November 2020

It's Not a Bound; It's an Opinion

Bonds Today | Part 2

Executive Summary

- Bond yields can fall meaningfully, either as a result of a move to negative policy rates or changes in market fundamentals.
- Many common arguments about a lower bound on interest rates are overblown or incorrect.
- The biggest barrier to negative policy rates is policymakers' opinions, which can change.
- While we are not making a market call, the fact that yields *can* fall has an important impact on asset allocation.
- Bonds are still a valuable diversifier.

Jonathan A. Fader
Managing Director

Zachary T. Mees
Executive Director

Michael A. Mendelson
Principal

We thank Jordan Brooks, Jeremy Getson, Pete Hecht, Antti Ilmanen, Derek Jansma, David Kupersmith, William Latimer, Charles E.F. Millard, Yao Hua Ooi, Carlos Pro, Scott Richardson and Dan Villalon for their helpful comments.

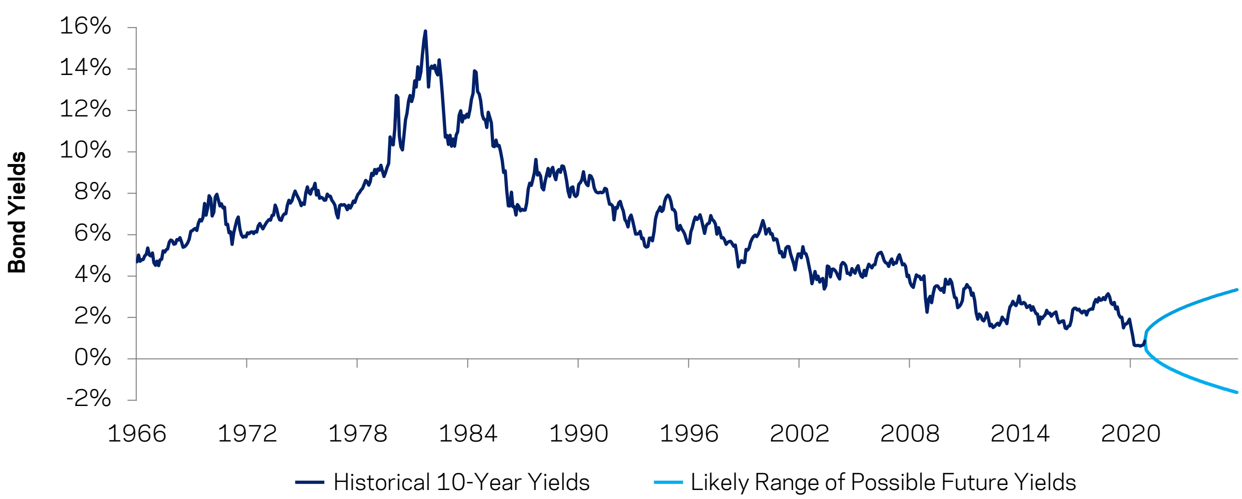
It's Not a Bound; It's an Opinion

Treasury yields have fallen to very low levels, so it's not surprising that many investors are worried about the long-term outlook for bonds. With the risk-free rate sitting near zero, *total return* expectations for bonds (and stocks) have, indeed, necessarily fallen. But is there still potential for bonds to deliver *excess returns* that are comparable with history? Positive carry from the upward-sloping curve may provide some of that, though investors are also wondering about the feasibility of earning capital gains from a meaningful further drop in long-term yields.

One potential catalyst for such a decline in yields might be the adoption of a negative short-term policy rate in the United States.[1] Many are quick to dismiss this notion or to insist that any move below zero could only be a very small one, similar to negative rate policies in Japan (-0.1%) or the Eurozone (-0.5%).[2]

It is worthwhile to examine more closely the purported barriers to negative rates. We believe that the most commonly cited constraint on negative rates – large-scale hoarding of paper money – won't be a constraint at all. In the absence of physical cash-hoarding, there is no insurmountable reason why the Fed can't push rates well below zero. Nevertheless, there may be good reasons why the Fed might not want to adopt even modestly negative rates, let alone significantly negative ones. However, we contend that none of the obstacles to negative rates will stand in the way should policymakers determine, at some point, that rates need to go very low. That brings us back to what's on everyone's mind: yes, there are important upside scenarios for bonds.

