Invited Editorial

Negative interest rates: Causes and consequences

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ABSTRACT As of mid-2016, almost one-third of global economy has been affected by negative interest rates. Nevertheless, the prevailing opinion among influential policymakers has been that the nominal interest rates are essentially zero-bound. Thus, it's not really clear what caused the recent breach of the zero percent level in many countries, and further, whether the US economy will also experience negative nominal interest rates. This article explains the following: (1) the arguments for the zero-bound on nominal interest rates, (2) the causes of the breach of the zero percent level, and (3) the implications for investors.

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INTRODUCTION

Bernanke (2012) argues that nominal interest rates are “zero-bound” – essentially ruling out the possibility of negative nominal interest rates. Yet, as of mid-2016, the government bonds reflecting about one-third of global economy had negative nominal interest rates (the Euro area, Japan, Sweden, Denmark, and Switzerland). So, what is causing the negative nominal interest rates on these government bonds, and more importantly what are the consequences for investors?

In this article, we first explain the Bernanke's (2012) “zero bound” arguments. Next, we attempt to explain the reasons for the apparent breach of the “zero” level on nominal interest rates. Our analysis specifically focuses on the yield curve spread, or the difference between the long-term interest rates and the short-term interest rates.

Finally, we discuss the implications for investors.

BERNANKE'S ZERO-BOUND ON INTEREST RATES

Ben Bernanke (2012) in his speech: “Deflation – Make sure it does not happen here” argues that nominal interest rates are zero-bound:

Deflation of sufficient magnitude may result in the nominal interest rate declining to zero or very close to zero. Once the nominal interest rate is at zero, no further downward adjustment in the rate can occur, since lenders generally will not accept a negative nominal interest rate when it is possible instead to hold cash. At this point, the nominal interest rate is said to have hit the zero bound.

However, Bernanke (2012) also acknowledges the risks associated with the zero or near-zero nominal interest rate level, specifically questioning the Central Bank's ability to further stimulate the economy in such an environment:

Deflation great enough to bring the nominal interest rate close to zero poses special problems for the economy and for policy. First, when the nominal interest rate has been reduced to zero, the real interest rate paid by borrowers equals the expected rate of deflation, however large that may be.... Although deflation and the zero bound on nominal interest rates create a significant problem for those seeking to borrow, they impose an even greater burden on households and firms that had accumulated substantial debt before the onset of the deflation.... Beyond its adverse effects in financial markets and on borrowers, the zero bound on the nominal interest rate raises another concern – the limitation that it places on conventional monetary policy.... It is true that once the policy rate has been driven down to zero, a central bank can no longer use its traditional means of stimulating aggregate demand and thus will be operating in less familiar territory.

Further, Bernanke (2012) lists several alternative monetary policy tools that can be successful in stimulating economy and defeating the deflation, even when the nominal interest rates are at (or near) zero percent:

...the Fed could also attempt to cap yields of Treasury securities at still longer maturities, say three to six years. Yet another option would be for the Fed to use its existing authority to operate in the markets for agency debt (for example, mortgage-backed securities issued by Ginnie Mae, the Government National Mortgage Association)....the Fed might next consider attempting to influence directly the yields on privately issued

securities... Although a policy of intervening to affect the exchange value of the dollar is nowhere on the horizon today, it's worth noting that there have been times when exchange rate policy has been an effective weapon against deflation.

WHAT CAUSES SYSTEMATIC DEFLATION?

Bernanke (2012) argues these two key points: (1) negative nominal interest rates are caused by systematic deflation; however (2) even when facing the significant deflationary pressures, the zero level on nominal interest rates should still hold, because the Central Banks have alternative policy tools to stimulate economy and boost inflationary expectations, and thus making it unnecessary to experiment with the negative interest rates.

But, what causes such broad-based systematic deflation, significant enough to warrant the implementation of extraordinary alternative policy tools to defend the zero nominal interest rate level? Generally, inflation (deflation) is a function of supply and demand for aggregate goods/services. Thus, any fundamental imbalance in supply/demand can technically cause falling prices, or deflation.

