

# The “Upside Down” of Negative Interest Rates

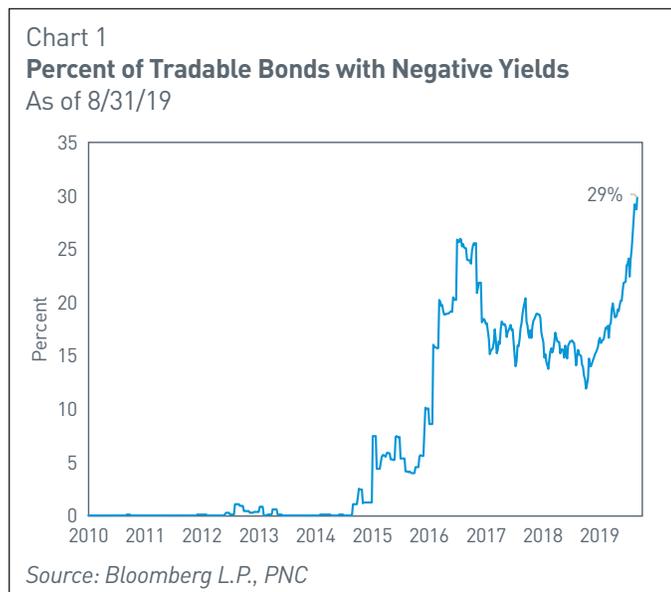
## Introduction

In the Netflix sci-fi series *Stranger Things*, viewers are introduced to an alternate dimension known as the “Upside Down.” The show introduces the Upside Down as a dimension that exists parallel to the human world. It is structurally similar, yet the conventional wisdom no longer applies. We promise no spoilers for those who may not have seen the show, but we find the challenges faced by the show’s heroes draw parallels to those faced by many investors today following the introduction of negative interest rate policies (NIRPs) in certain parts of the globe.

The current distortions created by some central bank monetary policies, specifically through the introduction of NIRP, takes *already unconventional* monetary policy even further to help reinvigorate economic growth and stimulate low inflation. However, from a rational investor’s perspective, we have entered another dimension, one that challenges

time-value-of-money theories.<sup>1</sup> For example, in this new reality, mortgage borrowers in Denmark are effectively being *paid* interest to borrow money, bank depositors in Switzerland are being *charged* interest on their savings accounts, and pension funds in Japan are *buying* negative-yielding bonds. It seems we are truly living in an alternate dimension. Perhaps the most visible consequence of NIRP adoption by “select” (a subgroup of) developed country central banks is the over \$16 trillion of negative-yielding global bonds, representing over 29% of the global tradable bond universe<sup>2</sup> (Chart 1).

In this edition of *Strategy Insights*, we explore how we arrived at negative interest rates in select developed geographies, where NIRP exists, and highlight the objectives and distortions of this unconventional monetary policy tool. Then we explore why we believe the United States may not necessarily follow others down the path of negative interest rates. We conclude with the investment implications of NIRP and provide examples of negative-yielding bonds and a negative rate mortgage.



## The Portal to Negative Interest Rates

The portal to NIRP began more than a decade ago with the unprecedented monetary policy actions taken in advanced economies in response to the global financial crisis. In an effort to help support economies during the downturn, central banks in several developed economies cut policy rates to zero, implementing zero-interest rate policy (ZIRP). In addition to traditional policy measures such as policy rate cuts, the central banks in several developed countries also implemented less-traditional monetary policy measures such as forward guidance and large-scale asset purchase programs.

As the recovery progressed, weaker and less consistent growth was unable to spur inflation to

<sup>1</sup> Time value of money: Traditionally, savings account pay a positive yield, not negative.

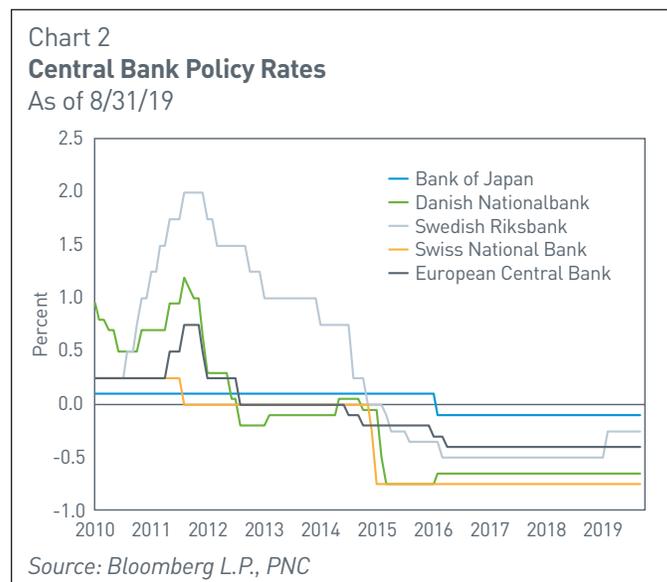
<sup>2</sup> Global tradable bond universe defined as the Bloomberg Barclays Global Aggregate Index.

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levels in line with many developed central banks’ price stability mandates (at or near 2%).<sup>3</sup> With policy rates already at zero, some central banks began to pursue nontraditional monetary policy measures, including the implementation of NIRP. While Denmark’s Nationalbank led the way in 2012, the European Central Bank (ECB) was the first major central bank to implement NIRP in summer 2014. The Swiss National Bank (SNB) and Swedish Riksbank followed in 2015 and the Bank of Japan (BOJ) in 2016 (Chart 2). Table 1 shows a timeline of NIRP implementation by major central banks and their primary motivations.

While nontraditional, the implementation of NIRP was driven by many of the same motivating factors as traditional monetary policy stimulus. Initially, negative interest rates were largely assumed to be a temporary emergency measure. However, persistently below-target inflation over the past five years suggests that

negative interest rates may be a more lasting feature than originally suspected.