Exhibit 1: Can bonds deliver large capital gains? It depends on if yields can fall below zero
U.S. 10-Year yields with range of possible future yields



Source: AQR, Bloomberg. U.S. 10 Year Treasury yields from January 1, 1966 to October 31, 2020. Range of potential yield outcomes is for illustrative purposes only. Past performance is not a guarantee of future performance.

1 Of course, a lower short-term rate could potentially boost bond excess returns from carry as well.
2 Source: Bloomberg. Eurozone and Japan policy rates as of November 11, 2020.

Vaults and Mattresses

Until recently, few people gave serious consideration to the possibility of negative rates. For decades, economists discussed the "zero lower bound" (ZLB) on interest rates, historically viewing it as impenetrable and focusing only on the possibility that central banks might get stuck at zero with no remaining policy ammunition.[3] The insufficiently examined assumption behind the ZLB was that any attempt to push interest rates below zero would unleash a flood of cash-hoarding aimed at avoiding the cost of holding money in bank accounts or financial instruments with negative yields.

Today, a number of countries have slightly negative rates, already disproving the contention that rates are hard-bound at zero. In response, most observers simply shifted their goalposts, arguing cash-hoarding still will arrive but only at a more-negative rate. However, a closer look at the structure of today's financial system makes it clear that the case for cash-hoarding, even at meaningfully negative rates, is overblown.

How the Fed Controls Interest Rates

To understand the behavior of U.S. financial institutions in a negative rate regime, we need to understand how monetary policy in the U.S. operates. The Federal Reserve targets an interest rate known as the fed funds rate, which reflects overnight borrowing and lending of reserves held at the central bank. Since the financial crisis, growth in the Fed's balance sheet has resulted in substantial "excess" reserves, which generate downward pressure on overnight interest rates.* The Fed effectively puts a floor under rates by paying interest on excess reserves (IOER).** Other short-term "risk-free" rates, such as those on Treasury Bills and repurchase agreements, tend to gravitate towards the fed funds rate as these instruments are close substitutes from the perspective of banks and asset managers. These risk-free short-term rates and expectations about their evolution then serve as an anchor for riskier and longer-term rates throughout the financial system.

If the Fed wanted to implement a negative rate policy, they would likely do so by moving the IOER rate below zero. Some argue this might be illegal under current law, which only mentions that the Federal Reserve can "pay" interest on reserves, in which case Congressional involvement would be required, and, we expect, forthcoming. If institutions, particularly banks and asset owners (and their proxies, including money market funds), responded by trying to hold physical cash, the transmission of Fed policy through the financial system might break down as short-term rates failed to move in line with the Fed's negative target.

* Individual banks used to be required to hold a certain quantity of reserves at the Fed. Excess reserves mean that the total quantity of reserves outstanding exceed the combined required reserves of the banking system. In other words, banks have more overnight money than they need, making them eager lenders in risk-free or low-risk instruments such as the fed funds market. In March 2020, the Fed reduced reserve requirements to zero, so now *all* reserves are excess reserves.

** We are simplifying a bit. Fed funds has mostly been *below* IOER in recent years for boring technical reasons.

3 Eggertsson, Woodford 2003 is one of the more influential pieces in this literature, but discussion of the topic goes all the way back to Keynes.

To start, let's divide the U.S. financial system into three broad groups: financial intermediaries (banks), asset owners (e.g., mutual funds and pension funds including, by proxy, their asset managers), and people.[4] The likelihood and implications of cash-hoarding differ starkly among these categories.

Many observers focus excessively on the logistical impediments to cash hoarding. A small bank or money market fund might have billions of dollars in "cash equivalents," meaning mostly T-Bills, corporate paper, and repurchase agreements. $1 billion worth of $100 bills weighs a bit more than 10 tons. The costs involved in storing, insuring, and transporting so much physical currency would be material.[5] Those highlighting the logistical issues then generally concede that the lower bound is not zero, per se, but instead is whatever modestly negative rate causes one to "break even" on the costs of holding cash in a vault. We contend, however, that the expense of safeguarding a cash pile is not the central concern for banks and asset owners considering a move to physical currency.

