount rate that investors use, there may be an increase in the present value of future cash flows, which should boost the stock market valuation. A simple dividend pricing model says that today’s stock price should be inversely related to the discount rate.³⁷ A second

35 Carlo Rosa, *How “unconventional” are large-scale asset purchases? The impact of monetary policy on asset prices*, Federal Reserve Bank of New York, staff report number 560, May 2012; Richhild Moessner, *Effects of explicit FOMC policy rate guidance on equities and risk measures*, DNB working paper number 390, September 2013; Michael Joyce, Matthew Tong, and Robert Woods, “The United Kingdom’s quantitative easing policy: Design, operation and impact,” *Bank of England Quarterly Bulletin*, Q3, 2011.

36 Marc H. Goedhart and Regis Huc, “What is stock market index membership worth?” *McKinsey on Finance*, winter 2004.

37 Here we refer to the dividend-discount model. In this model, prices would also increase with a lower risk premium or higher growth rates.

way that low interest rates could boost stock prices—and one that central bank policy makers have offered to explain the impact of QE policies—is through portfolio rebalancing. As yields on fixed-income securities decline, investors may shift into equities and other asset classes in search of higher yields, increasing demand for these assets and therefore their prices. Finally, very low interest rates could affect equity prices by directly increasing corporate profits through lower debt service payments and through stronger economic growth. All else being equal, higher profits today or expected future profits should result in higher equity prices.

However, both conceptual reasons and empirical evidence lead us to believe that all else is not equal and that these effects on equity prices might not be significant. First, a “rational expectations” investor who takes a longer-term view should regard today’s ultra-low rates as temporary and therefore is not likely to reduce the discount rate used to value future cash flows.³⁸ Moreover, this investor may assign a higher risk premium in today’s environment. Our conversations with management teams and corporate boards suggest that they take a similar approach when they consider investment hurdle rates. None of those with whom we spoke have lowered the hurdle rates they use to assess potential investment projects, reflecting their view that low rates will not persist indefinitely and dampening the effect of central bank actions.

Second, the discount rate argument assumes that lower government bond rates translate into a lower cost of equity.³⁹ In reality, investors may not view the government bond rate as the “risk-free rate.” We observed this in action in some southern European countries during the Eurozone crisis, where companies used a risk-free rate that was lower than the government bond rate. It may also hold true during a prolonged period of unconventional monetary policies and ultra-low rates. Empirically, if investors did reduce their discount rate on future corporate earning streams, we would expect to see price-earnings (PE) ratios rise. Today, however, PE ratios are below long-term averages (Exhibit 13). It is possible, of course, that PE ratios would be even lower today without ultra-low interest rates, but we cannot know this counterfactual.

Third, it is also possible to use current stock prices and other fundamentals such as long-term growth rates and inflation rates to build a model that derives the implied cost of equity in the market. If ultra-low rates were boosting equity prices, we might expect to see the cost of equity fall substantially below long-term averages. Using this model we find that, over the past 50 years, the real cost of equity in the United States has hovered in a narrow range between 6.1 percent and 8.2 percent; small fluctuations outside this range could be due to measurement errors. Since 2000, this implied real cost of equity has been rising steadily, but it has remained well within the historical range since the start of the crisis (Exhibit 14).⁴⁰ This implies that, even if investors believe the risk-free rate has fallen, reflecting a decline in government bond yields, they have offset this

38 Any argument relying on rational expectations must, of course, be taken with a pinch of salt—in a model based strictly on rational-expectations investors, the entire crisis may not have taken place.

39 The cost of equity is calculated as the risk-free interest rate plus an equity risk premium. It is also sometimes called the equity discount rate.

40 Marc H. Goedhart, Timothy M. Koller, and Zane D. Williams, “The real cost of equity,” *McKinsey on Finance*, autumn 2002.

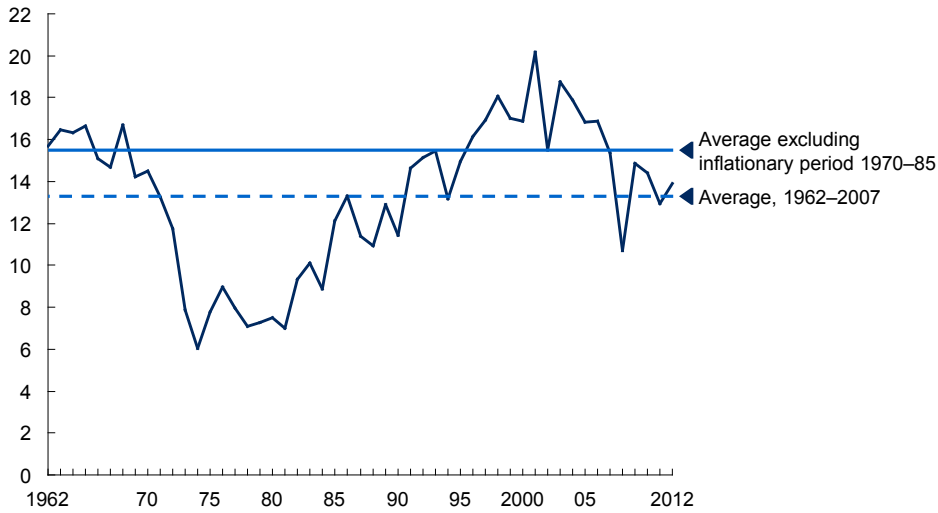
with a higher equity risk premium. Or it may be that investors do not view current government bond yields as the risk-free rate of return.

Exhibit 13

Equity price-earnings (PE) ratios have not moved outside their long-run averages



Median one-year forward PE ratio, excluding financials, for the S&P 500 Index, end-of-year values



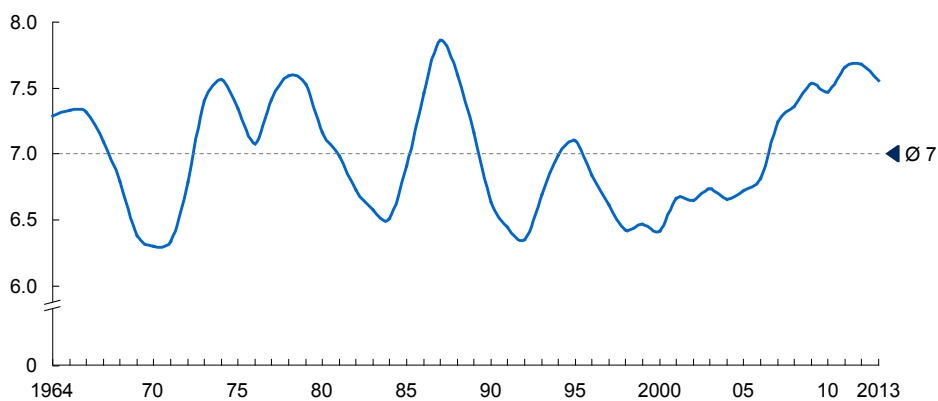
SOURCE: McKinsey Corporate Performance Analysis Tool; Bloomberg; McKinsey Global Institute analysis

Exhibit 14

The implied real cost of equity has remained within historical norms



Implied real cost of equity, 3-year moving average, 1964-2013



Source: McKinsey Corporate Performance Analysis Team; McKinsey Global Institute analysis

The portfolio rebalancing effect works only if investors see equity investment as a true substitute for fixed-income investment. There are reasons to believe that this is not the case. For example, equity markets have been highly volatile since the start of the crisis, which in all likelihood should persuade many fixed-income investors to avoid investing in these markets. Evidence from recent years shows that US retail investors have been pulling money out of equity mutual funds and exchange-traded funds. Other institutional investors—including foreign investors—may be buying shares. After a steep decline in share repurchases and dividends during 2008 and 2009, companies have increased their share repurchases in recent years.

The final means by which ultra-low interest rates may have boosted equity prices is by increasing corporate profits. As we have discussed, our research suggests that corporate profits were boosted by about 5 percent as a result of lower interest expenses. All else being equal, this should boost equity market valuations. If the market assumes that the interest rate impact on corporate profitability is temporary, expectations of long-term future earnings will not change. We therefore estimate that, if interest rates rise to normal long-term levels after five years, equity prices should be about 1 percent higher today than they otherwise would have been, assuming that the earnings boost persists until rates rise again.⁴¹

Taking everything into consideration, the theoretical and empirical evidence on the impact of QE and ultra-low interest rates does not point conclusively to an increase in equity prices. But if ultra-low rate policies do not explain the stock market rally since 2009, what does? It may be that there has simply been a recovery following a large overcorrection in equity prices. Research by the McKinsey Corporate Performance Analysis Team suggests that markets tend to overreact as an economy enters a recession, causing a steep decline in prices. After such a decline, it is quite usual for markets to climb back fairly quickly, and this could explain the rise since 2009. Additionally, corporate profits have rebounded and cash levels are high.

LOW INTEREST RATES MAY BOOST HOUSE PRICES, BUT THERE ARE SOME MITIGATING FACTORS IN TODAY'S ENVIRONMENT

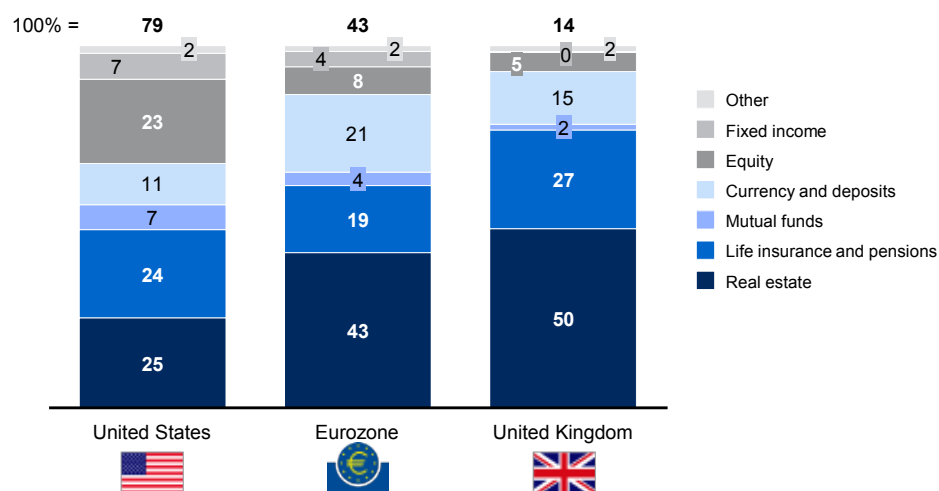
For most households in the United States, the United Kingdom, and the Eurozone, real estate holdings account for a large share of overall wealth (Exhibit 15). If low interest rates have had an effect on housing prices, this could have a large impact on the wealth of households.

Exhibit 15

A large share of household wealth comes from real estate holdings

Household wealth by source, 2012¹

%; \$ trillion



¹ Excludes consumer durables but includes wealth of non-profits.

NOTE: Numbers may not sum due to rounding.