Bernanke (2012) discusses deflation primarily from the demand point of view, and suggests that systematic deflation is possible only in case of sudden and persistent drop in demand:

Deflation is in almost all cases a side effect of a collapse of aggregate demand – a drop in spending so severe that producers must cut prices on an ongoing basis in order to find buyers. Likewise, the economic effects of a deflationary episode, for the most part, are similar to those of any other sharp decline in aggregate spending – namely, recession, rising unemployment, and financial stress.

However, in the footnotes of his speech, Bernanke (2012) also acknowledges the supply-side explanation of deflation:

Conceivably, deflation could also be caused by a sudden, large expansion in aggregate supply arising, for example, from rapid gains in productivity and broadly declining costs. I don't know of any unambiguous example of a supply-side deflation, although China in recent years is a possible case. Note that a supply-side deflation would be associated with an economic boom rather than a recession.

Consistent with Bernanke (2012), the discussion on negative interest rates and the appropriate alternative monetary policy tools focuses primarily on demand-side explanation of systematic deflation, which we believe is a serious oversight (see for example Danthine, 2013; Goyal and McKinnon, 2003; Ilgmann and Menner, 2011; Bassetto, 2004; Perold, 2012; Cecchetti, 1988; Kimball, 2015). More importantly, the alternative monetary policy tools designed to boost inflationary expectations at the zero percent nominal interest rate level can only be successful if the underlying deflationary causes are based on demand-side issues. However, as we later explain, these alternative policy tools are ineffective if the underlying deflationary pressures are based on supply-side issues. This, within such scenario, the Bernanke's zero-bound level would in fact be breached.

LONG-TERM INTEREST RATES, SHORT-TERM INTEREST RATES, AND THE YIELD CURVE SPREAD

To fully develop the discussion on negative interest rates, it is important to understand the difference between (a) the nominal longer term interest rates, and (b) the nominal short-term interest rates. More importantly, it is important to understand the macroeconomic importance embedded in the yield curve spread, or difference between

the longer term interest rates and the short-term interest rates.

Long-term interest rates

Long-term interest rates, such as the yield on 10-year T-bond, reflect (a) the real rate of interest and, (b) the long-term inflationary expectations or inflation premium, as illustrated in equation (1).

$$\begin{aligned} \text{Nominal longer term interest rate} \\ = \text{Real interest rate} + \text{inflation premium} \end{aligned} \quad (1)$$

Thus, market participants (such as financial institutions and investors) can use long-term government bonds to hedge inflation within their portfolios. As a result, since the long-term interest rate is primarily set by market participants, it is considered to be a market rate, which reflects longer term inflationary expectations

Mathematically, it is obvious that the nominal interest rates can turn negative if expected negative inflation (or deflation) exceeds the real rate of interest. In such a scenario, investors would still have an incentive to invest in long-term government bonds with negative nominal yields, as the real rate of interest remains positive.

Short-term interest rates

On the other hand, short-term interest rates (with maturities less than 1 year) are all significantly influenced by the Central Bank's interest rate policy, or broader monetary policy. For example, the Federal Reserve uses the Federal Funds rate to set the short-term interest rates to the level appropriate to reach the monetary policy objectives such as inflation targeting – or ensuring a stable longer term inflationary expectations of around 2 per cent annually. Thus, unlike the long-term interest rates, the short-term interest rates are not market rates – they are influenced by the Central Banks as a monetary policy tool. Thus, a negative short-term interest rate

Figure 1: US long-term interest rates: 10Y T-bond yields.

reflects a monetary policy strategy to deliberately boost inflationary expectations in an extraordinary situation when the market participants anticipate very low or negative longer term inflation, as reflected in long-term interest rates. Immediately, the relationship between the long-term interest rates (which reflect expected inflation) and the short-term interest rates (which reflect desired inflation) becomes immensely important.

The yield curve spread

The yield curve spread is the difference between the long-term interest rates and the short-term interest rates (equation (2)). Given that long-term interest rates reflect the market's inflationary expectations and short-term interest rates reflect the monetary policy, the short-term interest rates and the long-term interest rates can be moving in a different direction, depending on effectiveness of monetary policy in managing inflation. Thus, the yield curve spread is the key leading economic indicator that reveals struggle between the inflationary expectations and inflation targeting, and thus, significantly affects the business cycle.