For one thing, asset owners might view the holding of physical currency as an unacceptable, or at least undesirable, risk. Safely storing and transporting large stacks of paper money has not been part of the job description for fund managers, and any aggressive effort to boost cash returns by taking unusual risk tends to be viewed negatively by end-investors. It seems very unlikely that an asset owner, like an institutional investor, would allow its assets to be subject to the good safekeeping of physical currency by any asset manager.

Just as importantly, financial institutions and asset managers are heavily regulated and will find it difficult to subvert the explicit goals of regulatory bodies such as the Fed. There are several ways regulations could be used to ensure the intended transmission of monetary policy. Limits could be placed on the amount of physical currency held by banks and asset managers. Taxes on cash holdings could mimic the effects of negative rates. Fees could be imposed on large cash transactions. The Fed and the Treasury could actively restrict the availability of large denomination bills, or they may simply not work very hard to meet increased demand.[6] This might have interesting consequences, driving a wedge between the market value of electronic and physical money.[7]

In fact, the Fed has shown recently that it is prepared to push back if it sees financial intermediaries behaving in ways that might disrupt the function of their monetary policy.[8] It is not hard to imagine that the Fed would similarly move to stop regulated entities from hoarding cash in a negative rates scenario.

When it comes to businesses and households, the barriers to hoarding cash are less clear, though likely still substantial. As of mid-2020, households and non-financial businesses held

4 For these purposes, we will follow Mitt Romney's edict that "corporations are people, too."
5 How much is enough?
6 U.S. currency in circulation is currently around $2tn as of October 7, 2020, which sounds like a lot but is a small fraction of the value of bank deposits and money market shares. In 2019, the Bureau of Engraving and Printing produced less than $200bn in currency. At that pace, it would take decades to fully convert bank deposits into physical form. In other words, attempts to move from electronic to physical money would require a tremendous increase in currency production, and policymakers would not necessarily feel inclined to cooperate.
7 Based on Gresham's law, one might expect physical currency to disappear from circulation.
8 A good example is "The Narrow Bank" (TNB), a proposed bank that would have done only two things: accept deposits from institutions and then park the money at the Fed to earn IOER. While this might sound innocuous, a bank that can offer risk-free deposits in unlimited size at interest rates close to IOER threatened to be too strong a competitor for existing short-term investment options such as T-bills and repo. The Fed rejected TNB's application on the grounds that it might "complicate the implementation of monetary policy" and "could also have a negative effect on financial stability." S&P Global: "'Narrow bank' challenges traditional industry model, but Fed pushes back," 3/27/2019.

nearly $13 trillion in time and savings deposits and several trillion dollars more in checking deposits and money market funds.[9] The likelihood of large-scale cash-hoarding among these groups is hard to assess, but there are reasons to think this might not be a practical workaround for negative rates.

First off, checking accounts clearly offer benefits outside of earning interest. Indeed, many households currently pay for checking accounts, whether through monthly fees, ATM charges, or other items. Businesses with large transaction volumes are unlikely to see cash as a useful option.[10] A negative interest rate probably wouldn't drive large-scale abandonment of checking accounts.

Savings accounts and certificates of deposit (CDs), however, are more explicitly oriented towards generating interest income. Would a negative rate induce households to withdraw their money? Possibly, but by no means definitely. One reason to be skeptical is that people don't seem to care that much about maximizing interest payments on these accounts. For example, an early 2019 survey (back when rates on many online savings accounts and T-Bills were well above 2%), found that only one-in-seven respondents was earning above 2% on her savings account.[11] More tellingly, 20% of respondents were getting less than 1% and a whopping 24% said they were earning zero. Since the switching cost of moving from one savings account to another is certainly lower than the cost of storing physical cash, savers, who have already demonstrated a willingness to forgo a 1-2% interest rate pickup through simple means, are likely to shrug and leave their money in the bank even at a meaningfully negative interest rate.[12] Consideration of the safekeeping risk makes the case even stronger.