SOURCE: US Federal Reserve; Eurostat; European Central Bank; Bank of England; McKinsey Global Institute analysis

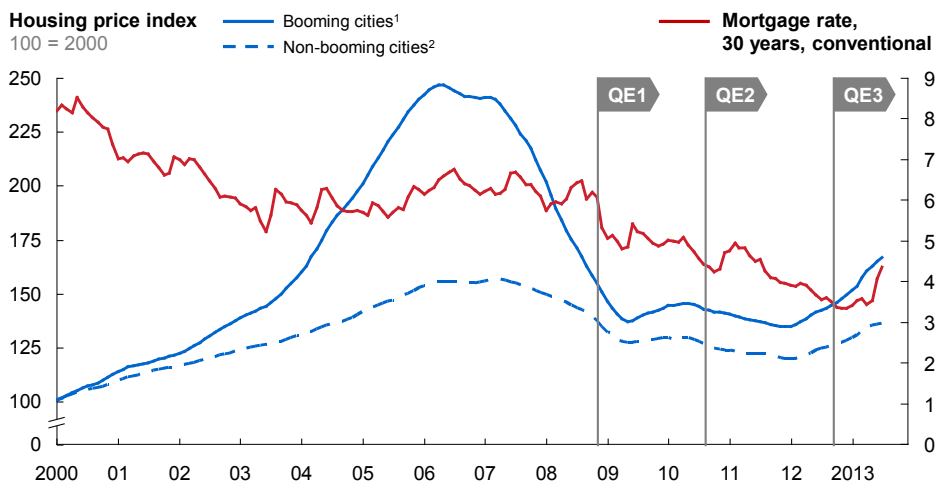
41 See the technical appendix for more detail on this calculation.

The transmission mechanism that links falling interest rates to rising house prices is the cost of mortgage credit. In the United States, the standard 30-year fixed mortgage rate dropped by around 270 basis points from 2007 to 2012 (although it has risen in the past few months on the expectation of Federal Reserve tapering of asset purchases). Lower mortgage rates make houses more affordable by increasing the size of a mortgage that a fixed amount of monthly payment can support—and therefore the purchase price of a home—and this can draw more buyers into the market. In this way, central bank measures may have hastened the housing market’s recovery. In the United States, the ratio of debt service payments to household disposable income is now at the same level it was in the early 1990s, and this may have lifted home sales at the margin.⁴²

However, developments in the US housing market may dampen the impact that low interest rates have on house prices. The typical inverse relationship between mortgage rates and house prices disappeared at the peak of the housing bubble in 2007 and reversed in the years that followed. This could very well be due to both the collapse of the housing bubble and low rates brought on by the recession, but it is not clear how tight the traditional link between interest rates and house prices has been since the crisis. House prices continued to fall until 2011 despite the fact that the Federal Reserve started to lower its policy rate in 2007, began more unconventional policy measures in late 2008, and started its first two rounds of large-scale asset purchases in 2008 and 2009. US mortgage rates dropped 158 basis points between 2008 and 2011 before housing prices turned around (Exhibit 16).

Exhibit 16

In the United States, the typical inverse relationship between mortgage rates and house prices broke down after 2004



¹ Las Vegas; Tampa; Miami; Washington DC; San Francisco; San Diego; Los Angeles; and Phoenix.

² Seattle, Dallas, Portland (Oregon), Cleveland, New York, Charlotte, Minneapolis, Detroit, Boston, Chicago, Atlanta, and Denver.

SOURCE: Standard & Poor’s; US Federal Reserve; McKinsey Global Institute analysis

Compounding this, US banks substantially tightened lending standards after the crisis, and this has likely prevented many potential new buyers from obtaining mortgages and many existing borrowers from refinancing their mortgages to take advantage of the lower rates. Moreover, the decline in housing prices left many homeowners with negative equity—that is, owing more than their house is

⁴² This includes mortgage payments, credit cards, property tax, and lease payments.

worth, preventing refinancing. As of the second quarter of 2013, 24 percent of homeowners were still in this situation.⁴³ Indeed, the number of new mortgages for the purchase of homes dropped by 76 percent from 2007 to 2012; 85 percent of all new mortgages over the past four years were for refinancing.

While low interest rates may not have increased house prices in a direct way, they may well have prevented an even steeper decline in prices, and they may have accelerated recovery in the housing market.⁴⁴ During the US housing boom in the early 2000s, a very large oversupply built up. Combined with a large number of foreclosures during the crisis, the supply of available housing since the bubble burst has far outpaced demand. This could have dampened or delayed any uptick in housing prices, potentially offsetting the impact of low interest rates.

Empirical evidence from academic literature shows that, in normal times, a decrease in the real long-term interest rate by 100 basis points has increased house prices by up to 7 percent.⁴⁵ If we hold other factors constant, the actual decline in real interest rates experienced since the crisis would have boosted US home prices by about 15 percent compared with what they would have been. This would translate into an increase in US household wealth of \$3.2 trillion. This is a very substantial sum, but it is difficult to judge against a counterfactual of how much further house prices would have fallen without central bank actions. Today, US home prices remain well below their pre-crisis peak in most cities.

In the United Kingdom, central bank measures may have supported house prices in a more direct way. While housing prices declined at the beginning of the crisis, they have recovered quite quickly, nearly returning to their pre-crisis peak by the end of 2009 and exceeding that level since, although there are significant regional differences in this trend (Exhibit 17). Two factors drove this rapid recovery. First, much of the United Kingdom did not have the excess of housing stock seen in the United States; indeed, it was likely that there was an undersupply of housing overall. Second, as we have noted, about 70 percent of outstanding mortgages in the United Kingdom have a variable interest rate that adjusts automatically as the base rate changes. The 322-basis-point drop in the UK standard variable mortgage rate between the average in 2007 and 2012 immediately lowered consumers' debt service payments and possibly drew new buyers into the market or allowed people to trade up.⁴⁶ Using the same research on the historical relationship between long-term interest rates and housing prices, this suggests

43 Svenja Gudell, *Negative equity rate falls for 5th straight quarter in Q2*, Zillow Real Estate Research, August 28, 2013.

44 Agustín S. Bénétrix, Barry Eichengreen, and Kevin H. O'Rourke, "How housing slumps end," *Economic Policy*, number 27, issue 72, October 2012. The authors show that decreasing rates increase the probability that the decline in house prices ends.

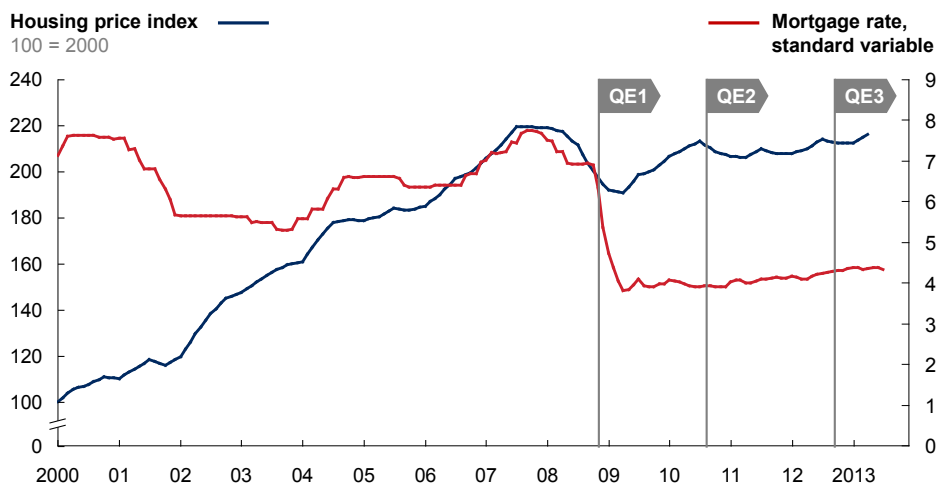
45 Kenneth Kuttner, *Low interest rates and housing bubbles: Still no smoking gun*, Williams College Department of Economics working paper, number 2012-01, January 2012; Edward Glaeser, "A nation of gamblers: Real estate speculation and American history," *American Economic Review*, volume 103, number 3, 2013; Charles Goodhart and Boris Hofmann, "House prices, money, credit and the macroeconomy," *Oxford Review of Economic Policy*, volume 24, number 1, 2008. Kuttner summarizes recent empirical findings on the link between interest rate movements and house prices and finds that the 7 percent estimated by Glaeser et al. and the corresponding 8 percent by Goodhart and Hofmann are the upper bound. Theoretical approaches employing the US cost of housing model find stronger effects but are said to overestimate the influence of interest rates.

46 The Financial Services Authority in the United Kingdom has worried that some households are taking on too much debt at low interest rates, and it has attempted to put rules in place that require mortgage lenders to take potential future rate increases into account.

that lower interest rates boosted UK house prices by 14 percent compared with where they would have been without lower interest rates. This is similar to the Bank of England's estimate.⁴⁷ This boost would translate into an increase in UK household wealth of around \$970 billion.

Exhibit 17

In the United Kingdom, the typical relationship between mortgage rates and house prices weakened after 2003, but the trend persists



SOURCE: Bank of England; UK Office for National Statistics; McKinsey Global Institute analysis

AN INCREASE IN WEALTH WOULD MORE THAN OFFSET LOST INTEREST INCOME FOR HOUSEHOLDS

In any evaluation of the combined impact of low interest rates and central bank action on household wealth, we need to bear in mind a number of complicating factors. They include the fact that the empirical evidence on the short- and long-term effect of lower interest rates on equity and housing prices is inconclusive and that there is considerable uncertainty about what would have happened to equity and house prices had central banks not intervened. As a consequence, estimates of the house- and equity-price impact of low interest rates should be treated with caution.

With this caveat, however, we estimate that the full decline in interest rates may have increased household wealth held in fixed income, real estate, and equity in the United States by up to \$5.6 trillion.⁴⁸ This assumes that housing prices are 15 percent higher than they otherwise would have been, that the value of fixed-income bonds has increased by 37 percent, and that equities are 1 percent higher than they otherwise would have been.

In the United Kingdom, household wealth may have increased by \$1.1 trillion as a result of ultra-low interest rates, with an estimated 89 percent coming from housing, 10 percent from bonds, and 2 percent from equity. In the Eurozone, the wealth impact is an estimated \$2.35 trillion—60 percent from real estate, 37 percent from fixed income, and less than 2 percent from equity.

47 Michael Joyce, Matthew Tong, and Robert Woods, "The United Kingdom's quantitative easing policy: Design, operation and impact," *Bank of England Quarterly Bulletin*, Q3, 2011.

48 Our measure of household wealth includes households' real estate, equity and fixed-income holdings, as well as indirect holdings in mutual funds, defined-contribution pension funds, and variable-rate life insurance assets.

It remains a matter for debate whether such increases in wealth boost annual household consumption. There is wide-ranging academic literature regarding the marginal propensity to consume out of wealth, with estimates ranging from zero to 14 percent depending on the country, asset class, time horizon, and a number of other variables. Generally accepted empirical estimates are usually in the 3 to 5 percent range.⁴⁹ In the case of housing wealth, which applies to a broader swath of the population of a typical advanced economy, the wealth effect might be higher. Indeed, some estimates put it as high as 14 percent, although the estimates sometimes differ across household income classes.⁵⁰ However, other authors argue that there should be no aggregate wealth effect in the long term.⁵¹

In this report, we conservatively assume a marginal propensity to consume out of wealth of 3 percent. This would translate into additional consumer spending in 2012 of \$167 billion for the United States, or the equivalent of around 1.0 percent of GDP. It would mean \$33 billion in additional consumer spending in the United Kingdom, the equivalent of around 1.3 percent of GDP, and \$71 billion in the Eurozone, or the equivalent of around 0.6 percent of GDP. These effects, if realized, far outweigh the lost net interest income for households in that year (Exhibit 18). However, it is important to remember that lost interest income is a tangible, real effect, but it is not certain how much of any increase in wealth actually leads to additional consumption. Moreover, the increase in wealth is not evenly spread across income classes. Based on our estimates, in the United States almost 50 percent of the increase in wealth went to households in the top 10 percent of the income distribution.⁵²

49 Karl E. Case, John M. Quigley, and Robert J. Shiller, *Wealth effects revisited 1975–2012*, Cowles Foundation discussion paper number 1884, December 2012; Ricardo M. Sousa, *Wealth effects on consumption: Evidence from the euro area*, ECB working paper number 1050, May 2009; Morris A. Davis and Michael G. Palumbo, *A primer on the economics and time series econometrics of wealth effects*, finance and economics discussion paper, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, 2001; and Eva Sierminska and Yelena Takhtamanova, *Wealth effects out of financial and housing wealth: Cross country and age group comparisons*, Federal Reserve Bank of San Francisco working paper number 2007–01, January 2007.