**Table 1**  
**Timeline of Negative Policy Rates**  
As of 8/31/19

Central Bank	Date Introduced (Chronological)	Policy Rate	Scope	Motivation
Danish Nationalbank	June 2012; September 2014	-0.65% (certificate of deposit rate)	Charged on reserves above an upper limit on current account holdings (7% of GDP based on local currency).	The Nationalbank seeks to prevent appreciation of the Danish krone, targeting a level of 7.46 per euro.
European Central Bank	June 2014	-0.40% (deposit rate)	Applies to “excess” reserves, which total 15% of GDP in local currency terms.	The ECB seeks to counter below-target inflation to achieve its price stability mandate of “near 2% inflation.”
Swiss National Bank	January 2015	-0.75% (policy rate)	Applies to reserves more than 20 times larger than minimum required reserves, which total 17% of GDP in local currency terms.	The SNB intends to prevent further appreciation of the Swiss franc after the ECB move into negative territory pressured the euro.
Swedish Riksbank	February 2015	-0.25% (repo rate)	Applies to 95% of “excess” reserves. Penal deposit rates of -0.35% and -1% apply to tiny amounts of particularly liquid funds, affecting 3.5% of GDP in the local currency.	The Riksbank aims to counter low and below-target inflation.
Bank of Japan	January 2016	-0.10% (interest on policy rate balance)	Different rates paid on three tiers of reserves, with negative rates on reserves beyond a high threshold. On net, the BOJ still pays banks positive interest rates.	The BOJ aims at achieving its 2% inflation target “at the earliest possible time.”

Source: Central Banks, Capital Economics, PNC

<sup>3</sup> European Central Bank, The Definition of Price Stability, <https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html>; Bank of Japan, “Price Stability Target of 2 Percent,” <https://www.boj.or.jp/en/mopo/outline/qqe.htm/>.

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## The Dimensions Where NIRP Currently Exists

Currently, NIRP exists only in several developed regions, including the European Monetary Union (EMU),<sup>4</sup> Denmark, Sweden, Switzerland, and Japan. Overall, this represents a significant 29.8% of world GDP.

Developed regions that have implemented NIRP have generally experienced lower growth rates and underwhelming inflation compared with regions with positive policy rates. Since 2009, core inflation in the Eurozone and Japan has averaged 1.1% and 0.0%, respectively. In contrast, other developed economies have experienced core inflation closer to target, with the United Kingdom averaging 1.9%; Canada, 1.8%; and the United States, 1.6%. Because there are many developed geographical regions that have not entered the NIRP dimension, it remains the exception, not the rule.

Importantly, no emerging market (EM) central bank has yet to approach the zero bound, let alone NIRP. Within EM countries, growth and inflation are not nearly as scarce, benefiting from the secular trends of a growing middle class, improving access to technology and education, and better demographics (that is, younger populations).

The average year-over-year inflation achieved by the four largest EM countries by GDP (China, India, Brazil, and Russia) has been 5.7% since 2009. As a result, some EM central banks have pursued multiple rate *hike* cycles over the last decade to help combat depreciating currencies and elevated local inflation rates. Given the relatively higher growth and inflation rates of EM countries, we believe the idea of entering an Upside Down remains a distant thought for those countries.

## Not All NIRPs Are Created Equal

While Denmark may have been the first and Switzerland has gone the most negative, we believe the ECB’s actions have had the greatest overall impact on global interest rates.

In our view, the ECB’s decisions in 2014–15 created a waterfall effect, prompting several smaller central banks in Europe (Denmark, Switzerland, and Sweden) to cut policy rates deeper to help prevent capital inflows and rapid currency appreciation. As such, these countries likely carry less flexibility in their own ability to set policy rates and will instead continue to be affected by the ECB’s policy rate decisions.

In Japan, where the policy rate is marginally negative, the BOJ is conducting a controlled experiment of its own with quantitative and qualitative easing and yield curve control. The BOJ was the last major central bank to move into negative territory (in 2016) and has not incrementally lowered its policy rate since.

## Stranger for Longer?

In *Stranger Things*, once the portal into the Upside Down was open, it became increasingly difficult to close. Similarly, negative interest rates appear to have gained some staying power, with developed country central banks having broadly leaned toward easing monetary policy measures in recent months.<sup>5</sup> During the summer, in the face of global economic uncertainty, the BOJ stated it is prepared to ease policy further if unable to progress toward its inflation target.

Given the commitment of central banks to maintain easy monetary policy, short- to long-dated sovereign debt yields in NIRP countries have also followed policy rates into negative territory, as shown in Table 2 (page 4). These stranger times mean that the entire Swiss and most of the German yield curves are negative!

In terms of drivers, long-term interest rates can be separated into three components: growth expectations, inflation expectations, and the term premium (Chart 3, page 4). Term premiums represent the extra compensation, or yield, investors receive to hold longer-term rather than shorter-term assets.

In the United States, Eurozone, and Japan, term premiums have been in a long-term downtrend

<sup>4</sup> EMU refers to the monetary union of 19 of the 28 European Union member states, often referred to as the Eurozone, which have adopted the euro as their common currency and fall under the policy of the ECB.

<sup>5</sup> In September, the ECB cut its bank deposit rate by 10 basis points (bps) to -0.5% and altered its forward guidance for rates to remain at present or lower “as long as necessary.”