Another reason to be less concerned about cash-hoarding among households and businesses is the experience of Switzerland. Overnight interest rates in Switzerland (-0.75% today) have been the world's lowest since January 2015. Switzerland also happens to offer the world's most convenient cash-hoarding denomination, the 1000 franc note (worth about $1100 today).[13] The Swiss franc would then seem to be a prime candidate for cash-hoarding, but in 2019 the Swiss National Bank (SNB) reported that there hasn't been a radical change in banknote demand.[14] While there are scattered stories of individuals withdrawing large quantities of cash, most have been deterred by the cost and hassle of safeguarding paper money as well as fear of scrutiny from authorities should they try to redeposit stacks of cash in the future.[15]

Indeed, if we look more broadly at quantities of physical cash in circulation, we do not find any tendency toward higher paper currency demand in countries with negative rates. Because central banks typically supply bills in whatever quantities are demanded by the public, growth in currency outstanding should accelerate if people pull their cash from the

9 Federal Reserve as of 11/11/2020.
10 In fact, an ECB working paper "Is there a zero lower bound? The effects of negative policy rates on banks and firms" found that "sound banks pass on negative rates to their corporate depositors without experiencing a contraction in funding."
11 Bankrate: "Survey: Nearly 7 in 10 Americans could easily boost their savings by banking online," 5/23/2019. https://www.bankrate.com/banking/savings/online-savings-survey-may-2019/
12 Behavioral economists might object here, noting that people may be more willing to give up a gain than to accept a loss of equal magnitude. If correct, then households might be more attentive to yield maximization in a negative rate world than a positive one. As we will argue below, however, there is little evidence of this so far in the countries where rates are already negative.
13 As of 11/18/2020, one Swiss franc was worth $1.0990, pricing from Bloomberg.
14 President Thomas Jordan noted in a speech that "the experience of the last four years has shown that there wasn't a radical change in demand for banknotes." Bloomberg: "SNB Hasn't Seen Surge in Cash Demand With Onset of Negative Rate," 9/3/2019.
15 CNN: "The rich have had enough of negative interest rates. Some are pulling cash out of Swiss banks," 1/23/2020.

banking system en masse. As Exhibit 2 shows, however, the countries where rates have been negative for all or part of the last five years have actually seen somewhat slower growth in physical cash outstanding than countries with strictly positive rates.

Exhibit 2: Demand for cash has grown more slowly in negative rate markets

Average growth rate in physical cash and coin in circulation since 2016 by G10 currency

Source: AQR, Bloomberg, IMF, Reserve Bank of New Zealand. January 1, 2016 to September 30, 2020. The amount of physical cash and coin in circulation sourced from central bank and IMF data available on Bloomberg with the exception of New Zealand which was sourced directly from the Reserve Bank of New Zealand. Annual seasonality in the amount of physical currency was adjusted by taking the average within each calendar year. 2020 is a partial year through September 30th. The growth rate is the average of the annual growth rates from 2016-2020. Negative rate countries are those which have had policy rates below zero at some point since 2016, while positive rate countries have remained at or above zero. Data is subject to change at any time without notice.

Crying All the Way to the Bank

The Swiss experience suggests rates of -0.75% are not sufficient to create cash-hoarding on a disruptive scale. However, there is one important caveat: Swiss banks (and their peers in the Eurozone, where rates are -0.5%) often choose not to pass along negative rates to all of their customers, particularly small depositors. Rightly or wrongly, these banks are acting as if negative rates would lead to deposit flight (from hoarding or switching to another bank) or too much bad publicity. Instead, they are choosing to take a hit to their lending margins.