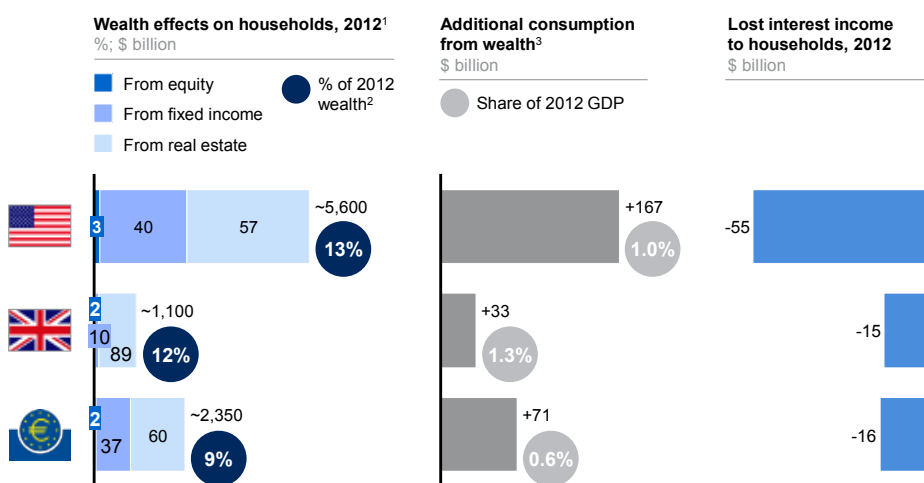
50 Eva Sierminska and Yelena Takhtamanova, *Wealth effects out of financial and housing wealth: Cross country and age group comparisons*, Federal Reserve Bank of San Francisco working paper number 2007–01, January 2007. The authors provide a summary of empirical estimates.

51 Willem H. Buiter, *Housing wealth isn't wealth*, NBER working paper number 14204, July 2008; John Muellbauer, *Housing, credit and consumer expenditure*, proceedings from the Federal Reserve Bank of Kansas City, Economic Symposium in Jackson Hole, Wyoming, August 31–September 1, 2007. Buiter argues that, in the long run, there should be no housing wealth effect because it is a redistribution among consumers in the economy. Muellbauer finds that many empirical studies fail to account for the role of credit constraints and could therefore overestimate the impact of house prices on consumption.

52 A 2013 Pew Research Center report finds that between 2009 and 2011, only the top 7 percent of households by net worth experienced wealth gains, an extension of a long-term trend in the United States. See Richard Fry and Paul Taylor, *A rise in wealth for the wealthy; declines for the lower 93%: An uneven recovery, 2009–2011*, Pew Research Center, April 23, 2013.

Exhibit 18

Additional consumption from the estimated household wealth effects more than makes up for lost interest income



1 Assuming counterfactual of a prevented decrease in equity and house prices and no increase in bond prices.
 2 Includes real estate, equity and fixed-income holdings, including indirect holdings via mutual funds, defined-contribution pension funds, and variable-rate life insurance assets.
 3 Assuming 3% pass-through to consumption from incremental wealth.
 SOURCE: US Federal Reserve; Bloomberg; Eurostat; European Central Bank; Bank of England; UK Office for National Statistics; McKinsey Global Institute analysis

The impact of wealth on consumption may also be different in recessionary times than during “normal” economic times for several reasons. First, although equity and housing prices have increased since 2009, homes are still worth less than they were in 2007 for most Americans. Moreover, equity portfolios have recovered in nominal terms to their level in 2007 but are still worth less in inflation-adjusted terms—implying five years’ worth of lost growth.⁵³ So, despite the fact that they are wealthier than they could have been had central banks not acted, many households may not feel this way. This may reduce the wealth effect on consumption.

In addition, many households have not benefited from the rise in equity prices since 2009, because equities are mainly held by upper-income households. Finally, research has also pointed out that, in order for the wealth effect to lead to increased consumption, households must either increase their borrowing against wealth or decrease their savings. This is particularly true for increases in consumption due to rising housing wealth.⁵⁴ However, the tightening of credit standards since 2007 has made home equity loans harder to obtain and therefore may dampen the wealth effect, especially in the case of lower- and middle-income households that hold a much larger portion of their wealth in real estate.

53 In December 2012, the S&P 500 equity index was at almost exactly the same level as in January 2007 in nominal terms, but it was down 12 percent in inflation-adjusted real terms. The FTSE 100 was down 5 percent in nominal terms and 21 percent in real terms, and the Euro Stoxx index was down 37 percent in nominal terms and 45 percent in real terms.

54 Matteo Iacoviello, *Housing wealth and consumption*, Board of Governors of the Federal Reserve System, International Finance discussion paper number 1027, August 2007.

If there has been a wealth effect on household consumption, this could be one way in which unconventional monetary policy has boosted GDP. Contrary to conventional economic models, we find that ultra-low interest rates have had no impact on private investment. We estimate that additional household consumption as a result of the possible increase in wealth combined with the additional government expenditure enabled by lower debt service costs contribute 1 to 3 percent of GDP. We base this estimate on the assumption that lower government interest payments on public debt have enabled additional public spending that would otherwise not have occurred, thereby boosting GDP.

DEFINED-BENEFIT PENSION FUND LIABILITIES HAVE INCREASED DUE TO LOWER INTEREST RATES

Defined-benefit pension funds invest in long-term assets to cover a fixed stream of payments to retirees.⁵⁵ These plans place the risk of changes in asset prices and liabilities on the sponsoring company, government, or other employer. In contrast, in defined-contribution plans, which we discuss in our analysis of the household sector, households bear all the risk of investment gains and losses.

The rules for the accounting of future liabilities (the promised payouts to retirees) are complicated, and they vary across countries. But in many countries, as the prevailing interest rate in the economy changes, so do the rates that pension managers must use to discount these future liabilities. So ultra-low interest rates have hurt defined-benefit plans because the discount rate has declined, leading to a corresponding increase in the present value of future liabilities. If pension funds had a completely matched book between liabilities and long-term bonds, changes to the interest rate would have no effect. This is not the case in reality, however, as pension funds invest in a wide variety of assets in an attempt to generate returns. Depending on the degree of matching between the maturities of assets and liabilities, lower interest rates can create a gap between returns and the funds needed to pay retirees.

In the United States, the loss of interest income in 2012 due to lower interest rates among corporate-sponsored, defined-benefit plans was about \$14 billion, or only about 0.6 percent of total plan assets. A potentially more damaging effect on pension plans has been the increase in the present value of liabilities, which rose by 43 percent from 2007 to 2012. We estimate that the reduction of the discount rate was responsible for 83 percent of that increase, or \$817 billion. This has created a large funding gap that many US companies have had to fill by increasing contributions. The value of corporate defined-benefit pension assets has not increased enough to offset this liability growth, growing by only 1 percent since 2007. In aggregate, the top 100 corporate plans were more than fully funded in 2007, but a large funding gap had appeared by the end of 2012, according to Milliman analysis.⁵⁶ From pure investment returns, these pension plans' assets should have increased by about \$440 billion. However, over the same period, there was a net subtraction of funds of the same amount, leading to

55 Defined-benefit plans guarantee a fixed stream of payment to retirees. In contrast, defined-contribution plans such as 401(k) plans are those in which workers and employers contribute money, and the retirement benefit then is determined by the investment gains and losses of the portfolio. We consider defined-benefit plans in isolation because the risk of changing interest rates lies on the plan managers and sponsors.

56 John Ehrhardt and Zorast Wadia, *Milliman analysis: Corporate pension funded ratio in September exceeds 91%, a level last observed in 2008*, Milliman 100 Pension Funding Index, October 2013.

flat assets overall. We believe that the net outflow of assets from these funds has, in part, been due to companies' eliminating defined-benefit plans altogether, as well as removing individual workers from existing defined-benefit plans by offering one-time lump-sum buyouts.⁵⁷

Many US public sector pensions (state and local governments) have been underfunded for some time, and the underfunding gap increased by \$450 billion between 2007 and 2012. This (rising) unfunded liability has not been due to the decline in interest rates as in the case of corporate defined-benefit pension plans. This is because public-sector pensions use a different method for calculating the discount rate, which is not as directly affected by the decline in government bond yields. However, US state and local pension plans do hold many fixed-income assets, and their interest income has declined significantly due to lower interest rates. These plans earned \$19 billion less on their fixed-income assets in 2012 than they did in 2007.

European corporate pension funds have also experienced an increase in unfunded liabilities due to lower interest rates. Defined-benefit plan liabilities increased by 31 percent from 2007 to 2012, with the majority of this increase due to a decrease in the discount rate, similar to the changes in US plans. Unlike in the United States, total assets have increased, but by only 23 percent. That means that the funding gap has widened. We estimate that the change in the value of pension plan assets due to price changes in the underlying securities had a negligible, or slightly negative, impact between 2007 and 2012. This means that the increase in pension plan assets was mainly due to additional contributions from plan sponsors. At the same time, these plans lost interest income in fixed-income portfolios of about \$9 billion in 2012, equivalent to just 0.7 percent of assets in 2012.

Trends in 2013 have shown that, as interest rates have begun to rise in the United States, some of the funding gap that opened between 2007 and 2012 has narrowed. According to Milliman reports on the largest 100 US corporate defined-benefit pension funds, between the end of 2012 and the third quarter of 2013, the funding ratio improved from 77 percent to 91 percent. This was primarily because higher interest rates increased the average discount rate from 396 basis points to 480, reversing the previous trends that we have described.⁵⁸

It is important to remember that the assets and liabilities of corporate pension funds are also those of the overall corporations to which they belong. We have mentioned that US non-financial corporations recorded a cumulative gain of about \$310 billion between 2007 and 2012 due to lower net interest payments. However, in the United States, pension liabilities have increased by \$817 billion due to lower interest rates, and this has not been offset by an increase in assets. Looking at the picture as a whole, under the accounting approach used, US corporations with defined-benefit pension plans have lost out from lower interest rates.

⁵⁷ Elimination of plans or buyouts also reduces the liabilities of pension plans. However, the total liabilities of all defined-benefit pension plans have still increased over this period as interest rates have declined.

⁵⁸ John Ehrhardt and Zorast Wadia, *Milliman analysis: Corporate pension funded ratio in September exceeds 91%, a level last observed in 2008*, Milliman 100 Pension Funding Index, October 2013.

4. Impact on capital flows to emerging markets

Monetary policies undertaken by central banks in advanced economies have had significant unintended repercussions on some emerging economies. Central banks in all countries base policy decisions on the state of their respective national economies, but the monetary policy stance in advanced economies—and in the United States in particular—can also have a significant impact on global capital flows.⁵⁹

Capital flows to emerging markets can generally be divided into two categories: foreign direct investment (FDI), when foreign companies make direct purchases or build factories, stores, or other facilities; and debt, equity, and bank flows, when foreign investors make portfolio investments in a foreign country's equities or bonds, or when banks make cross-border loans. FDI results from the long-term strategies of companies and their choices about their global footprint and supply chains, and therefore represents long-term flows that do not respond immediately to relative changes in interest rates across countries. In 2012, FDI accounted for the largest share of all capital flows—64 percent—to emerging economies. This was an average of \$723 billion a year between 2009 and 2012.