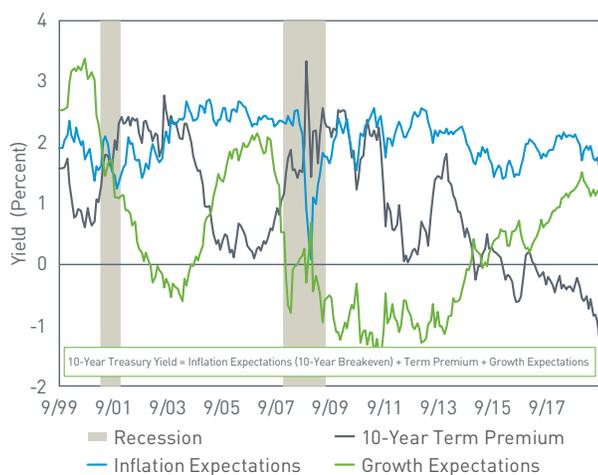
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Table 2  
**Sovereign Debt Yield Heat Map**  
 As of 9/10/19

		Country	Policy Rate	2 Year	5 Year	10 Year	30 Year
NIRP Countries	Eurozone	Germany	-0.40	-0.85	-0.84	-0.55	0.03
		France	-0.40	-0.77	-0.69	-0.25	0.68
		Italy	-0.40	-0.31	0.35	1.02	2.16
		Spain	-0.40	-0.54	-0.27	0.25	1.20
	Other	Denmark	-0.65	-0.87	-0.80	-0.55	n/a
		Sweden	-0.25	-0.63	-0.64	-0.22	n/a
		Switzerland	-0.75	-1.18	-1.07	-0.91	-0.42
Japan		-0.10	-0.30	-0.33	-0.24	0.28	
Non-NIRP Countries	Developed	United States	2.25	1.64	1.55	1.69	2.16
		United Kingdom	0.75	0.46	0.43	0.63	1.13
		Canada	1.75	1.58	1.43	1.41	1.60
		Australia	1.00	0.87	0.83	1.07	1.64
	Emerging	China	2.62	2.68	2.90	3.03	3.63
		India	5.40	5.70	6.19	6.58	n/a
		Brazil	6.00	1.89	2.30	3.76	4.67
		Russia	7.00	6.60	6.74	7.03	n/a

Source: Bloomberg L.P., PNC

Chart 3  
**10-Year Treasury Yield Decomposition**  
 As of 8/30/19



Source: Bloomberg L.P., Cornerstone Macro, PNC

since 2000, entering negative territory in 2016. This has been driven in part by central banks conducting asset purchases of longer-dated securities, which compresses longer-term yields.<sup>6</sup> With inflation expectations still below targets alongside the renewed

commitment from some major central banks to potentially provide additional monetary stimulus, policy rates and sovereign bond yields in NIRP regions may stay lower, negative, and thus “stranger” for longer.

## Beware the NIRP Mind Flayer

Drawing definitive conclusions about the success (or lack thereof) of NIRP in achieving the objectives of reducing borrowing costs, stimulating borrowing, raising inflation, and depreciating currency is relatively difficult. However, we are able to observe some effects and unintended consequences of the negative interest rate experiment so far, despite the limited sample size.

### 1. Objectives/Distortions

#### Reduced Borrowing Costs Globally

On the one hand, NIRP appears to have achieved its desired effect on borrowing costs, with lending rates for governments, consumers, and corporations broadly declining since the policy’s inception. However, just as the Upside Down begins to creep

<sup>6</sup> Bank for International Settlements, “Term Premia: Models and Some Stylised Facts,” *BIS Quarterly Review*, September 2018.

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into the human world, the impact of NIRP can be seen both within and beyond the countries where it has been implemented. As stated earlier, term premiums have gone negative, not only in NIRP regions but also in the United States. This suggests that as term premiums compress, it could have the unintended consequence of a gravitational pull on other developed world sovereign debt yields.

## Stimulate Borrowing or Perpetuate Deflationary Expectations

The primary objective of monetary easing is to stimulate credit growth by boosting the money supply and/or lowering interest rates within the specified monetary system. Higher demands for capital over time should lead to greater consumption and investment, which traditionally correlate with increases in total output and ultimately GDP growth. Hence, the intention of NIRP is to help fuel greater demand for capital, which should translate into even greater borrowing demands. A key end goal of NIRP is to reignite economic growth.

One way to measure the success of monetary policy's effect on stimulating loan growth is to analyze a region's credit impulse, which captures the change in the flow of credit to the broad economy as a percentage of GDP. As shown in Chart 4, as the ECB reduced its policy rate into negative territory in 2014, there appeared to be an initial positive impact on credit growth expectations. This may signal that negative rates incentivized many formerly unwilling borrowers to come off the sidelines.

Interestingly, however, deeper negative interest rates within the EU did not result in a further expansion of credit, implying some diminishing marginal benefit of negative rates over prolonged periods—eventually relapsing into negative credit growth by 2017.

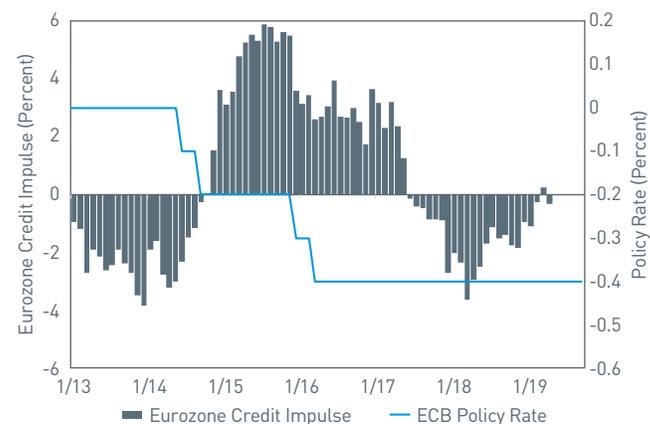
Ultimately, the early evidence of negative interest rates stimulating the demand for capital has been mixed. Many borrowers were eager to lock in low/negative rates early in the easing cycle while demand has tapered as rates moved further into negative territory.