Yield curve spread =

$$\begin{aligned} &\text{Nominal yield on 10-year T-bonds} \quad (2) \\ &- \text{The Federal Funds rate} \end{aligned}$$

Generally, a widening yield curve spread stimulates the economic growth through credit expansion, while narrowing yield curve spread restrains the economic growth through credit contraction. Specifically, since banks borrow funds at the short-term rate, and lend to consumers at the longer term rates, the bank profits increase as the yield curve spread widens, which encourages more bank lending, and stimulates economic growth. Similarly, as the yield curve flattens or inverts, banks are less likely to lend, which negatively affects the economy. Thus, central banks are able to affect the business cycle by effectively managing the yield curve spread, or setting the short-term interest rates in relation to the level of long-term interest rates. It is important to emphasize that the actual level of long-term interest rates is the key predictor of an eventual level of short-term rates during the monetary policy implementation stage, as central banks specifically target the yield curve spread in managing the business cycle.

ANALYSIS OF LONG-TERM INTEREST RATES

Figure 1 shows the historical data on 10-year T-Bond yield, which is a base for all long-term interest rates. A visual analysis of Figure 1

Figure 2: Effective federal funds rate (gray), US 10 T note yield (black).

clearly shows: (a) the trend of rising long-term interest rates from early 1960s to early 1980s, (b) and the trend of falling long-term interest rates from early 1980s to current.

The period from early 1960s to early 1980s, which many define as the Great Inflation, was characterized with different demographic and geopolitical events, all of which caused significant inflationary pressures (Tokic, 2008). Specifically, the entrance on baby-boomers into labor force affected the aggregate demand, while geopolitical situation related to energy markets affected the aggregate supply. As a result, during this period, the nominal interest rates on 10Y T-Bonds were increasing, primarily reflecting increasing inflationary expectations.

The demographic pressures eased in early 1980s, as the last generation on baby-boomers entered the labor force, which lessened the demand-side inflationary pressures. Additionally, in early 1980s, the US has begun to implement new policies designed to boost international trade. These policies specifically aimed to expand the global production capacity by outsourcing manufacturing to emerging markets abundant with cheap labor, which essentially

commenced the new wave of globalization. These combined events ended “the Great Inflation” period and started what some define as the period of “the Great Moderation,” or the new trend of falling long-term nominal interest rates reflecting decreasing inflationary expectations.

Note, the trend of falling long-term interest rates is still intact as of 2016, in a clear path to the zero percent level. Also notice, the zero percent level has already been broken in developed markets countries such Germany, Switzerland, and Japan. Thus, the question is whether the US long-term rates will also breach into the negative territory as well?

ANALYSIS – SHORT-TERM INTEREST RATES

Figure 2 shows the Effective Federal Funds rate, which is the benchmark for all short-term interest rates in the US. In fact, the Federal Funds rate is a monetary policy tool used by the Fed to accomplish the dual mandate of inflation targeting and full employment. A visual analysis of Figure 2 indicates that the long-term rates and the short-term rates are highly correlated and follow the same trend. However, the Federal

Figure 3: The yield curve spread (US 10-year treasury note yield – effective federal funds rate).

Funds rate is more volatile and it zigzags around the long-term interest rate, as monetary policy objectives change. Specifically, we observe three major interest rate tightening cycles during “the Great Inflation” period when the Fed exceeded the long-term rates to rein-in the runaway inflation, and five interest rate tightening cycles during “the Great Moderation” period when rising short-term rates were generally met by the falling long-term interest rates, which reflected the trend of decreasing long-term inflationary expectations. Note, the short-term interest rate reached the “zero-bound” in 2009, and remained near the zero percent level until 2016. The question is whether the Fed will have to implement the negative interest rate policy in the future (similar to Japan and the Euro area), despite Bernanke (2012) zero-bound arguments.

ANALYSIS – THE YIELD CURVE SPREAD

As previously discussed, since the long-term interest rate reflects inflation expectations and the short-term interest rate reflects inflation targeting, these rates can temporary go in an

opposite direction, as we in fact frequently observe in Figure 2. The relationship between the long-term rates (10-year T-Bonds) and the short-term rates (Federal Funds rate) is best visible by observing the yield curve spread, or the difference between these two rates (Figure 3).