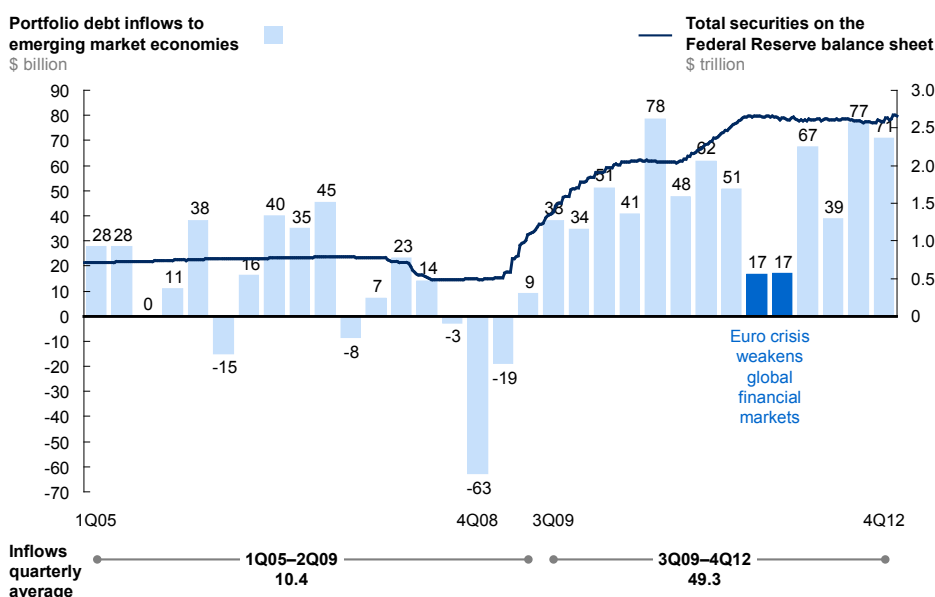
However, ultra-low interest rates have had a marked impact on other types of capital flows to emerging markets, and in particular foreign investor purchases of emerging-market bonds. While foreign investment in emerging stock markets has grown only slightly and cross-border lending has contracted since 2007, there has been a surge in the purchase by foreign investors of bonds issued by emerging-market governments and companies (Exhibit 19). Such purchases have more than tripled from \$80 billion in 2009 to \$264 billion in 2012. Several countries experienced even larger surges into their bond markets: Mexico experienced seven times the bond inflows between 2009 and 2012 as in 2005 to 2008, Turkey six times, Poland five times, and Brazil and Indonesia two times. One reason for this may well be that investors in advanced economies faced with low yields at home were searching for higher yields elsewhere. This phenomenon has allowed Honduras, Mongolia, Rwanda, and other developing economies to undertake large international bond issuances⁶⁰, a development that would scarcely have been imagined in the past.

59 For a discussion of the theoretical impact of US monetary policy on emerging markets, see H el ene Rey, *Dilemma not trilemma: The global financial cycle and monetary policy independence*, working paper, 2013. Also see Shaghil Ahmed and Andrei Zlate, *Capital flows to emerging market economies: A brave new world?* Board of Governors of the Federal Reserve System, International Finance discussion paper number 1081, June 2013.

60 Institute of International Finance, *Principles for stable capital flows and fair debt restructuring*, Report on Implementation by the Principles Consultative Group, October 2013.

Exhibit 19

The surge in portfolio bond flows to emerging markets coincided with the start of the US Federal Reserve's large-scale debt securities buying in 2009



SOURCE: International Monetary Fund Balance of Payments; US Federal Reserve; McKinsey Global Institute analysis

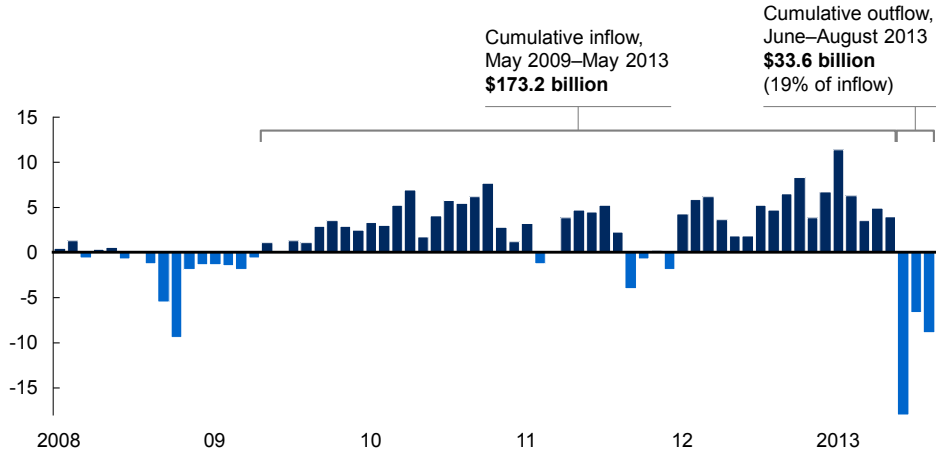
Ultra-low interest rates in advanced economies are undoubtedly not the only reason for the surge in foreign buying of emerging-market bonds. The strong fundamentals and long-term growth prospects of emerging economies are clearly major factors that will continue to attract foreign investment. Since 2009, the amount of emerging-market bonds outstanding has grown faster than foreign capital inflows into these economies. Overall, bonds outstanding have risen by \$5 trillion since 2008, or a rate of about 13 percent a year. Nevertheless, only an estimated 15 percent of the overall bond market in emerging markets is today owned by foreigners, compared with 33 percent in advanced economies.

Low interest rates are still an important factor. Statements by the Federal Reserve in May and June 2013 that it may start to taper asset purchases by the end of 2013 appear to have sparked a sudden outflow of capital from some emerging economies over the summer. Investors in mutual funds dealing in emerging-market bonds had invested about \$173 billion between May 2009 and May 2013. But from the beginning of June 2013, they began pulling money out rapidly. In June, July, and August, they withdrew more than \$34 billion, 19 percent of the previous inflow (Exhibit 20). Specifically, Turkey experienced consecutive months of negative outflows from its portfolio debt in June and July totaling \$4.2 billion; in Poland, it was \$2.4 billion for the two-month period. Emerging-market equity and aggregate bond indexes declined by more than 10 percent between April and August.⁶¹

61 This shift was not just a shift out of emerging market bonds. The Barclays aggregate bond index for the United States also fell by about 4 percent from April to August 2013.

Exhibit 20**A surge of bond outflows from emerging markets occurred from June to August 2013**

Monthly flows into emerging-market bond funds
\$ billion



SOURCE: EPFR Global; McKinsey Global Institute analysis

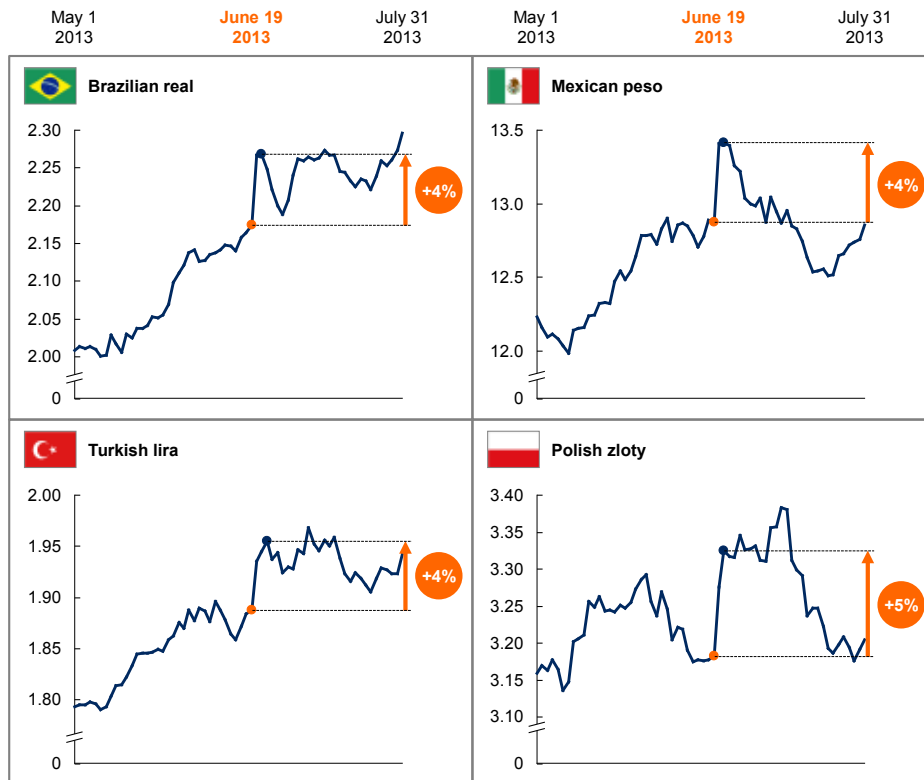
Some emerging markets also experienced depreciations in their currencies when the Federal Reserve mentioned the possibility of tapering. Turkey, Brazil, Mexico, and Poland all had depreciations of 4 to 5 percent immediately after the Federal Reserve's statement on June 19, 2013 (Exhibit 21). However, in the case of Mexico and Poland, these depreciations were reversed within weeks. The currencies of Turkey and Brazil were already depreciating, independent of signals from the Federal Reserve, due to weakening domestic macroeconomic indicators. After an immediate depreciation following the Federal Reserve's announcement, the currencies of these two economies appear to have resumed their weakening trend. Similar developments—except in reverse—occurred in mid-September when the Federal Reserve announced that it would keep its asset purchase policies in place. In this case, the lira, real, peso, and zloty all appreciated about 2 percent.

Overall, it appears that unconventional monetary policies have had a direct effect on capital flows to some developing economies and that these flows may reverse if and when such policies end in developed economies. This should not be entirely surprising, because the monetary policy set by advanced economies, and particularly the US Federal Reserve, normally does have an impact on emerging markets.

Exhibit 21

**Currencies of emerging markets with high bond inflows depreciated
~4 percent after the Fed's June 19 tapering announcement**

Exchange rates of four emerging markets with highest bond inflows, 2009–12
Local currency unit per \$ (larger numbers indicate a weaker local currency)



SOURCE: Bank of Canada; McKinsey Global Institute analysis

5. Future scenarios and risks

With the tapering of QE already on the horizon in the United States and the economic recovery gathering a little momentum in the United Kingdom and the Eurozone, the likelihood of interest rates rising in the years ahead has increased substantially. Indeed, as this report goes to press, rates on ten-year government bonds in the United States have already increased by more than 100 basis points over the past several months. Over the next few years, the benefits gained or losses incurred due to the recent era of ultra-low interest rates could be reversed. Tightening monetary policies and rising rates are likely to create new risks for different sectors and countries around the world, and we discuss these risks in this chapter.

THE END OF ULTRA-LOW INTEREST RATES MAY CREATE NEW RISKS FOR THE ECONOMY AND GLOBAL FINANCIAL SYSTEM

Given the signs of momentum in the economic recovery in the United States, the United Kingdom, and some parts of the Eurozone, the most likely scenario over the next several years is that at least some of the central banks will begin to taper asset purchases and thereafter begin to increase policy rates, prompting all interest rates to rise. Statements by Federal Reserve officials over the summer of 2013 laid out a framework for this adjustment in the policy stance. They indicated that if both the US economy and labor market conditions improve, the Federal Reserve would begin to taper asset purchases, which were running at \$85 billion a month when officials made their statements. However, the Federal Reserve has also indicated that it expects the policy rate to be held at very low levels for an extended period, and will start to consider raising the policy rate only when the unemployment rate reaches 6.5 percent. The Bank of England has announced a similar approach, stipulating that unemployment must reach 7 percent before it will consider increasing the base rate. The ECB has not yet made any announcements about a tightening of monetary policy.⁶² However, some Eurozone banks are repaying LTROs, leading to a natural reduction in the ECB balance sheet. One question is whether the ECB will extend a new round of LTRO loans once all the current outstanding loans are repaid in late 2014 or early 2015. At any rate, Eurozone borrowers may experience an impact when the Federal Reserve begins to taper asset purchases, even if there is no monetary tightening by the ECB.