This in turn has created concerns that sub-zero rates could impact the profitability of banks and ultimately, their ability to lend and help grow economies. If banks are funding themselves with expensive zero-yielding deposits and holding assets with low or negative yields, the incentive to lend could disappear. In the last few years, economists and policymakers have begun to discuss a concept called the "Reversal Rate." The idea is that there is some level of negative rates at which reduced bank profitability leads to tighter financial conditions more broadly. A much-discussed 2019 working paper put forward an economic model of this phenomenon and estimated that the reversal rate might be around -1% in the Eurozone.[16]

16 Brunnermeier, Koby 2019.

However, this model lacked a number of real-world considerations, notably policies specifically designed by central banks to mitigate the impact of negative rates on banks. One popular approach, embraced by the European Central Bank (ECB), the SNB, and the Bank of Japan, is to charge a negative rate on only a portion of the reserves held by banks.[17] The idea is to provide each bank an allowance of reserves that will be remunerated at zero before the negative rate kicks in on incremental deposits. The goal is to make the marginal overnight interest rate negative, while significantly softening the hit to banking sector profits. However, this type of policy does not necessarily ensure that banks remain incentivized to make new loans.

Another approach, which may do more to encourage continued loan growth is for the central bank to provide long-term funding to banks at rates close to the negative policy rate. Should negative rates begin to erode the deposit base of the banking system, the central bank can effectively step in and replace the funding directly. The ECB has been a pioneer on this front, offering banks an increasingly generous series of refinancing operations at negative rates in recent years. If done at a sufficient scale, these policies should be able to keep the banking system functioning in a healthy fashion even if some households and small businesses decide they prefer cash in a mattress over deposits at a bank.

Finally, banks can just pass through the negative rates to depositors, as they are showing an increasing willingness to do in Europe.[18] If and when negative policy rates move far below deposit rates, the competitive pressure among banks to protect retail savers will surely diminish. It may well turn out that slightly negative rates are the worst case for banks, as offering zero interest rate deposit accounts is painful but nevertheless viable and forced by competition. Should rates go much lower, the implausibility of continuing to do that may be a big help as competing banks can no longer afford to subsidize their customers.

Meanwhile, lending data from Switzerland and the Eurozone offer little evidence that negative rates are disrupting the normal function of the banking system. Loan books have continued to grow in both places and average interest rates have fallen.[19]

Breaking the Buck

The discussion above has been fairly universal and applies to any country considering negative rates. However, some argue that the U.S. would face special challenges in moving towards negative rates. These arguments usually center on the U.S. money markets – i.e. short-term borrowing and lending of U.S. dollars – a uniquely large and complex domain which plays a central role in the global financial system.[20] Over $4 trillion currently sits in money market funds, which are a critical source of financing for the U.S.

17 People often call this "deposit tiering."
18 Financial Times. "Most German banks are imposing negative rates on corporate clients", 11/18/2019.
19 Swiss National Bank, European Central Bank. 8/31/2020.
20 The U.S. dollar remains the most important reserve currency globally and it is widely used for payment purposes and as a store of value outside of U.S. borders. Foreign governments and financial institutions borrow and lend in U.S. dollars to a degree not rivaled by any other currency.

government, U.S. and international banks, and other borrowers.[21]

There are operational and regulatory barriers to negative rates in money market funds, but these seem easily broken down.[22] More importantly, though, there is a clear hesitance on the part of the Federal Reserve to take actions that might upset this crucial ecosystem.[23] While it is understandable that policymakers might be risk averse in this context, it is far from certain that negative rates would be destabilizing to U.S. money markets.

Concerns that investors would flee from negative-yielding money markets presuppose that those investors will have other convenient places to park their money at non-negative rates. As we have already discussed, this is unlikely to be the case for most investors. In the Eurozone, assets in money market funds have risen modestly in the years since rates first fell below zero.[24] We suspect that the European experience and careful consideration of the likely behavior of money market investors might help the Fed overcome its concerns.