## Inflation Is the Expectation, Deflation Is the Reality

As previously mentioned, the primary motivation of the ECB's and BOJ's implementation of NIRP was to help combat deflationary forces. The hope was again

Chart 4  
**Eurozone Credit Impulse**

As of 8/30/19



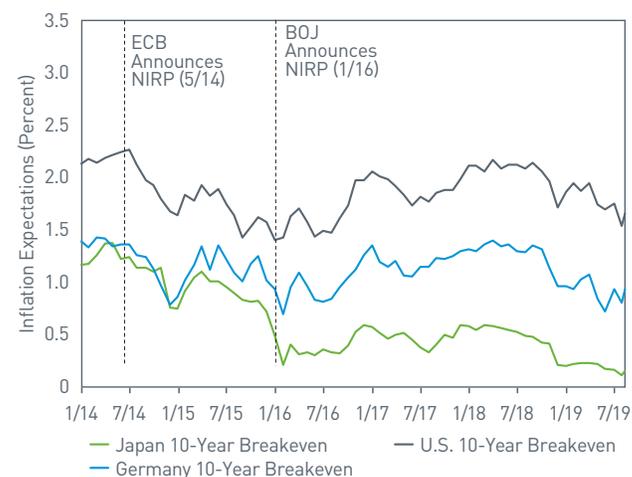
Source: Bloomberg L.P., PNC

to reignite economic growth and increase inflation to levels consistent with their mandates of price stability.

However, Chart 5 shows that 10-year inflation breakeven rates, which reflect market pricing of future inflation, did not respond favorably to the policy changes. As we continue in this alternate world, inflation expectations have drifted lower in Europe and Japan ever since, regardless of central bank actions. Both regions continue to undershoot respective central bank targets and, in both cases, are significantly lower than the United States.

Chart 5  
**Inflation Expectations**

As of 8/30/19



Source: Bloomberg L.P., PNC

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## The Paradox of Currency Depreciation with NIRP

Some central banks have implemented NIRP with the *stated intent* of weakening their currencies. Economic theory suggests lowering interest rates should decrease the relative value of a country’s currency. This, in turn, should help make exports more competitive on the global stage and thus accelerate that country’s economic growth. However, these rules get distorted in a NIRP world. In fact, since Switzerland and Japan set policy rates below zero, both currencies have strengthened. Why? We believe there are two reasons:

- In part, these central banks lowered interest rates in reaction to the ECB’s NIRP actions. Because these central banks weren’t acting in isolation, the countervailing forces on their currencies effectively offset one another.
- The time to implement NIRP is typically when there is a heightened concern about weakening global growth prospects. Unfortunately, in times like this, most investors tend to seek safety in (and, thus put upward pressure on) safe-haven currencies, such as the Swiss franc and Japanese yen. Therefore, these crosscurrents have made it especially challenging to achieve the desired effect of NIRP.

## 2. Distortions/Reality

### Hoarding Physical Cash?

Some believed NIRP would lead to a hoarding of physical cash by depositors to avoid being charged interest on deposits held at banks. In addition to putting stress on an economy’s banking system, the money supply and velocity of money could be severely reduced, limiting a central bank’s ability to influence corporate and consumer behavior (that is, stimulate loan growth through lower interest rates).<sup>7</sup>

Despite negative policy rates, in our view banks have selfishly been reluctant to pass negative deposit rates onto retail customers because of fears they would take their saving and deposit accounts elsewhere. Today,

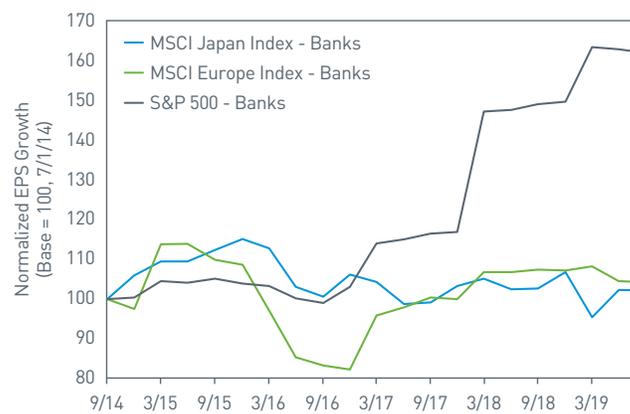
retail deposit rates are still marginally positive across most NIRP regions, giving little incentive for depositors to spend or use their funds in ways that enhance productivity. According to Capital Economics, the cost of storing and transacting in physical cash is between 1% and 2%. Therefore, policy rates would need to fall substantially from here, below –1%, to elicit the desired effects of NIRP. However, outside of a few banks in Denmark and Switzerland, most retail deposit rates have not gone negative, which totally offsets the estimated economic breakeven point for banks.<sup>8</sup>

### Banks Caught Between a Rock and a Hard Place

Globally, bank profitability in NIRP regions has been challenged relative to regions where interest rates are still nominally positive, such as in the United States. While coinciding with the implementation of NIRP, we believe the slowdown in economic growth has also played a factor. As shown in Chart 6, European and Japanese banks’ earnings per share (EPS) have notably lagged those in the United States; however, that divergence also took place around the time the United States passed the TCJA. The combination of fiscal stimulus and outsized share buyback programs relative to their global counterparts may have exacerbated this differential in EPS growth.

Chart 6  
Bank EPS by Region

As of 8/30/19



Source: Bloomberg L.P., PNC

<sup>7</sup> “Negative Rates: Is the Cure Worse than the Disease?”, Capital Economics, September 5, 2019.

<sup>8</sup> In September, the Danish Nationalbank further cut rates into negative territory, to -0.75%, prompting the country’s second largest bank to pass on negative interest rates to clients with \$111,000 (750,000 krona) or more in deposits. The move will be closely monitored and could spur other European banks to follow.

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Bank profitability is determined, in part, by net interest margins (NIMs).<sup>9</sup> Because of the reluctance of banks to pass negative deposit rates on to consumers, NIMs in NIRP regions have in part been compressed relative to their U.S. counterparts. This unfavorable backdrop has resulted in still positive but moderating EPS growth for European and Japanese banks.