An era of rising interest rates will have important implications for different sectors in advanced economies and for the dynamics of the global capital market. Indeed, for many individuals working in capital markets, this will be the first time in their careers that they face a prolonged period of rising rates. Of course, when interest rates rise, it will be a positive signal that the economic recovery has gained momentum and that unemployment is showing solid declines. But, while

⁶² Jens Weidmann, president of the Bundesbank, has called on the ECB to discontinue LTROs and said that the ECB would not simply react to action by the Federal Reserve but is instead focused on Eurozone inflation. No official announcements have been forthcoming.

the broad economic picture may be healthier, there are likely to be new risks during the transition to more normal rates of interest:

Increased volatility

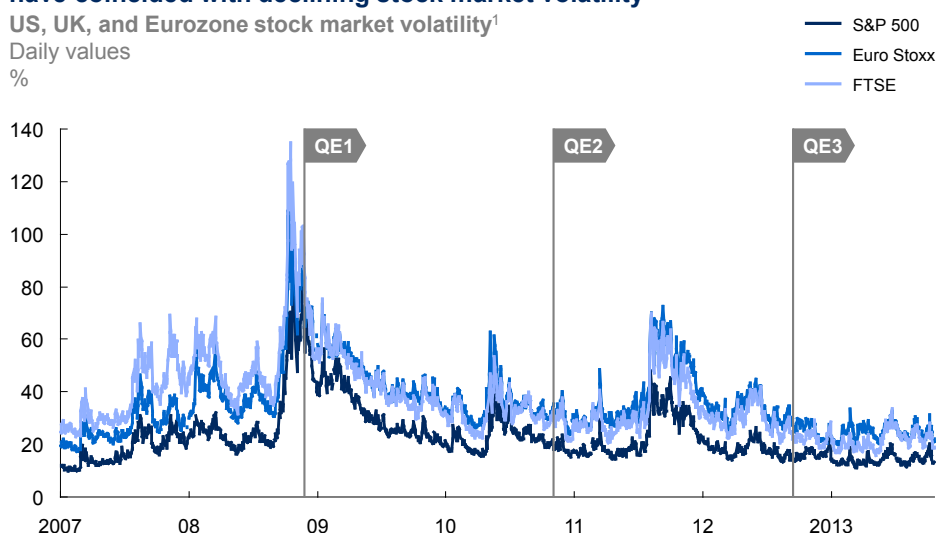
In the summer of 2013, the announcement of possible tapering of asset purchases by the Federal Reserve sparked a sharp reaction in asset prices, capital flows, and exchange rates. Once that tapering actually begins, this reaction could be magnified. Unconventional monetary policies and the expansion of central bank balance sheets have added significant liquidity to the global financial system and are therefore likely to have reduced the overall volatility of asset prices by diminishing their tail risk.⁶³ Stock market volatility in the United States, the United Kingdom, and the Eurozone has declined since the height of the crisis. The largest decline in volatility coincided with the first round of QE by the Federal Reserve (Exhibit 22). Measures of volatility in oil prices, gold, the dollar exchange rate, and many other financial variables follow a very similar pattern. Once tapering of asset purchases begins and liquidity in the financial system is withdrawn, many market participants are expecting price volatility to increase once again. Market expectations will be the significant driving force as interest rates adjust upward. Rates may overshoot their long-term equilibrium level. In general, this volatility compounds a difficult environment for investors—faced with falling prices in interest-rate-sensitive assets such as bonds, they will tend to sell other assets, particularly those that are traded in liquid markets, causing ripple effects and collateral damage in other asset classes and countries. Moreover, there is a risk that volatility could prove to be a headwind for broader economic growth as households and corporations react to uncertainty by curtailing their spending on durable goods and capital investment.

Exhibit 22

US Federal Reserve asset-purchase programs—especially QE1—have coincided with declining stock market volatility

US, UK, and Eurozone stock market volatility¹

Daily values
%



1 Measures market expectations of near-term (30 days) volatility as conveyed by stock index option prices. The measures used are the VIX for the S&P 500, VSTOXX for the Euro Stoxx, and VFTSE for the FTSE.

SOURCE: Datastream; McKinsey Global Institute analysis

63 “Tail risk” refers to the probability of an extremely bad or extremely good event occurring. See Shaun K. Roache and Marina V. Rousset, *Unconventional monetary policy and asset price risk*, IMF working paper number 13/190, August 2013.

Government debt service costs could rise by up to 20 percent

Governments in the United States, the United Kingdom, and parts of the Eurozone have issued large amounts of debt over the past five years at very low interest rates. Lower rates have also made it easier for governments to increase the level of their debt, with bonds outstanding rising by \$11 trillion since 2007. Today, total government debt service costs are about \$780 billion a year in the United States, the United Kingdom, and the Eurozone. Although the average maturity on sovereign debt has lengthened, at the end of 2012 it was still only 5.4 years in the United States, 6.5 years in Germany, and about 6 years for the Eurozone overall. The United Kingdom stands in contrast to this general picture, with a long average maturity of 14.6 years. As debts are rolled over, governments will face higher interest payments as rates rise. For example, we estimate that a 300-basis-point rise in US ten-year government bond yields—which would reverse the decline in government bond yields since 2007—would increase US federal government debt interest payments by \$75 billion a year, or 23 percent higher than payments in 2012.⁶⁴ The Congressional Budget Office in the United States has estimated the impact of rising rates on government debt payments, factoring in its own projections of changes in government deficits. It expects the government's net interest costs to more than double relative to the size of the economy over the next decade, from 1.25 percent of GDP in 2013 to almost 2 percent in 2017 and to more than 3 percent by 2023.⁶⁵ In the Eurozone, we estimate that aggregate government debt interest costs would increase by \$39 billion a year—10 percent higher than 2012 levels—if interest rates rose by 200 basis points, thus reversing their decline from 2007 to 2012. However, this effect would be very unevenly distributed across countries. For those Eurozone economies where growth remains stagnant, this will pose particular challenges. In the United Kingdom, rising rates will not have as great an impact in the short term as they will in other regions because of the relatively long average maturity of government debt. A 300-basis-point increase—reversing the decline in bond yields since 2007—would increase annual debt payments by \$5 billion, 6 percent above 2012 levels. In general, rising interest costs on debt would put government budgets under additional stress at a time when the cost of providing services for aging populations is rising, implying that governments will face even more difficult choices between raising taxes and cutting spending.

Household debt service costs could rise significantly for some

Although households in many advanced economies have reduced their debt burdens since the financial crisis began, total household debt is still higher as a percentage of GDP and in absolute terms than it was in 2000 in the United States, the United Kingdom, and most Eurozone countries. Higher interest rates will increase debt service costs significantly on variable-rate debts. In the United States, where approximately 80 percent of mortgages have fixed interest rates, the impact may be modest. We estimate that every 100-basis-point increase in effective interest rates on this debt would increase annual US household debt service payments on variable-rate mortgages and other forms of consumer debt by about \$54 billion, a 7 percent increase from 2012 debt payments. In the United Kingdom, the impact would be greater because, as we have noted, 70 percent of mortgages are on variable rates. We estimate that, for every 100-basis-point increase, effective annual debt payments by UK

64 This assumes that 20 percent of US government debt is rolled over each year, which aligns with the current average maturity of US government debt of just over five years.

65 Congressional Budget Office, *The 2013 long-term budget outlook*, September 17, 2013.

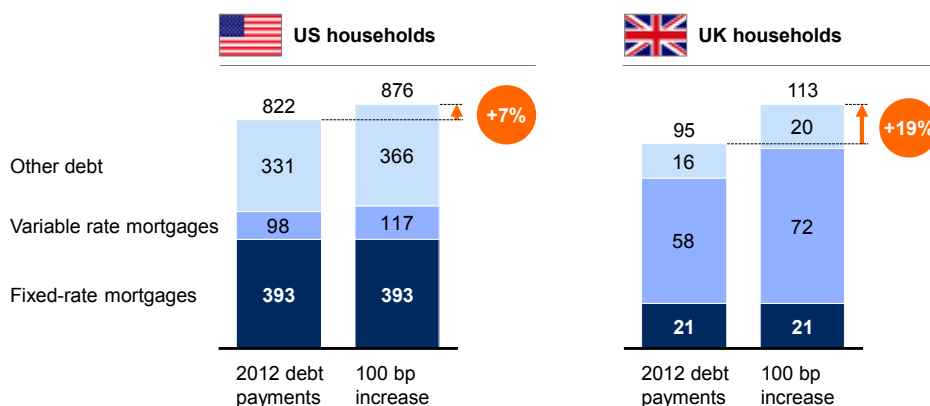
households would rise by about \$18 billion, 19 percent higher than the level in 2012 (Exhibit 23). While the many households with savings would be better off as a result of the rise in interest rates, an increase in interest payments could impose particular strains on households that took out loans that they could afford only at low interest rates.

Exhibit 23

For every 100-basis-point increase in rates, US household debt payments could increase by 7 percent and UK payments by 19 percent

Total household debt payments, 2012

\$ billion



NOTE: Not to scale. Numbers may not sum due to rounding.

SOURCE: US Federal Reserve; Bank of England; Eurostat; US Treasury Department; Bankrate; Bloomberg; McKinsey Global Institute analysis

Non-financial corporations will need to boost capital efficiency

Corporations have benefited from declining interest rates through lower interest payments. As we have discussed, this has boosted corporate profits by about 5 percent in the United States (accounting for about one-quarter of the profit growth of US corporations since 2007) and the United Kingdom and by 3 percent in the Eurozone. This source of profit growth will disappear as interest rates rise. But a potentially even more important effect will be to penalize those companies in capital-intensive industries (such as utilities, manufacturing, and mining) that have low levels of capital efficiency. Real interest rates have been declining since the 1980s as central banks brought inflation under control. During this period, companies could afford to pay less attention to capital efficiency as growth seemed to be investors' biggest priority and capital was cheap. Higher interest rates will make capital inefficiency more costly but, conversely, reward companies that use capital productively. Companies with large balance sheets and high credit ratings or access to low-cost capital from high-saving countries such as China may find themselves in a position to offer financing to customers and suppliers, potentially creating a competitive advantage.

Eurozone countries caught in a crosswind

The ECB has a single mandate for maintaining price stability and is unlikely to react directly to changes in the Federal Reserve or Bank of England monetary policies. However, rising rates in the United States could cause capital outflows from the Eurozone as investors seek higher yields in dollar-based assets or unwind carry trades. This could indirectly put upward pressure on interest rates in the Eurozone and could lead to euro depreciation that would make imported goods more expensive while enhancing the global competitiveness of exported and import-competing goods.