As previously mentioned, the Fed sets the short-term interest rate to accomplish the inflation target objectives mainly by controlling credit creation, which also creates the business cycle. In fact, the visual inspection of Figure 3 clearly identifies each business cycle during the data time frame. Specifically, every recession since 1960s has been preceded by the so-called inverted yield curve, or negative yield curve spread, when the short-term interest rates are higher than the long-term interest rates. During these episodes, banks find it difficult to make lending profits, and tight credit conditions eventually lead to a recession. The Federal Reserve eventually lowers the short-term interest rates below the long-term interest rates, creating a normal yield curve, which essentially ends the recession as banks resume with lending. Somewhere near the middle of the expansionary cycle, the yield curve

spread begins to narrow, until it eventually inverts and causes another recession.

As a very important observation, Figure 3 also shows that the yield curve spread generally reaches the 2.5 per cent level (or higher) right after the recession. In other words, the Federal Reserve has generally lowered the Federal Funds rate to be at least 2.5 per cent lower than the 10Y T-Bond yields to create a highly accommodative monetary level necessary to restart the expansionary cycle, or to encourage the banks to lend. With this observation in mind, we might be able to explain the negative interest rate policy.

WHAT CAUSES THE NEGATIVE INTEREST RATE POLICY?

To re-emphasize to previously raised point, the actual level of long-term interest rates determines the eventual level of short-term rates during the monetary policy implementation stage, given that the Fed specifically manages the yield curve spread to influence the business cycle and inflation targets. Thus, as also previously observed, the Federal Funds rate apparently has to be at least 2.5 per cent lower than the 10-year T-Bond yield to stimulate the credit creation and restart the new economic growth cycle. For example, during the recession of 2001, the long-term rates were around 3.5 per cent at the lowest point, which allowed the Fed to lower the short-term rate to 1 per cent. During the 2008 recession, the long-term rates were around 2.5 per cent on the low side, which allowed the Fed to cut the short-term interest rates to near 0 per cent.

However, if the next recession starts while the yields on 10-year T-Bonds are significantly below 2 per cent, the Fed will likely be forced to lower the short-term rates below 0 per cent to at least create an illusion of a highly accommodative yield curve spread. Failure to implement a negative interest rate policy in such an environment will be reflected in an unusually narrow yield curve spread, or

permanently tight lending conditions unlikely to restart the new growth phase.

Nevertheless, it is questionable how or whether the negative interest policy would work in practice? Technically, the negative interest policy can be successful in boosting lending under the proper framework. For example, the central bank could deposit funds at banks by buying money market instruments with negative interest rate, while banks would lend these deposits to public at attractively low interest rates. Essentially, these would be subsidized loans, where a borrower would, for example, pay a 1 per cent nominal interest rate on mortgage loan to the bank, and the central bank would pay for example 1 per cent to the bank by buying the negative interest money market instruments. In total, the bank would earn 2 per cent net profit on the loan, with 1 per cent paid by the borrower, and 1 per cent paid by the central bank. Note, this is just a simple example, and it is important to significantly extend the discussion on lending frameworks under the negative interest rate policy.

Thus, the negative interest rate policy is a function of the given level of long-term interest rates. As long as long-term interest rates are significantly below 2 per cent at the onset of a recession, the central bank has to consider a negative interest rate policy to ensure an accommodative yield curve spread. As long-term rates approach zero percent, the negative interest rate policy becomes a necessity; otherwise the economy faces a permanently tight credit conditions, and thus, possibly a permanent recession. Thus, the key issue becomes, what causes a near-zero or sub-zero long-term interest rates?

WHAT CAUSES NEGATIVE OR NEAR-ZERO LONG-TERM INTEREST RATES?

Based on equation (1), as the rate of deflation approaches (exceeds) the real interest rate, the nominal interest rate approaches (breaches)

the zero percent level. Further, given the observation that the trend of falling long-term interest rates since 1980s is still intact and approaching the zero percent level, it is important to discuss the underlying causes of long-term diminishing inflationary expectations that have potentially evolved into deflationary pressures. Based on Bernanke (2012), deflation can be caused by demand-side issues and/or supply-side issues.