## Even Lower for Even Longer for Investors

The growing level of negative-yielding debt globally has led to behavioral finance distortions across the efficient frontier. The alternate dimension has effectively pushed bond investors to *trade* on the singular hopes of price appreciation (that is, rates need to go deeper into negative territory). It would be irrational for an investor in a NIRP region to buy and hold a negative-yielding bond.

In this alternate world, stock dividends actually pay a higher yield than most bonds, potentially forcing many investors further out on the risk curve than they would prefer to generate income. For example, the dividend yield of the MSCI AC World ex-US Index is 3.0% versus the Bloomberg Barclays Global Aggregate yield of 1.3%, but assuming nearly double the volatility (that is, standard deviation) of total expected return. For perspective, this is not simply a NIRP phenomenon; at the time of this writing, the U.S. 10-year Treasury is yielding 1.8%, 10 bps below the S&P 500<sup>®</sup> dividend yield, with an even wider dispersion in expected volatility.

Most pension and insurance companies have been hit particularly hard by NIRP. Falling rates have effectively increased the cost of these institutions' liabilities. As a result, we've seen a widespread deterioration in the funded status of pension plans and profitability of insurers. At the same time, these institutions are forced to allocate further out on the risk curve. This has translated into increased duration risk, credit risk, and even higher equity exposures to reach their required return targets.

The more painful alternative we have seen globally in reaction to historically low interest rates has been to consider reducing benefits to plan beneficiaries or to push for plan sponsors to increase cash

contributions to remain solvent. At a time when economic growth and corporate profits are already slowing, these objectives in a distorted world could continue to be challenged unless we see a material reversal in policy stance.

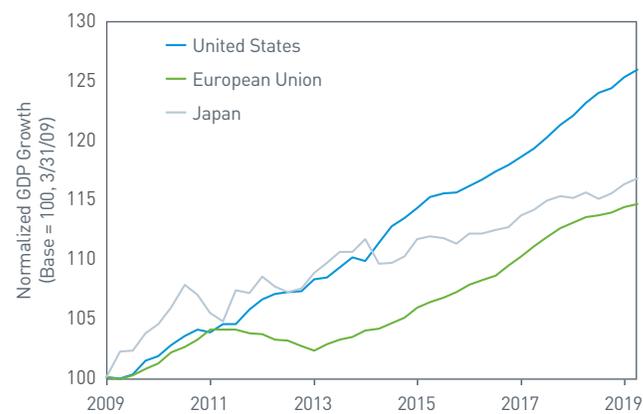
## Is the United States Headed for NIRP?

Could the United States also embrace NIRP and enter an Upside Down of its own? We never say never, but the secular forces subduing inflation and global growth are likely to remain in place for some time.<sup>10</sup> However, we have identified four key differences among monetary policies used in the United States and countries that have adopted NIRP. This suggests to us the United States is unlikely to pursue NIRP in the near future.

### 1. Economic Growth Has Been Stronger in the United States than in NIRP Regions this Cycle

Cumulative U.S. economic growth has outpaced both the European Union (EU) and Japan since the global financial crisis ended in 2009 (Chart 7). Though the past is not a predictor of future growth, the structural forces that were in play then are still here now. We are starting from a much higher base relative to the EU and Japan; therefore, there would need to be a significant decline in U.S. economic growth before NIRP became part of the base-case narrative.

Chart 7  
U.S., EU, and Japan GDP Growth  
As of 6/30/19



Source: Bloomberg L.P., PNC

<sup>9</sup> Net interest margin is defined as interest income – interest expense divided by total assets.

<sup>10</sup> Juan M. Sánchez and Hee Sung Kim, “Why Is Inflation so Low?”, *Regional Economist*, Federal Reserve Bank of St. Louis, February 2, 2018.

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## 2. The United States Has Been More Willing to Use Fiscal Policy to Stimulate Growth

Fiscal policy can help stimulate economic growth in a number of ways, for example:

- reducing taxes;
- industry deregulation;
- infrastructure investments; and/or
- increasing government spending.

Compared to NIRP regions, the United States has been more willing to employ fiscal stimulus measures (TCJA, for example). In our view, it is the mosaic of supportive monetary policy *plus* fiscal stimulus that is likely to be most effective in combating deflationary forces and sluggish growth. Central bankers in NIRP regions, such as the EU and Switzerland, have pointed to the lack of fiscal support for continued unconventional monetary policy accommodation.

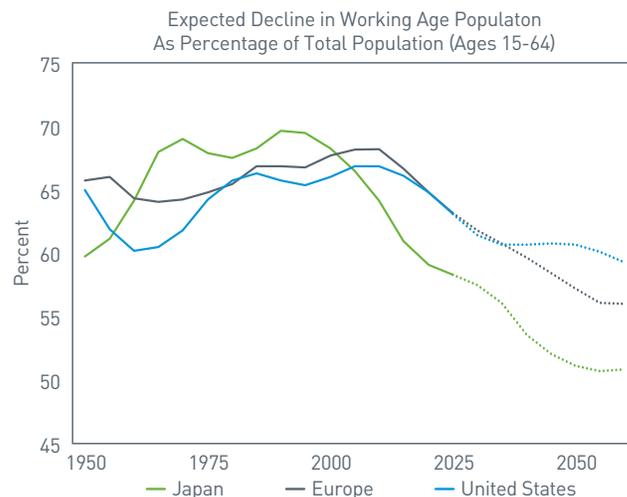
## 3. U.S. Demographics Pose Relatively Less of a Headwind

A nation’s labor force is a reflection of its demographic trends. The trajectory of population growth, age cohorts, and labor participation rates are key characteristics that help form productivity growth expectations in the long run (also known as potential GDP). This somewhat simplified view illustrates one of the primary economic challenges shaping the growth outlooks of many developed economies—a steep decline in working-age populations (Chart 8). While the United States is not entirely immune to these challenges, we believe U.S. demographic trends likely will be relatively more supportive for growth prospects and thus have a lower probability of needing to rely on NIRP.