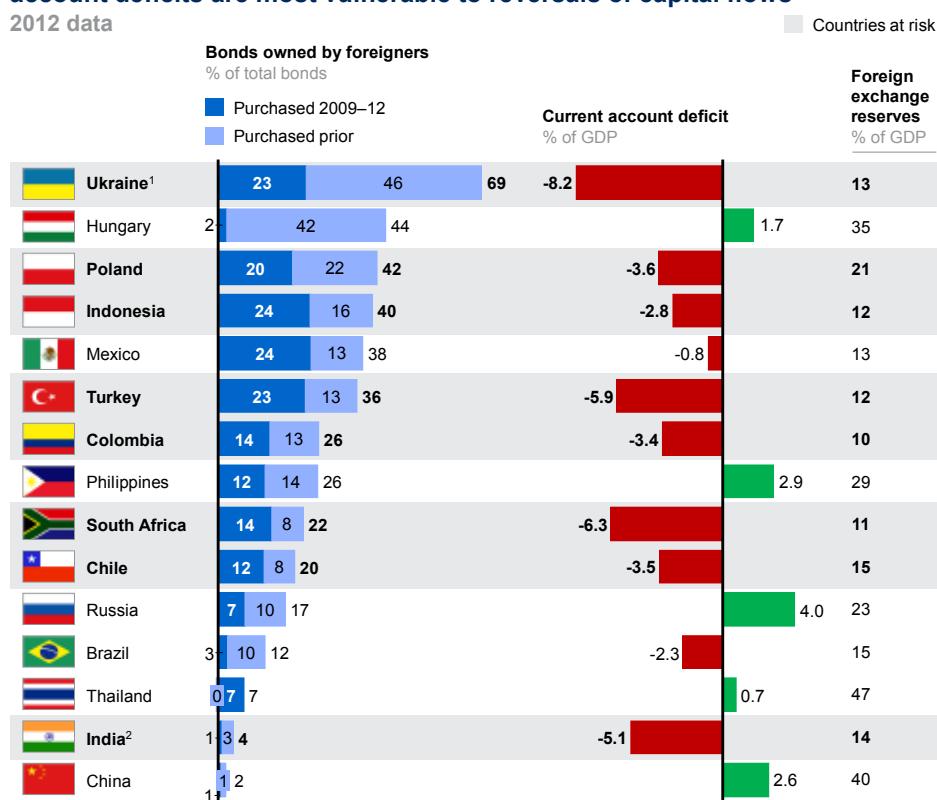
Retrenchment of capital flows to emerging markets

As interest rates rise in advanced economies, it is quite possible that the inflows of capital into emerging markets may begin to reverse and that volatility in these flows may increase. The Institute of International Finance noted increased volatility in capital flows to emerging markets in the summer of 2013. It said that a surge of inflows that began in mid-2012 had started to reverse sharply in mid-May 2013 before picking up again in September and October 2013.⁶⁶ To maintain long-term stability of capital flows, FDI is a more effective way to finance external deficits as this type of long-term investment does not fluctuate heavily in response to short-term economic developments. FDI has an additional advantage in that it brings new technologies and management capabilities. Purchases of bonds by foreign investors, especially short-term bonds, are a much less stable way to finance external deficits. As we have noted, countries that have experienced large inflows of capital into their bond markets may be vulnerable, especially if they are also running large current account deficits. Examples include Turkey, South Africa, Indonesia, and several Eastern European countries (Exhibit 24). In the event of sudden capital outflows, governments in such economies could face balance of payments crises. However, in the medium term, stronger import demand from the United States, combined with continued advances in productivity in emerging markets, could mitigate the negative effects of tapering.

Exhibit 24

Countries heavily dependent on foreign investors and with large current account deficits are most vulnerable to reversals of capital flows

2012 data



1 Bonds data for Ukraine captures only foreign currency bonds.

2 India received \$60 billion of equity inflows from 2009–12, representing ~4.8% of total outstanding equity. Overall 10% of equity is foreign-owned.

SOURCE: International Monetary Fund; McKinsey Global Institute Financial Assets database; McKinsey Global Institute analysis

66 Institute of International Finance, *Capital flows to emerging market economies*, IIF research note, October 7, 2013.

Investors in bond markets could face large losses

Rising interest rates and falling bond prices will create declines in portfolio values for banks, life insurers, and other investors that must mark such assets to market. Banks and insurance companies that match their interest rate risk on assets and liabilities will not see a large impact from higher rates. However, these institutions profit from the maturity transformation obtained by not fully matching assets and liabilities, and so they could face losses as rates rise. We do not know how much of the interest rate risk banks and other investors have hedged. Banks in Eurozone economies that are still struggling to weather the crisis could be hit particularly hard because they have added significant sovereign bond holdings to their balance sheets in recent years. Life insurers, whose assets are mostly in fixed-income products, will also face large accounting write-downs on their portfolios, particularly if interest rates rise rapidly. However, it is also possible that a general rise in interest rates caused by improved economic conditions could result in lower risk premiums and therefore lower bond yields (and higher prices) in some Eurozone countries.

Collapse of leveraged trades could threaten financial stability

During the era of ultra-low interest rates, there have been anecdotes about some investors increasing their use of leverage to amplify returns in some markets. Examples include leveraged carry trades across currencies in foreign exchange and bond markets, and increasing leverage in private-equity deals. If interest rates were to adjust upward very quickly, many of these investors could face large losses that would then impact banks and other financial institutions that have provided the leverage and potentially threaten broader financial stability.

WHAT IF ULTRA-LOW INTEREST RATES CONTINUE?

It is also possible that advanced economies could continue to experience very low interest rates for many years to come. If the economic recovery in advanced economies continues to be weak, central banks could maintain their current set of conventional and unconventional monetary policies or taper them only very gradually. We have seen this scenario unfold over the past 15 years in Japan, where even ultra-low interest rates have not stimulated the economy and growth has remained sluggish. In this case, the negative distributional effects of ultra-low interest rates for some sectors and institutions, including financial institutions, would continue, and new risks would threaten others. Everyone would experience a “lost decade” scenario.

Life insurers and banks in Europe would experience continued erosion in their profitability, putting many of them under financial stress. European banks are already suffering from compressed net interest margins compared with their US counterparts. If this were to continue in the longer term, they would need to be aggressive in adopting new business models and identifying innovative ways to generate return, without which the industry could face the prospect of significant restructuring. Life insurance companies with large portfolios of guaranteed return products, in particular, would see what is currently a mark-to-market loss become an erosion of their profitability if interest rates were to remain ultra-low for a long period, putting the survival of many at risk.

While life insurance companies in Europe probably face the greatest threat, other types of insurance companies are not immune. One of the main profit sources for all insurance companies comes from investing customer policy premiums. If interest rates on fixed-income investments remain low, these companies would continue to experience declining investment returns and lower profits.

In an ongoing ultra-low rate environment, defined-benefit pension schemes in both the private and public sectors would likely struggle to earn enough on their assets to deliver on their commitment to their retirees. Many corporate plans would continue to require additional contributions from employers. Although accounting rules have shielded some public-sector pension plans from rising liabilities so far, over time, this could become a growing issue and could threaten the solvency of some plans. Households saving for retirement and other purposes would also be challenged due to low returns on fixed income, and some households could need to increase their saving rate or delay retirement or both. For those within ten years or so of retiring, this could prove particularly difficult. This group has planned retirement for many years assuming higher rates and may not have enough time before stopping work to accumulate sufficient additional savings to cover the losses they would incur from lower returns on fixed income—not to mention the lost years of equity price growth.

An extended period of low interest rates could potentially also distort investment choices over time, resulting in more leverage as investors try to generate returns. There is anecdotal evidence of rising leverage used in private-equity deals and by non-bank financial institutions such as hedge funds. We could also see the return of asset-price bubbles in some sectors, especially real estate. In emerging markets and those markets that have always been attractive to international investors (such as London and New York real estate), a continued inflow of capital could cause the prices of some assets to diverge from fundamentals. The IMF has noted that there are already signs of overheating in real estate markets in some European countries, in Canada, and in some emerging-market economies.⁶⁷ In the United States, minutes from the Federal Reserve's advisory council in February 2013 noted a rise in the price of agricultural land as a potential bubble resulting from persistently low rates. Although such bubbles are difficult to forecast, the longer low interest rates continue, the more likely it is that they could develop, potentially sowing the seeds for another crisis.⁶⁸

67 IMF, *Global financial stability report*, April 2013.

68 Michael D. Bordo and John Landon-Lane, *Does expansionary monetary policy cause asset price booms: Some historical and empirical evidence*, NBER working paper number 19585, October 2013.

One area where we do not see major risk even if ultra-low interest rates were to continue is general inflation. In advanced economies, labor markets still have quite a degree of slack from unemployment and underemployment, and our colleagues' and our conversations with companies suggest that there is still excess production capacity in most sectors. The reason that ultra-low interest rate policies would remain in place would be that the relevant economies would still be experiencing weak growth and significant slack. In the absence of such weak economic conditions, central banks plan to remove bank reserves from the economy quickly, limiting the risk of overheating. Whether they can achieve a "costless exit" remains to be seen.

Appendix: Technical notes

These technical notes provide more detail on some of the definitions and methodologies employed in this report. We address the following points:

1. Central bank profits
2. Impact of interest rate changes on interest income and interest expense
3. Impact of interest rate changes on household wealth
4. Model for cost of equity

1. CENTRAL BANK PROFITS

Central banks earn profits from the assets on their balance sheets. Earnings over and above their operating costs are usually remitted to the treasuries of the central government. To measure this amount and estimate how much of it is due to additional purchases of assets undertaken over the past five years, we used data from the annual reports of the US Federal Reserve, the Bank of England, and the ECB. Our approach was slightly different in the three regions due to the data available. In the United Kingdom and the Eurozone, earnings generated from asset purchases are reported directly. The Bank of England set up a separate Asset Purchase Facility Fund in which it holds its large-scale asset purchases, and it reports remittances of profits to Her Majesty's Treasury from this facility. For the Eurozone, we took the annual net interest income earned between 2008 and 2012 from the ECB's two asset purchase programs: the Securities Markets Program and the Covered Bond Purchase Program. We did not factor in the impact of the LTRO on the bank's net income because it is difficult to quantify, and we expect it to be small relative to overall net interest income. The ECB remits any profits to the national central banks of EU member states, which, in turn, distribute shares to their respective governments based on specific national rules. For the United Kingdom and the Eurozone, we estimated the additional income earned from the expanded balance sheets of the central banks, irrespective of whether these amounts had yet been distributed to governments.

In the United States, the Federal Reserve reports annual remittances to the Treasury Department. To estimate remittances due to large-scale asset purchases and other measures, we assumed that the Federal Reserve balance sheet and remittances would have remained at the same share of GDP as in 2007. We considered any remittances above this share to be the result of the Federal Reserve's large-scale asset purchase and include them in our estimate. Economists at the Federal Reserve have recently estimated that, when rates rise and the sale of the additional securities bought under the Large Scale Asset Purchase program begins, remittances to the Treasury may be lower than they otherwise would have been because of higher interest expenses on reserve

balances and capital losses associated with the sales of assets.⁶⁹ However, given the uncertainty about the future, we did not factor this possibility into our estimates.

2. IMPACT OF INTEREST RATE CHANGES ON INTEREST INCOME AND INTEREST EXPENSE

To develop a model of how low interest rates have had an impact on the interest income and interest expense of various sectors in the United States, the United Kingdom, and the Eurozone, we used national balance sheet data from the US Federal Reserve's Flow of Funds for the United States and Eurostat for the United Kingdom and the Eurozone, and data on interest rates from several sources. Our broad methodology was to determine the stock of interest-bearing assets and liabilities for each sector annually between 2007 and 2012, as well as the effective interest rate on those assets and liabilities in each year. Using these data, we then calculated the actual interest income earned on interest-bearing assets and interest expense paid on interest-bearing liabilities for each sector in each year. We also calculated what interest income and expense would have been if interest rates had not changed since 2007. Note that all of our calculations are performed pre-tax. We do not take into consideration secondary tax effects, which could be different depending on how rates vary between corporations and households as well as among household demographic groups. We investigated the balance sheets of the following sectors: households, non-financial corporations, central governments, banks, insurance and pensions, and rest of world.⁷⁰ Our calculations then proceeded as follows:

Define interest-earning assets and interest-bearing liabilities of each sector

We included the following types of interest-bearing assets and liabilities: deposits, debt securities, loans, trade credits, and the portion of mutual fund shares and net equity of households in life insurance and pension fund reserves that are interest-earning (see details below). We excluded public equity, equity in non-corporate business, real estate, and consumer durables because they are non-interest-bearing. On the liability side, we included the same categories as on the asset side because all assets on the balance sheet of a particular sector must show up as liabilities for some other sector, and vice versa.