The demand-side arguments are related to deflationary pressures that emerge as certain asset prices collapse (such as the stock market crash, the housing market crash, or even the collapse of commodity prices) as well as when the credit markets tighten due to widespread defaults in corporate or consumer sectors. These events can cause significant drop in demand, which can further cause higher unemployment and kick-start the vicious cycle of deflation. The Great Depression of 1930s is a good historical example of demand-side deflation. Nevertheless, Bernanke (2012) is confident that there are “alternative tools” specifically designed to boost the asset prices (primarily via quantitative easing), which can successfully counter the demand-born deflationary pressures and restore the supply/demand balance. Thus, Bernanke (2012) is confident that nominal interest rates are “zero bound.” In fact, there have been many asset price collapses in a recent history, starting with the 2000 stock market crash, the 2008 housing price crash, the 2014 oil price crash, and in all cases, the Fed has successfully managed to boost inflationary expectations in the short term. Yet, the trend in long-term interest rates continues to approach the zero percent level in a clear downtrend. Thus, while demand-side monetary tools can restore the demand/supply balance in the short term, they appear to be inefficient in the long term.

The supply-side deflation arguments are related to the imbalance between the aggregate global demand/supply due to the globally abundant production capacity

(production capacity in excess of demand). Note, the trend of falling nominal 10-year T-Bond yields started in early 1980’s with the new wave of globalization or the trend of outsourcing manufacturing to emerging markets, particularly China. Over the next 35 years, the production capabilities of China and other emerging markets significantly grew, which provided the boost to global economy via lower inflation and higher real economic growth. However, this wave of globalization has potentially run its course, as the global production capacity now possibly exceeds the global demand. As a result, there is potentially an imbalance in supply and demand – a scenario in which China and other emerging markets now export deflation to the rest of the world. Thus, the trend of diminishing inflationary expectations since early 1980s has likely evolved into a deflationary trend. More importantly, central banks are not able to counter the supply-side deflationary pressures in longer term. Consequently, the trend of falling US long-term interest rates is likely to continue to approach the zero percent level, and the Fed will likely be forced to implement the negative interest rate policy at the onset of the next recession.

Note, the negative interest rate policy is nevertheless ineffective in the long run in boosting the inflationary expectations, as the case of Japan shows. Only the change in global policy can create a new trend in stable or rising inflationary expectations. The supply-side deflationary pressures can be mitigated with protectionist and isolationist policies, which would essentially end the current globalization framework, enacted early 1980s. Alternatively, the current wave of globalization has to evolve into a consumption-based emerging market structure, whereby creation of significant middle class in emerging markets would restore the global supply/demand balance by boosting the demand. Thus, only the global political changes can determine the new trend in long-term interest rates, with

Figure 4: US stock market (Wilshire 5000 total market full cap index).

particular focus on policies on trade and protectionism.

IMPLICATIONS FOR INVESTORS

As we explain, long-term disinflationary/deflationary pressures are associated with supply issues (China), and unfortunately, central banks are unable to counter supply-side deflation in long term. Only government policies with respect to trade can change the current globalization scheme, which in fact would require radical departures from policies in place and cause the systematic shock to the global economy. Thus, these protectionist policies are unlikely to gather enough political support to be implemented. Furthermore, demand-boosting strategies in emerging markets are likely to require long time to ensure successful transition, with many setbacks. Thus, investors have to understand how to manage their portfolios in an environment of ultra-low or negative nominal interest rates.

- Stock market and growth investing

The prevailing investment advice to growth investors is to engage in a passive

stock market investing – so-called buy-and-hold strategy. As Figure 4 shows, historically, the stock market has been in an uptrend, which has been significantly interrupted only during the recessions. Thus, the long-term performance of the stock market can be viewed as a function of the time between the recessions, as well as the length of a recession itself. Historically, the US economy experienced a recession every 7–8 years, which allowed the long-term uptrend in the stock market to develop and, thus, rewarded passive buy-and-hold investing.