## 4. U.S. Inflation Close to Federal Reserve’s Target

Most central banks in the developed world have a 2% inflation mandate. However, they have persistently undershot this level throughout this economic cycle. The exception has been the United States, where not only has headline inflation exceeded 2% at times, but also core inflation (that is, excluding food and energy) is currently above its 2% target. With inflation this close to the Federal Reserve’s (Fed’s) target, we do not see any reason for aggressive policy accommodation along the lines of NIRP.

Chart 8  
Expected Decline in Working Age Populations in the United States, EU, and Japan



Source: Bloomberg L.P., PNC

*The projections contained herein are for illustrative purposes only and should not be relied upon as investment advice or a recommendation to buy or sell any security or adopt any investment strategy. Projections are speculative in nature, as they are based upon subjective estimates and assumptions about circumstances and events that may not have yet occurred and may never occur.*

## Still Enough Tools in the Fed Policy Toolkit

We believe the Fed still has more monetary policy ammunition available before needing to employ NIRP. In its *Conducting Monetary Policy* paper,<sup>11</sup> the Fed considers interest rate cuts a *traditional* monetary policy tool and large-scale asset purchases a *nontraditional* tool. In our view, the Fed continues to have the following levers available to pull should it need to provide more accommodating monetary policy:

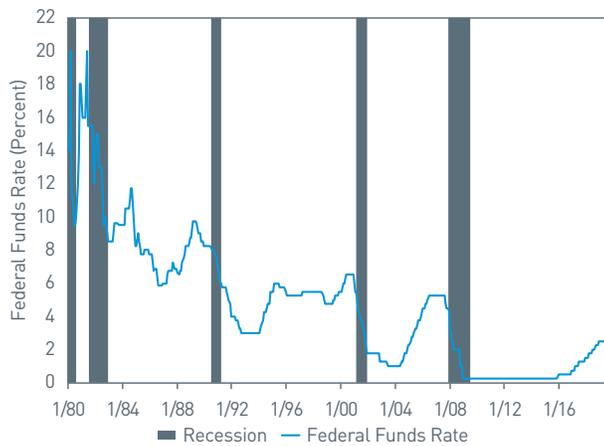
- policy rate cuts, down to ZIRP;
- forward guidance that its policy rate will stay near zero for an extended period of time; and
- one or more large-scale asset purchase programs (that is, a return to quantitative easing).

With ample options still left on the table, NIRP appears to be a distant, last resort for the Fed. The Fed may likely enter the next U.S. downturn with less policy room than in previous cycles. In each of the past two recessionary rate cut cycles (2000–02 and 2007–09), the Fed reduced its policy rate by more than 500 bps.

<sup>11</sup> Board of Governors of the Federal Reserve System: Section 3 - Conducting Monetary Policy.

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Chart 9  
**Future Rate Cuts Might Not Have the Impact They Previously Had**  
As of 8/31/19



Source: Bloomberg L.P., PNC

Since the Fed is now starting at a much lower policy level, 2.50%, an easing cycle of similar magnitude would put the United States into an alternate dimension of its own. Therefore, NIRP in the United States remains a possibility, but we view this outcome as unlikely in the very near future (Chart 9).

## Potential Investment Implications of an Upside Down

In an Upside Down world, traditional investment expectations are reversed: Borrowers now get paid by lenders, depositors get charged on cash accounts, and sovereign bonds, once counted upon for predictable streams of positive income, now offer negative yields. Therefore, how should investors reposition a traditional balanced portfolio in a NIRP world? Or should they?

While we would steer clear of a dramatic shift in allocations, there are still options to consider at the margin. In no way are we saying these are formal tactical recommendations to make at this juncture, but in a low-ZIRP-NIRP world, these asset classes would tend to be favorably positioned. Given we remain in the later innings of the cycle, we continue to prefer a tilt toward active management over passive implementation.

## Allocations to Alternative Investments

At a time when expected performance of traditional (that is, publicly traded) asset classes are below historical norms, it has become increasingly important to consider the role of alternatives in investment portfolios. When carefully selected, we believe alternative investments have the potential to add incremental return in a NIRP environment.

In addition, we believe alternative investments can improve the overall risk profile of portfolios through alternatives' diversification benefits. Since alternative investments typically have a low correlation with public markets, they could be an appropriate way to diversify risk exposure, tap into new sources of yield, and decrease overall portfolio volatility. Alternative asset classes that could be beneficial to investors in a NIRP world include private equity, private debt, and private real estate.

**Private Equity:** We still see pockets of opportunity as it relates to strategies extending into new/less efficient markets and a more diverse investable opportunity set, for example, via secondaries and co-investment options.

**Private Debt:** We continue to see investors rewarded with a substantial illiquidity premium for taking on unrated, smaller-sized loans. As with public market credit spreads, pricing has improved in the private markets.

**Private Real Estate:** We continue to believe the outlook for value-added and opportunistic real estate remains fairly strong and positive overall. Key drivers include a still relatively constrained supply backdrop, modest leverage levels relative to how these strategies typically operate, and capital flows into the asset class becoming increasingly global.

## Allocations to Global Infrastructure

Global infrastructure investments tend to have monopolistic features and contracts embedded with inflation adjusters, key characteristics that provide relatively lower risk expectations than both private equity and traditional large-cap core public equities. Relative to fixed income securities, infrastructure is

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unique in that the asset provides stable cash flows like traditional fixed coupon bonds but with the potential for capital appreciation.

We believe infrastructure investing may be well positioned in a NIRP world. There are secular forces at play that we have discussed, such as low productivity growth and unconventional global monetary policy accommodation, which may continue to weigh on interest rates for some time.