People Come and Policies Go

While we have argued that the obstacles to negative rates in the U.S. all can be overcome by sufficiently determined policymakers, the fact remains that the current leadership of the Fed has not looked fondly on this policy tool. Chair Powell has repeatedly ruled out negative rates, and there do not appear to be any strong advocates elsewhere on the board or among the regional Fed presidents.[25]

It is important to remember, however, that people have changes of heart,[26] and institutions have changes of personnel. The U.K., another country where rates have spent a lot of time just above zero in recent years, provides a useful illustration. In 2019, then-Governor of the Bank of England (BoE) Mark Carney said "at this stage we do not see negative rates as an option here. I am not criticising others that have used them, but we don't see it as an option."[27] But Governor Carney's term ended in March, and the BoE sounds quite different today. Under new Governor Andrew Bailey, negative rates "are part of our toolbox, but at the moment we do not have a plan to use them."[28] According to recent reports, the BoE is making sure U.K. banks are operationally ready[29] for negative rates.[30] Perhaps tellingly, U.K. Gilts with maturities up to around 4 years now have yields below zero.

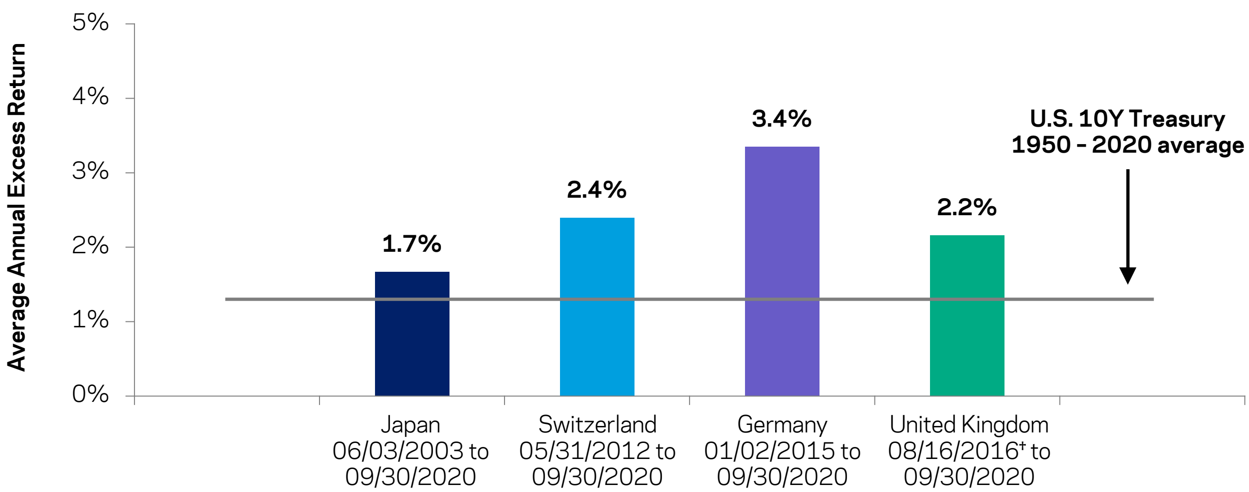
21 Federal Reserve. 10/2/2020.
22 Most money fund assets currently sit in funds with a fixed NAV. To deliver negative yields, these funds would need to either adopt floating NAVs or allow share cancellations. This issue gets mentioned a lot but does not seem difficult to overcome. Similarly, people will sometimes mention that Treasury Bill auctions currently do not allow bids above par, i.e. negative rates at auction. This just appears to be a choice by the Treasury Department, so we are burying it all the way at the end of this footnote.
23 This stems partly from the recent memory of the Global Financial Crisis, when one money market fund "broke the buck" due to Lehman-related losses, a development that sparked a catastrophic run on money market funds. Arguably, it was the abrupt flight of capital from money market funds that brought about the most severe stress in global financial markets at the end of 2008.
24 European Central Bank. 8/31/2020.
25 Bloomberg: "Powell Pushes Back Against Possibility of Negative Fed Rates," 5/13/2020.
26 Especially when confronted with new data domestically or from abroad.
27 Reuters: "BoE's Carney says negative rates not an option for UK: Central Banking," 8/19/2019.
28 Reuters: "Negative rates in the toolbox, no plans to use them for now: BoE's Bailey," 8/6/2020.
29 In other words, they want banks to make sure their software can handle negative values in places like interest accrual computations.
30 Wall Street Journal: "Bank of England Questions Lenders on Readiness for Negative Rates," 10/12/2020.