Determine interest rates for each asset/liability class

For each asset category we used annual statistics on interest rates for 2007 to 2012, and, where possible, sector-specific interest rates. We collected data on rates from national sources such as the US Federal Reserve, the FDIC, the Bank of England, and the ECB as well as some from private providers such as Bankrate and Bloomberg. If available, we used or calculated effective interest rates from official national sources. If these effective rates were not available, we chose the best estimates that were available.

⁶⁹ Seth B. Carpenter et al., *The Federal Reserve's balance sheet: A primer and projections*, Federal Reserve Board Finance and Economics discussion series 2012–56, August 2012.

⁷⁰ In line with how most national statistics offices categorize economic sectors, our model of the household sector includes non-profits and some personal businesses. Due to data limitations, we could not exclude these entities, but they are a small part of the overall data, and we do not think it distorts our findings to leave them out.

Make adjustments for the market value of long-term debt securities

Debt securities on national balance sheets are generally reported at either book value or market value. We wanted to know the face or book value of the security in order to calculate the interest income received and expense paid. In the United States, the Flow of Funds reports most debt securities at book value, and we use these values in our estimation. For the United Kingdom and the Eurozone, Eurostat reports data on debt securities in market values. The only sector for which we know both the market and face value of debt is governments. Using the ratio of market to face value for government debt, we converted all long-term debt securities in the United Kingdom and the Eurozone to face values. We did not make any adjustment to short-term securities since their value is less sensitive to movements in the interest rate due to their short maturity.




Make adjustments to the balance sheets of specific sectors

- **Mutual funds.** Mutual funds invest in different financial assets, but we wished to consider only what is held in interest-bearing financial assets. For the United Kingdom and the Eurozone, we calculated the share of interest-bearing assets among mutual fund assets based on information from the European Fund and Asset Management Association. For the United States, the US Federal Reserve's Flow of Funds provides a breakdown of mutual fund assets. We used only mutual fund assets that are invested in interest-earning fixed-income assets, and we attributed these to the household, pension fund, and insurance sectors according to the relative amount of mutual fund reserves held by each of these three sectors.
- **Insurance and pension funds.** In this case, we first identified only interest-bearing assets, almost entirely composed of fixed-income securities and deposit accounts. We then sought to allocate reported assets between the insurance and pension sector and the household sector according to which bears the interest rate risk. For instance, all interest-bearing assets of defined-contribution pension funds are transferred to the balance sheet of households, while those of defined-benefit pensions remain in the pension category. For insurance, we estimated the share of insurance policies that are on variable rates and allocated these to the household sector. The share that has a guaranteed rate or guaranteed minimum rate was allocated to the insurance company sector.
- **Financial institutions and banks.** In the United States, the Flow of Funds reports the balance sheets of the banking, insurance, and pensions sectors separately. However, in the Eurozone, Eurostat does not distinguish between the insurance and pensions sectors. To separate the interest-bearing assets and liabilities of each sector, we estimated the split between the two subsectors using ECB data. By applying this split to each asset and liability category, we derived estimated balance sheets for each subsector. For the United Kingdom, Eurostat reports data on "financial corporations," "other financial intermediaries," and "insurance corporations and pension funds." To approximate the balance sheet of the banking sector specifically, we subtracted from the total financial sector (financial corporations) the assets and liabilities of the central bank (sourced from the Bank of England), other financial intermediaries, and insurance corporations and pension funds.

After performing all of these adjustments, we had estimates for the total interest-bearing balance sheets of the sectors in the economy. Exhibit A1 summarizes the results of these adjustments on 2007 data.

Exhibit A1

Interest-bearing balance sheets, by sector

Sector	Interest-bearing assets/liabilities, 2007 \$ billion			
		United States	United Kingdom	Eurozone
Central government	Assets	455	189	1,217
	Liabilities	5,374	1,043	7,875
Non-financial corporations	Assets	5,482	1,038	5,128
	Liabilities	12,319	1,960	9,664
Banks	Assets	10,991	8,584	15,830
	Liabilities	10,271	8,573	15,183
Insurance and pensions	Assets	5,508	974	2,340
	Liabilities	18	203	97
Households	Assets	14,225	3,057	11,391
	Liabilities	13,825	2,381	7,272
Rest of world	Assets	8,685	8,554	25,226
	Liabilities	3,381	7,782	23,607

SOURCE: US Federal Reserve; Eurostat; European Central Bank; McKinsey Global Institute analysis

Calculate the impact of changes in the interest rate on interest income/expenses

We measured the impact of the change in interest rates in two ways. First, we estimated the annual “pure” interest rate effect by calculating the impact of lower interest rates on net interest income for each year t , holding assets and liabilities constant at their 2007 levels.

$$\text{Impact}_t = (\text{rate}_t - \text{rate}_{2007}) \times \text{assets}_{2007} - (\text{rate}_t - \text{rate}_{2007}) \times \text{liabilities}_{2007}$$

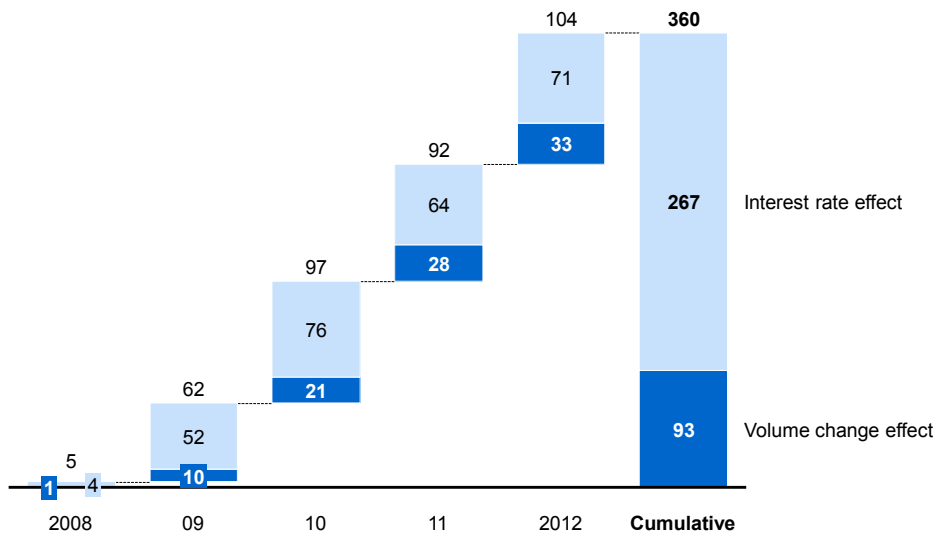
We assumed that the stock of assets and liabilities remained unchanged from 2007 and then calculated the annual impact based on the change in interest rates. We used this method when reporting a simple annual benefit/loss from interest rates. In Exhibit A2, we show that US households gained from lower debt payments and lost from lower interest income, producing a net loss due to interest rate changes of \$55 billion in 2012 compared to 2007.

Exhibit A3

The effect of annual interest rate and volume changes on the net interest expenses of Eurozone governments



Estimated impact of lower interest rates: change in net interest income
\$ billion, converted at constant 2012 exchange rate



SOURCE: Eurostat; Bloomberg; McKinsey Global Institute analysis

3. IMPACT OF INTEREST RATE CHANGES ON HOUSEHOLD WEALTH

To estimate the impact of ultra-low interest rates on household wealth, we wanted to compare what household wealth in 2012 would have been with (the “base case”) and without (the “counterfactual”) ultra-low rates. We are not considering the effect of changes in household asset positions, only the repricing of the position held in 2007. Our estimate is the difference between the base case and the counterfactual.

The base case for 2012 estimates the value of households’ fixed-income, equity, and real estate holdings in 2012 by applying the change in the average price of the respective asset class between 2007 and 2012 to 2007 asset holdings. In other words, we estimated what household wealth would have been in 2012 had the volume of asset holdings not changed. We calculated asset class a (equity, fixed-income, or real estate holdings) as:

$$\text{Base case } a_{2012} = \frac{\text{average price of asset class } a_{2012}}{\text{average price of asset class } a_{2007}} \times \text{asset } a \text{ holdings}_{2007}$$

For the counterfactual scenario in 2012, we estimated how much lower, in percentage terms, asset prices would have been had interest rates not changed from 2007. We used different methodologies to estimate the counterfactual for each of the three asset classes:

- **Fixed-income prices.** We assumed that all of the observed increase in bond prices from 2007 to 2012 was due to low interest rates. Thus, our

counterfactual scenario is one in which fixed-income prices were the same in 2012 as they were in 2007.

- **Real estate prices.** We applied estimates from academic literature on the impact of a 100-basis-point drop in the real interest rate on the price of housing. We scaled these estimates up or down according to the drop in real rates actually observed in the different regions. We subtracted this estimated increase in housing prices from the actual observed change in prices to derive the counterfactual. For example, in the United States the observed decline in the real interest rate was 219 basis points, calculated as the ten-year government bond yield less inflation. This leads to an estimated impact on housing prices of 15 percent. Actual average housing prices between 2007 and 2012 fell by 16 percent. Therefore, our counterfactual scenario is one in which housing prices fell by 31 percent.
- **Equity prices.** Based on our calculations of the impact on net interest income and expenses, we estimated that about 5 percent of the annual profits of non-financial corporations in the United States and the United Kingdom, and 3 percent in the Eurozone, could be attributed to savings from reduced net interest expense. All else being equal, this should boost equity market valuations due to higher corporate profits. However, we assumed that this increase in profits due to low interest rates was not permanent; specifically, we assume that the increase would continue for five years. To calculate the impact on equity prices today, we discounted these five years of additional profits back to today at a discount rate of 9 percent and assumed that, after the end of five years, corporate profits returned to their 3.5 percent growth trend. This calculation yields an increase in equity prices today of 1.3 percent in the United States and the United Kingdom, and 0.8 percent in the Eurozone. We then applied these figures to the observed change in equity prices to derive the counterfactual. By way of example, average US equity prices fell by 7 percent between 2007 and 2012. Therefore, our counterfactual scenario is one in which equity prices fell by 8 percent over this period.

Once we determined the counterfactual scenario, we calculated holdings in asset class a in 2012 as

$$\text{Counterfactual } a_{2012} = \frac{\text{average counterfactual price of asset class } a_{2012}}{\text{average price of asset class } a_{2007}} \times \text{asset } a \text{ holdings}_{2007}$$

We then derived the estimated wealth impact as the difference between the base case and counterfactual case for asset class a :

$$\text{Wealth effect from } a_{2012} = \text{Base case } a_{2012} - \text{Counterfactual } a_{2012}$$

After calculating the wealth effect, we converted any additional household wealth into additional household consumption using academic estimates on the marginal propensity to consume out of changes in wealth. As we have mentioned, there is a broad body of academic literature on this topic, with estimates ranging from zero to 14 percent depending on a range of variables such as source of wealth, country, demographics, and so on. We used 3 percent as a conservative estimate.