## Allocations to Structured Solutions

There are a number of derivative strategies in the form of structured notes that have the ability to not only provide downside protection but also to generate income prior to an anticipated market pullback. As with any investment, there are drawbacks, but our view is that these vehicles can play a role in portfolio construction in a distorted world. It is important to think creatively about ways to generate return and protect assets in this market, and we view structured notes as a potential solution.

## Allocations to Real Estate Investment Trusts

Allocations to real estate offer the potential to derive consistent/recurring income generation for a portfolio, add diversification benefits via lower correlation to traditional asset classes, the potential to outpace inflation at various points in the economic cycle, and ultimately positive real returns. Also, historically real estate has experienced lower volatility than other asset classes because it is typically less affected by short-term economic conditions. Additionally, income-oriented equities such as real estate investment trusts may be able to replace the lack of yield provided by fixed income allocations in a NIRP world.

## Allocations to EM Debt

Our view on EM bonds is reflective of our broader macro view on emerging markets, as we discussed in our second-quarter 2019 *Strategy Insights, Emerging from Hibernation: The Green Shoots of Emerging Markets*. We believe EM sovereign debt and credit markets are attractive for those investors looking to

add higher-yielding assets to their portfolios. In spite of the different macro/trade tensions affecting EM equities, EM debt spreads remain at healthy levels. They also play an important role as a diversifier in a fixed income allocation.

## Conclusion

In the first episode of the first season of *Stranger Things*, the main characters are seen playing Dungeons & Dragons, a role-playing game popular in the 1980s and set in an imaginary world based loosely on medieval myth, or an “Upside Down” world. As the first season of the show progresses, that imaginary world crosses over and distorts the human realm.

The evolution of NIRP is a surprisingly similar analogy, in our view, to the plot line of *Stranger Things*. What started as a well-intended and brief expectation by central banks to help stimulate economic growth through unconventional means (that is, NIRP) turned into a realm far more lasting and difficult to exit.

Fortunately, the United States has seen where others have already gone, and in that way is much like the character Eleven, one of the main protagonists of *Stranger Things* who has inherited psychokinetic abilities. The United States has seen the power of NIRP in action and still has multiple tricks up its sleeve to defend against it.

Just like in the show, the Upside Down is always there in the background, with reverberations and distortions felt from time to time. We expect NIRP in certain parts of the globe to remain for some time. Hence, the traditional portfolios we are accustomed to might need to be adjusted at the margin to be able to continue supporting investor goals and objectives in a NIRP world.

We believe it is imperative for us to focus on balancing reward, risk, and portfolio construction in this lower-for-longer (and sometimes *stranger*) market environment. For the time being, we remain firmly in the “human world,” where earnings and cash flow still matter most in the long run, and as the show’s Sheriff Hopper would declare, “mornings are still for coffee and contemplation!”

# The “Upside Down” of Negative Interest Rates

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# The “Upside Down” of Negative Interest Rates

## Appendix A<sup>12</sup>

### How a Negative-Yielding Bond Works

A simple example of a traditional bond is a one-year, 2.0% coupon bond, as illustrated in Table A1. At the onset of the bond, the investor outlays par (\$100) to receive interest in the form of a coupon payment every six months (\$1). At maturity (one year from today because the bond is a one-year bond), the investor is returned the principal of \$100 that was originally lent. The total dollar return on investment, which is the difference between the total principal and interest received (\$102) and the investor’s initial investment (\$100) is a positive \$2.

Table A1	
Traditional versus Negative-Yielding Bond Cash Flow Table	
Traditional Bond (1-Year, 2.0% Coupon)	
Time	Cash Flow
Today	Investor .....→ \$100 .....→ Borrower
Today + 6 months	Investor ←..... \$1 ←..... Borrower
Today + 12 months	Investor ←..... \$1 ←..... Borrower
Today + 12 months	Investor ←.....\$100 ←.....Borrower
Total Principal and Interest Received:	\$102
Initial Investment:	\$100
Dollar Return on Investment	<b>\$2</b>
Negative Yielding Bond (1-Year, 2.0% Coupon)	
Time	Cash Flow
Today	Investor .....→ \$103 .....→ Borrower
Today + 6 months	Investor ←..... \$1 ←..... Borrower
Today + 12 months	Investor ←..... \$1 ←..... Borrower
Today + 12 months	Investor ←.....\$100 ←.....Borrower
Total Principal and Interest Received:	\$102
Initial Investment:	\$103
Dollar Return on Investment	<b>-\$1</b>

Source: Bloomberg L.P., PNC

As Table A1 also demonstrates, a negative-yielding bond has the same cash flow structure as a traditional bond. However, at the onset of the bond, the investor outlays a “premium” payment (\$103). A bond is considered trading at a premium if the current price is above par. The investor receives a coupon payment every six months (\$1), and at maturity the investor is returned \$100 of principal. The total dollar return on investment, which is the difference between the total principal and interest received (\$102) and the investor’s initial investment (\$103) is *negative* \$1.

It’s important to note that a negative-yielding bond typically still has a positive coupon payment to the investor and therefore is not accompanied by cash outflows from the investor at coupon dates. The negative yield is realized by purchasing the bond at a premium and receiving a lesser amount back in a combination of principal and coupon payments.

## Appendix B<sup>12</sup>

### How a Negative Rate Mortgage Works

Imagine buying your dream home and being *paid* to do it. It’s a bit more complicated than that, but a bank in Denmark recently offered mortgages at a fixed rate of *negative* 0.5%.<sup>13</sup> Below we walk through an example of a traditional mortgage and negative rate mortgage and highlight the differences (Table A2, page 12).

Consider the following example. A household purchases a \$200,000 home and intends to put 20% down, or \$40,000. The loan amount is therefore \$160,000. Let’s assume our purchasers have strong credit and can obtain a traditional 30-year fixed rate mortgage at 3.75%. The monthly principal and interest loan payment amounts to \$741 per month. Now if our purchasers could obtain a -0.5% mortgage under the same terms, the monthly principal and interest payment would only amount to \$412, a meaningful reduction.