Fed Chair Powell has shown himself to be a flexible thinker about policy since he took office as chair in 2018. If rates are stuck at zero for a long time, and the economic outlook were to deteriorate, he might well find himself revisiting the arguments for and against negative rates. Importantly, Chair Powell's term is also set to end in 2022, and he might be replaced by a new Chair who is eager to embrace negative rates.

Bottom Line: There Is No Bottom Line

This March, U.S. 10-year yields hit an all-time low of 0.50% (and are 0.88%,[31] as we write). If we look back to see how bond investors fared in other countries after reaching the same level, we find (Exhibit 2) that they happened to have been well compensated. In fact, they earned more excess return than 10-year U.S. Treasuries have earned on average over the past 70 years. The reason they delivered these outsized gains is, in part, due to their central bank's willingness to move policy rates slightly below the presumed bottom line, zero.[32] Today, central banks have varying views on the best ways to achieve accommodative policy, but they all want accommodative policy. Some are more open to cutting interest rates while others continue to seek alternative ways to stimulate. Both approaches can be good for bond returns (and have been thus far).[33]

Exhibit 3: There has been plenty of upside for bonds that had yields lower than the U.S. lows
Average excess bond returns since their yield fell to the lowest level of U.S. 10-year yields (0.50%)



† The U.K. 10-year Gilt yield reached an intra-day low of 0.50% on August 15, 2016.

Source: AQR, Bloomberg, Datastream, Global Financial Data. Average annual excess returns for each country from the date indicated when the 10-year government bond yield reached 0.50% through September 30, 2020. The long-term U.S. 10-year Treasury return is the average annual excess return from January 1, 1950 to September 30, 2020. Returns are excess of each country's respective 3-month government bill return. Performance data quoted does not reflect the deduction of fees. If reflected, the fees would reduce the performance quoted. Past performance is not a guarantee of future performance.

31 Bloomberg. 11/18/2020.
32 Or signal the possibility of moving rates negative, in the case of the U.K.
33 Positive carry has played an important role as well, as low policy rates in these countries were generally accompanied by relatively steep yield curves.

While negative policy rates do not appear likely in the U.S. in the immediate future, we think it would be a mistake to assume they will not happen in the longer term. Further, it's important to remember that changes in short-term interest rates are by no means the only determinant of bond market performance. Yield curve movements reflect expectations for economic growth, inflation and risk aversion. Monetary policy may indeed serve as an anchor for bond yields, but the anchor line is long.

It is not hard to envision economic scenarios that could result in lower bond yields. For example, an increased risk of slower than expected post-pandemic recovery or the lack of fiscal support to provide necessary aid during this downturn would put downward pressure on bond yields. A slow recovery for labor markets could weigh on wage inflation and aggregate demand, potentially pushing yields lower. More structurally, declines in labor productivity and population growth that dampen the real expected return of capital would reduce real long-term bond yields. If any of these scenarios were to materialize, bond yields would likely decline regardless of whether the Fed reacts by cutting short-term rates.[34]

If bond investors are patient (and bond-investors usually seem to be patient types) there may still be significant upside scenarios for Treasuries. Contrary to widespread claims, the distribution of future bond returns is not one-sided despite historically low yields.[35] This is not meant as a tactical call – the next short-term move in bond markets could be up or down – but rather as a warning not to be too hasty in reconsidering the strategic role of bonds in a diversified portfolio. Treasuries can still deliver not only returns from carry and rolldown in quiet times, but also outperformance in periods of equity market weakness, economic pessimism, and deflationary sentiment. The same cannot be said of any other asset put forward as a potential substitute for bonds. Furthermore, while it is not a necessary precondition for positive returns, the possibility of negative short-term rates means that large bond market rallies may still be in our future.

34 And can you really picture the Fed doing nothing in these states of the world?
35 This is not to deny that there could be some level of bond yields, likely well below zero, at which further gains appear more dubious. Rather, we would paraphrase Aragorn from *The Lord of the Rings* by saying: "a day may come when [the return potential of bonds] fails… but it is not this day."