4. MODEL FOR COST OF EQUITY

In finance theory, the cost of equity is the rate shareholders expect to earn to compensate them for investing their capital in the company. Therefore one might expect that, as yields on fixed-income securities drop, the return that shareholders would demand from equity investments would also decline, thus lowering the cost of equity. To test what actually happened, we developed a model of the real cost of equity. We started with the market PE ratio and then backed out the cost of equity by assuming a reasonable long-term corporate profit growth rate and the average market return on equity.

First, we calculated the nominal implied cost of equity in any year as

$$\text{Implied cost of equity} = \frac{(1 - \text{reinvestment rate})}{\text{median S\&P 500 PE multiple}} + \text{nominal growth rate}$$

where the reinvestment rate is the percentage of profits that needs to be reinvested to grow based on long-term median return on equity (ROE) of 13.5 percent and the nominal growth rate is based on consumer price index (CPI) inflation and an expected real long-term rate of corporate profit growth of 3.5 percent. We then converted this nominal cost into a real cost using the CPI inflation rate:

$$\text{Real cost of equity} = \frac{(1 + \text{implied cost of equity})}{(1 + \text{inflation rate})} - 1$$

Bibliography

Ahmed, Shaghil, and Andrei Zlate, *Capital flows to emerging market economies: A brave new world?* Board of Governors of the Federal Reserve System, International Finance discussion paper number 1081, June 2013.

Antolin, Pablo, Sebastian Schich, and Juan Yermo, "The economic impact of protracted low interest rates on pension funds and insurance companies," *OECD Journal: Financial Market Trends*, volume 2011, issue 1, September 2011.

Bank of England, *The distributional effects of asset purchases*, July 12, 2012.

Bénétrix, Agustín S., Barry Eichengreen, and Kevin H. O'Rourke, "How housing slumps end," *Economic Policy*, number 27, issue 72, October 2012.

Bernanke, Ben, *Monetary policy since the onset of the crisis*, speech at Federal Reserve Bank of Kansas City Economic Symposium in Jackson Hole, Wyoming, August 31, 2012.

Blanchard, Olivier, and Daniel Leigh, *Growth forecast errors and fiscal multipliers*, IMF working paper number 13/1, January 2013.

Bordo, Michael D., and John Landon-Lane, *Does expansionary monetary policy cause asset price booms: Some historical and empirical evidence*, NBER working paper number 19585, October 2013.

Buiter, Willem H., *Housing wealth isn't wealth*, NBER working paper number 14204, July 2008.

Carpenter, Seth B., Jane E. Ihrig, Elizabeth C. Klee, Alexander H. Boote, and Daniel W. Quinn, *The Federal Reserve's balance sheet: A primer and projections*, Federal Reserve Board Finance and Economics, discussion series 2012–56, August 2012.

Case, Karl E., John M. Quigley, and Robert J. Shiller, *Wealth effects revisited 1975–2012*, Cowles Foundation discussion paper number 1884, December 2012.

Chen, Han, Vasco Cúrdia, and Andrea Ferrero, *The macroeconomic effects of large-scale asset purchase programs*, Federal Reserve Bank of New York staff reports number 527, December 2011.

Chen, Shiu-Sheng, "Lack of consumer confidence and stock returns," *Journal of Empirical Finance*, number 18, issue 2, March 2011.

Christiano, Lawrence, Martin Eichenbaum, and Sergio Rebelo, "When is the government spending multiplier large?" *Journal of Political Economy*, volume 119, number 1, February 2011.

Congressional Budget Office, *The 2013 long-term budget outlook*, September 17, 2013.

Chung, Hess, Jean-Philippe Laforde, David Reifschneider, and John C. Williams, *Estimating the macroeconomic effects of the Fed's asset purchases*, Federal Reserve Bank of San Francisco economic letter number 2011–03, January 31, 2011.

Cúrdia, Vasco, and Andrea Ferrero, *How stimulatory are large-scale asset purchases?* Federal Reserve Bank of San Francisco economic letter number 2013–22, August 12, 2013.

Davis, Morris A., and Michael G. Palumbo, *A primer on the economics and time series econometrics of wealth effects*, finance and economics discussion paper, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, 2001.

Dokko, Jane, Brian M. Doyle, Michael T. Kiley, Jinill Kim, Shane M. Sherlund, Jae Sim, and Skander Van den Heuvel, "Monetary policy and the global housing bubble," *Economic Policy*, volume 26, number 66, April 2011.

Ehrhardt, John, and Zorast Wadia, *Milliman analysis: Corporate pension funded ratio in September exceeds 91%, a level last observed in 2008*, Milliman 100 Pension Funding Index, October 2013.

Fawley, Brent W., and Christopher Neely, "Four stories of quantitative easing," *Federal Reserve Bank of St. Louis Review*, January/February 2013.

Fratzscher, Marcel, Marco Lo Duca, and Roland Straub, *On the international spillovers of US quantitative easing*, ECB working paper number 1557, June 2013.

Fry, Richard, and Paul Taylor, *A rise in wealth for the wealthy; declines for the lower 93%: An uneven recovery 2009–2011*, Pew Research Center, April 23, 2013.

Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian Sack, "The financial market effects of the Federal Reserve's large-scale asset purchases," *International Journal of Central Banking*, volume 44, March 2011.

Glaeser, Edward, "A nation of gamblers: Real estate speculation and American history," *American Economic Review*, volume 103, number 3, 2013.

Glaeser, Edward, Joshua D. Gottlieb, and Joseph Gyourko, "Can cheap capital explain the housing boom?" in *Housing and the financial crisis*, NBER conference report, Edward L. Glaeser and Todd Sinai, eds., 2013.

Glick, Reuven, and Sylvain Leduc, *The effects of unconventional and conventional US monetary policy on the dollar*, Federal Reserve Bank of San Francisco working paper 2013–11, May 2013.

Goedhart, Marc H., Timothy M. Koller, and Zane D. Williams, "The real cost of equity," *McKinsey on Finance*, autumn 2002.

Goedhart, Marc H., and Regis Huc, "What is stock market index membership worth?" *McKinsey on Finance*, winter 2004.

Goldman Sachs, *Halftime highlights: Corporate pension plans face ongoing stresses*, Goldman Sachs Asset Management white paper, August 2012.

Goodhart, Charles, and Boris Hofmann, "House prices, money, credit and the macroeconomy," *Oxford Review of Economic Policy*, volume 24, number 1, 2008.

Gudell, Svenja, *Negative equity rate falls for 5th straight quarter in Q2*, Zillow Real Estate Research, August 28, 2013.

Hamilton, James D., and Jing Cynthia Wu, "The effectiveness of alternative monetary policy tools in a zero lower bound environment," *Journal of Money, Credit, and Banking*, volume 44, 2012.

Hott, Christian, and Terhi Jokipii, *Housing bubbles and interest rates*, Swiss National Bank working paper number 7, 2012.

Iacoviello, Matteo, *Housing wealth and consumption*, Board of Governors of the Federal Reserve System, International Finance discussion paper number 1027, August 2007.

Institute of International Finance, *Capital markets monitor*, October 2013.

Institute of International Finance, *Capital flows to emerging market economies*, IIF research note, October 7, 2013.

Institute of International Finance, *Principles for stable capital flows and fair debt restructuring*, Report on Implementation by the Principles Consultative Group, October 2013.

International Monetary Fund, *Global impact and challenges of unconventional monetary policy*, IMF policy paper, October 7, 2013.

International Monetary Fund, *Global financial stability report*, April 2013.

International Monetary Fund, *Global financial stability report*, October 2013.

International Monetary Fund, *Unconventional monetary policies—recent experience and prospects*, IMF policy paper, April 18, 2013.

Joyce, Michael, Matthew Tong, and Robert Woods, "The United Kingdom's quantitative easing policy: Design, operation and impact," *Bank of England Quarterly Bulletin*, Q3, 2011.

Koo, Richard, "The world in balance sheet recession: Causes, cure, and politics," *Real-World Economics Review*, number 58, December 2011.

Krishnamurthy, Arvind, and Annette Vissing-Jorgensen, *The effects of quantitative easing on interest rates: Channels and implications for policy*, Brookings Papers on Economic Activity, fall 2011.

Kuttner, Kenneth, *Low interest rates and housing bubbles: Still no smoking gun*, Williams College Department of Economics working paper, number 2012-01, January 2012.

McKinsey Global Institute and the McKinsey Sustainability & Resource Productivity Practice, *Resource Revolution: Tracking global commodity markets*, September 2013.

McLaren, Nick, and Tom Smith, "The profile of cash transfers between the Asset Purchase Facility and Her Majesty's Treasury," *Bank of England Quarterly Bulletin*, Q1 2013.

Moessner, Richhild, *Effects of explicit FOMC policy rate guidance on equities and risk measures*, DNB working paper number 390, September 2013.

Muellbauer, John, *Housing, credit and consumer expenditure*, proceedings from the Federal Reserve Bank of Kansas City Economic Symposium in Jackson Hole, Wyoming, August 31–September 1, 2007.

Otoo, Maria Ward, *Consumer sentiment and the stock market*, Board of Governors of the Federal Reserve System, November 1999.

Rajan, Raghuram, *A step in the dark: unconventional monetary policy after the crisis*, Andrew Crockett Memorial Lecture, Bank for International Settlements, June 23, 2013.

Rey, H el ene, *Dilemma not trilemma: The global financial cycle and monetary policy independence*, working paper, 2013.

Roache, Shaun K., and Marina V. Rousset, *Unconventional monetary policy and asset price risk*, IMF working paper number 13/190, August 2013.

Rosa, Carlo, *How "unconventional" are large-scale asset purchases? The impact of monetary policy on asset prices*, Federal Reserve Bank of New York, staff report number 560, May 2012.

S a, Filipa, Pascal Towbin, and Tomasz Wieladek, *Low interest rates and housing booms: The role of capital inflows, monetary policy, and financial innovation*, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute, working paper number 79, April 2011.

Santor, Eric, and Suchanek, Lena, "Unconventional monetary policies: Evolving practices, their effects and potential costs," *Bank of Canada Review*, spring 2013.

Sielman, Rebecca A., *Milliman 2012 public pension funding study*, October 2012.

Sierminska, Eva, and Yelena Takhtamanova, *Wealth effects out of financial and housing wealth: Cross country and age group comparisons*, Federal Reserve Bank of San Francisco working paper series number 2007–01, January 2007

Sousa, Ricardo M., *Wealth effects on consumption: Evidence from the euro area*, ECB working paper number 1050, May 2009.

Stein, Jeremy C., speech given at the "Banking, Liquidity and Monetary Policy" symposium, Center for Financial Studies, Frankfurt, Germany, September 26, 2013.

Swanson, Eric T., *Let's twist again: A high-frequency event-study analysis of Operation Twist and its implications for QE2*, Federal Reserve Bank of San Francisco working paper number 2011-08, February 2011.

Swanson, Eric T., and John C. Williams, *Measuring the effect of the zero lower bound on medium- and longer-term interest rates*, Federal Reserve Bank of San Francisco working paper, January 2013.

Ugai, Hiroshi, "Effects of quantitative easing policy: A survey of empirical analyses," *Monetary and Economic Studies*, volume 25, number 1, March 2007.

White, William R., *Ultra easy monetary policy and the law of unintended consequences*, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute working paper number 126, September 2012.

Williams, John C., "Lessons from the financial crisis for unconventional monetary policy," presented at a panel discussion at the NBER Conference in Boston, Massachusetts, October 18, 2013.

Woodford, Michael, *Methods of policy accommodation at the interest-rate lower bound*, paper presented at the Federal Reserve Bank of Kansas City Economic Symposium in Jackson Hole, Wyoming, August 31, 2012.

Woodford, Michael, "Simple analytics of the government expenditure multiplier," *American Economic Journal: Macroeconomics*, volume 3, number 1, January 2011.

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