Nevertheless, the stock market was in a sideways pattern from mid 1960s to early 1980s, as the economy was experiencing more frequent and deeper recessions. These recessions were caused by inflationary pressures which culminated in 1982. The question is whether the current deflationary pressures, and resulting ultra-low or negative interest rates, would also cause more frequent and deeper recessions. Based on the Japanese example, yes, the ultra-low or negative interest rates are likely to create a less stable macroeconomic environment, prone to more frequent recessions. Figure 5 shows that Japan has been struggling with ultra-low

Figure 5: Japanese interest rates (to Oct 2014): 10-year long-term government bond yields (*black*), short-term treasury bills (*gray*).

Figure 6: Gross domestic product in Japan 6.

and negative short-term interest rates since late 1990s, while long-term rates remained below the 2 per cent level. During the same period, Japan experienced at least 7 recessions, with the economy essentially going in and out of recession (see Figure 6). How did Japanese stock market perform in such an environment? Figure 7 shows that

NIKKEI 255 was essentially in a sideways trend since the late 1990s.

Thus, the ultra-low and negative interest rates are likely to cause more frequent recessions, and hence, a sideways or even down-trending stock market over the longer term. As a result, stock market investors should engage in active investing, and

Figure 7: Japan stock market NIKKEI 225.

possibly attempt to time the recessions. In such an environment, even an imperfect timing is likely to outperform the passive buy-and-hold strategy over the longer term.

- Fixed income investing – real estate

Clearly, income investors are not going to be able to earn desired income from bonds or money market instruments in a negative (or ultra-low) nominal interest rate environment. Further, it's unknown whether banks would charge the negative interest rates to consumer deposits. Income investors, especially retirees reliant on investment income for living expenses but holding significant savings, should venture into rental real estate market where the net rents can replace the interest income.

- Gold (commodities)

Note, Bernanke (2012) suggests that there is an ultimate tool in curing deflation – completely debasing the currency by engaging in money printing press, which some reference as helicopter drop of money:

U.S. dollars have value only to the extent that they are strictly limited in supply. But the U.S. government has a technology, called a printing press (or, today, its electronic equivalent), that allows it to produce as many U.S. dollars as it wishes at essentially no cost. By increasing the

number of U.S. dollars in circulation, or even by credibly threatening to do so, the U.S. government can also reduce the value of a dollar in terms of goods and services, which is equivalent to raising the prices in dollars of those goods and services. We conclude that, under a paper-money system, a determined government can always generate higher spending and hence positive inflation.”

In such an environment, investing in gold as an alternative currency can be an effective hedge against unknown effects of global debasement of currencies, as well as unintended consequences on other financial markets.

CONCLUSION

The negative interest rate policy, when short-term interest rates are deliberately set below the zero percent level by the Central Bank, is not an experimental monetary policy, as frequently quoted in the media. Rather, Central Banks are forced to lower the short-term interest rate to a certain level below the long-term interest rate to create a highly accommodative yield curve spread during recessions. In case of the US, it appears that the yield curve spread has to be at least 2.5 per cent to counter recessionary forces. Thus, if 10-year T-bond yield is

below 2 per cent at the onset of the next recession, the Fed will be forced to lower the Federal Funds rate below the 0 per cent level. In fact, all countries currently implementing the negative interest rate policy have long-term interest rates below 2 per cent.

More importantly, the downtrend in long-term interest rates, which breached the 0 per cent level in some countries, and approached the 1 per cent level in the US, has been supported by the globalization policies related to free international trade first enacted in early 1980s to slay the inflationary dragon. Unfortunately, these policies have created a situation where the global supply capability now possibly exceeds the aggregated demand. Further, the resulting deflationary forces cannot be countered by alternative monetary policy tools (which can explain the breach of the Bernanke's zero-bound level). Rather, only the change in policy can reverse the trend of falling nominal interest rates. Given the political uncertainty whether these anti-trade policies can gather enough political support, investors should understand how to manage their portfolios in an environment of low or negative interest rates. Specifically, in such an environment, investors should expect a sideways market at best, and thus refrain from passive investing and attempt to actively time the market based on recessionary expectations. Further, income investor should actively invest in income-producing

real estate. Finally, gold can be an effective hedge against the deliberate debasement of global currencies if Central Banks engage in desperate attempt to reflate the markets by engaging in a "helicopter drop" of money, as suggested by Bernanke (2012), which in fact earned him a nickname "Helicopter Ben."

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