Disclosures

This document has been provided to you solely for information purposes and does not constitute an offer or solicitation of an offer or any advice or recommendation to purchase any securities or other financial instruments and may not be construed as such. The factual information set forth herein has been obtained or derived from sources believed by the author and AQR Capital Management, LLC ("AQR") to be reliable but it is not necessarily all-inclusive and is not guaranteed as to its accuracy and is not to be regarded as a representation or warranty, express or implied, as to the information's accuracy or completeness, nor should the attached information serve as the basis of any investment decision. This document is intended exclusively for the use of the person to whom it has been delivered by AQR, and it is not to be reproduced or redistributed to any other person. The information set forth herein has been provided to you as secondary information and should not be the primary source for any investment or allocation decision.

Past performance is not a guarantee of future performance

This presentation is not research and should not be treated as research. This presentation does not represent valuation judgments with respect to any financial instrument, issuer, security or sector that may be described or referenced herein and does not represent a formal or official view of AQR.

The views expressed reflect the current views as of the date hereof and neither the author nor AQR undertakes to advise you of any changes in the views expressed herein. It should not be assumed that the author or AQR will make investment recommendations in the future that are consistent with the views expressed herein, or use any or all of the techniques or methods of analysis described herein in managing client accounts. AQR and its affiliates may have positions (long or short) or engage in securities transactions that are not consistent with the information and views expressed in this presentation.

The information contained herein is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Charts and graphs provided herein are for illustrative purposes only. The information in this presentation has been developed internally and/or obtained from sources believed to be reliable; however, neither AQR nor the author guarantees the accuracy, adequacy or completeness of such information. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to be relied on in making an investment or other decision.

There can be no assurance that an investment strategy will be successful. Historic market trends are not reliable indicators of actual future market behavior or future performance of any particular investment which may differ materially, and should not be relied upon as such. Target allocations contained herein are subject to change. There is no assurance that the target allocations will be achieved, and actual allocations may be significantly different than that shown here. This presentation should not be viewed as a current or past recommendation or a solicitation of an offer to buy or sell any securities or to adopt any investment strategy.

The information in this presentation may contain projections or other forward-looking statements regarding future events, targets, forecasts or expectations regarding the strategies described herein, and is only current as of the date indicated. There is no assurance that such events or targets will be achieved, and may be significantly different from that shown here. The information in this presentation, including statements concerning financial market trends, is based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons. Performance of all cited indices is calculated on a total return basis with dividends reinvested.

Diversification does not eliminate the risk of experiencing investment losses. Broad-based securities indices are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index.

The investment strategy and themes discussed herein may be unsuitable for investors depending on their specific investment objectives and financial situation.

Neither AQR nor the author assumes any duty to, nor undertakes to update forward looking statements. No representation or warranty, express or implied, is made or given by or on behalf of AQR, the author or any other person as to the accuracy and completeness or fairness of the information contained in this presentation, and no responsibility or liability is accepted for any such information. By accepting this presentation in its entirety, the recipient acknowledges its understanding and acceptance of the foregoing statement.

The data and analysis contained herein are based on theoretical and model portfolios and are not representative of the performance of funds or portfolios that AQR currently manages.

Gross performance results do not reflect the deduction of investment advisory fees, which would reduce an investor's actual return.

AQR Capital Management, LLC is exempt from the requirement to hold an Australian Financial Services License under the Corporations Act 2001 (Cth). AQR Capital Management, LLC is regulated by the Securities and Exchange Commission ("SEC") under United States of America laws, which differ from Australian laws. Please note that this document has been prepared in accordance with SEC requirements and not Australian laws.

Canadian recipients of fund information: These materials are provided by AQR Capital Management (Canada), LLC, Canadian placement agent for the AQR funds.

www.aqr.com

AQR Capital Management, LLC Two Greenwich Plaza, Greenwich, CT 06830 **P** +1.203.742.3600 **F** +1.203.742.3100