<sup>12</sup> This example is for illustrative purposes only and is hypothetical in nature. Hypothetical results have inherent limitations because they are not based on actual transactions and may under or over compensate for the impact of certain economic and market factors, all of which can adversely affect results. Data do not account for taxes, fees, transaction costs or withdrawals and assume no increase in pay and reinvestment of dividends and other income or investments. Tax calculations have been simplified for illustrative purposes and do not take into account state and local taxes, marital status, number of Federal exemptions or other withholdings, such as flexible spending account, that may affect your tax situation. PNC does not provide legal, tax, or other investment advice. Consult with your tax and legal advisors regarding your individual situation. This example is not a guarantee of future results or any rate of return on any investment.

<sup>13</sup> C. Maloney, “Bad News, U.S. Homebuyers: Sub-Zero Mortgages ‘Ain’t Happening,’” Bloomberg L.P., September 9, 2019.

## The “Upside Down” of Negative Interest Rates

Table A2

### Traditional versus Negative Rate Mortgage Example

As of 8/31/19

	<u>30-Year 3.75% Fixed Rate Mortgage</u>	<u>30-Year -0.50% Fixed Rate Mortgage</u>
Purchase Price	\$200,000	\$200,000
20% Down	\$40,000	\$40,000
Loan Amount	\$160,000	\$160,000
Loan Term in Years	30	30
Interest Rate	3.75%	-0.50%
Monthly Principal and Interest Loan Payment	\$741	\$412
Total Principal Paid Over Lifetime of Mortgage	\$160,000	\$160,000
Total Interest Paid Over Lifetime of Mortgage	\$106,755	<b>-\$11,733</b>
Total Cost:	\$266,755	\$148,267
Monthly Principal and Interest Loan Payment	\$741	\$412
Property Tax	\$207	\$207
Homeowners' Insurance	\$100	\$100
<b>Total Loan Payment</b>	<b>\$1,048</b>	<b>\$719</b>
Median Household Income U.S. 60,000	\$5,000	\$5,000
One Mortgage Payment Percentage of Pretax Income	21%	14%
Two Mortgage Payments Percentage of Pretax Income	42%	29%

Source: Bloomberg L.P., PNC

The total cost of a traditional mortgage over its 30-year life is generally high enough to make most borrowers cringe. In this example, a 3.75% mortgage loan for \$160,000 ends up costing our borrowers \$266,755, which is due to the \$106,755 of interest paid over 30 years. However, under our negative-rate mortgage example, our borrowers actually pay back less than originally borrowed. In this sense, borrowers get paid to purchase their dream home.

Now here's where it begins to get a bit more complicated. Lenders generally consider property tax and homeowners' insurance payments to be part of the borrower's monthly payment, neither of which is reduced by negative interest rates. If we assume the borrowers escrow \$207 per month for property taxes and \$100 per month for homeowners' insurance, the monthly payments amount to \$1,048 and \$719,

respectively. Even with these fixed costs included, a negative-rate mortgage meaningfully reduces the borrower's monthly payment.

The two main benefits a borrower would experience, should they be fortunate enough to obtain a negative-rate mortgage, are a lower monthly payment and a significantly lower total mortgage cost over the life of the loan.

Some borrower's first reaction to negative-rate mortgages may be that they would borrow an infinite amount at a negative interest rate. However, consider that lenders generally have percentage limits that monthly mortgage and total debt payments can represent as a percentage of pretax income. Assume these limits: total mortgage payments cannot exceed 28%, and total debt service payments cannot exceed 35% of pretax income.<sup>14</sup>

<sup>14</sup> PNC: Home Buyer's Basics, <https://www.pnc.com/en/personal-banking/borrowing/home-lending/understanding-home-lending-center/home-buyers-basics.html>

## The “Upside Down” of Negative Interest Rates

If the borrowers in our example earn near the median household income in the United States,<sup>15</sup> say \$60,000 annually, this equates to \$5,000 per month. At 3.75% interest, their monthly payment (including property tax and homeowners insurance) represents 21% of pretax income, which is below the 28% threshold, thus our borrowers likely qualify for the loan. However, at 3.75% interest, our borrowers' combined monthly payment on two of these mortgages would represent 41% of pretax income, which would likely make qualifying for a second mortgage of the same size a challenge.

Now, in our negative-rate mortgage example, our borrower's monthly payment represents only 14% of pretax income, well within the qualification threshold

of below 28%. Two mortgages would represent 29% of pretax income, which increases our borrower's chances of qualifying for a second mortgage, but certainly not an infinite amount.

It is also worth considering that the borrowers in our example still need to provide the down payment (\$40,000 in this example) and cover closing costs, which can generally range from 3% to 5% of the loan amount.<sup>16</sup> For each home purchased, homeowners are responsible for utility bills, repairs, and maintenance. And with current 30-year mortgage rates in the United States near 3.75%,<sup>17</sup> negative rate mortgages in the United States appear unlikely in the near term, in our view.

<sup>15</sup> Federal Reserve Bank of St. Louis, Economic Research, <https://fred.stlouisfed.org/series/MEH01NUSA672N>.

<sup>16</sup> C. Maloney, “Bad News, U.S. Homebuyers: Sub-Zero Mortgages ‘Ain’t Happening,’” Bloomberg L.P., September 9, 2019.

<sup>17</sup> PNC: Home Buyer's Basics, <https://www.pnc.com/en/personal-banking/borrowing/home-lending/understanding-home-lending-center/home-buyers-basics.html>

# The “Upside Down” of Negative Interest Rates

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For definitions of indexes used in this publication, please refer to [pnc.com/indexdefinitions](http://pnc.com/indexdefinitions).

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