

LUND UNIVERSITY
SCHOOL OF ECONOMICS AND MANAGEMENT
DEPARTMENT OF ECONOMICS

The Low Interest Rates: a Legacy of the Financial Crisis or the Result of Something Else?

Lessons from History

Johan von Wiesen

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Supervisor: Klas Fregert

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Abstract: The 2008 Global Financial Crisis has come and gone. Since then, worldwide interest rates remain at an all-time low, yet economic growth remains sluggish. Theories have been put forward to explain the phenomena, two of which take a secular perspective, detached from the recent crisis. This paper employs an explorative style of examining two historical datasets with the staging point of the real interest rate levels, making it one of the more extensive overlooks of the real rate in both time and amount of countries. This paper finds that while the current period of low interest rates is neither exceptional in terms of length or severity, it stands unique in some regards. Notably, past episodes of low real interest rates have almost always coincided with significant increases in the rate of inflation, while the current bout of low real rates is occurring amidst lower than average rates of inflation. Even so, in many countries investment has weakened, savings has increased and policy rates were lowered to their limits since the crisis, all of which would contribute to lower real interest rates even in the absence of inflation.

Key Words: real interest rate, financial crisis, secular stagnation, savings glut

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1. Introduction

The 2008 Global Financial Crisis, by many economists called the worst financial crisis since the Great Depression, has come and gone. During its wake, the crisis, manifested as a liquidity crisis, threatened the collapse of large financial institutions which had to be bailed out to prevent financial collapse. Even so, worldwide stock markets dropped, consumer wealth decreased dramatically, and the crisis sparked a downturn in economic activity that some now call the Great Recession.

The crisis and the accompanying recession was met with vigorous crisis management and stabilization policy efforts by governments as well as central banks. Fiscal and monetary policy were both used to stem the economic downturn. For many countries conventional monetary was deployed to its fullest, with policy interest rates set at or just above the Zero Lower Bound (ZLB).

Since then, worldwide interest rates remain at their all-time low. In the US, the Federal Reserve's Funds rate has been hovering just above the ZLB for seven years straight now since the outburst of the Great Recession. In Europe several central banks, including the ECB, have recently set policy rates that are even below zero. Others, like the Bank of England, still hover close to the ZLB like in the US. Yet despite of this, economic recovery following the Great Recession has been sluggish in both the US and the Euro-area.

The phenomenon has hardly gone unnoticed by so well economists, economic commentators as well as journalists. "NEVER in recent economic history have interest rates been so low for so many for so long." (The Economist 2013) A recent BIS report (BIS 2015) echoes this and further adds that:

"Interest rates have never been so low for so long. They are low in nominal and real (inflation-adjusted) terms and low against any benchmark. [...] Policy rates are even lower than at the peak of the Great Financial Crisis in both nominal and real terms. And in real terms they have now been negative for even longer than during the Great Inflation of the 1970s. Yet, exceptional as this situation may be, many expect it to continue."

The report seeks to explain that the low rates are, at least partly, this low because they've been too low in the past. "Low rates begets lower rates still" they argue, essentially making the case that the interest rates are kept low because of the weak economic performance since crisis.

Among other theories put forward to explain the low interest rates, two of the more prominent ones: the global savings glut hypothesis put forward by Ben Bernanke - and the secular stagnation hypothesis reintroduced by Larry Summers share common ground: they seek to trace the low interest rates to a mismatch in desired saving over desired investment. They interestingly also both adopt a secular viewpoint and explain the low rates as the result of longer run factors, detached from the latest crisis.

The purpose of this paper is to add to the current dialogue on the topic of the low interest rates that are being experienced worldwide as of late. Because the two prominent theories advocate long-term structural changes in the world economy as the cause of the changes in the interest

rates rather than ultimately caused by the latest crisis, it would lend them credibility if there were to exist some historical precedent.

The research question asked is: “do the current period of low interest rates share any common attributes with previous episodes of low interest rates in the past, or is it unique to our times?”

This paper investigates whether or not there exists some pattern to previous occurrences of low interest rates and how the recent episode compares. Further it attempts to clarify whether the recent low rates can be attributed to low investment demand or excess savings, and whether or not the crisis has played a part.

To do this, this essay employs an explorative style of examining two historical datasets, a “long” set which includes data extending back to the late 19th century for 12 countries, as well as a “wide” data set that contains more recent data for the same as well as an additional 12 countries for a total of 24 countries, all from the OECD. The staging point for the examination will be the real interest rate levels.

This paper finds that while the current period of low interest rates is neither exceptional in terms of length or severity and that it shares a number of attributes with past periods of low interest rates, it stands unique in some regards as well. Notably, past episodes of low real interest rates have almost always coincided with significant increases in the rate of inflation, while the current bout of low real rates is occurring amidst lower than average rates of inflation. Even so, in many countries investment has weakened, savings has increased and policy rates were lowered to their limits since the crisis, all of which would contribute to lower real interest rates even in the absence of inflation.

This paper only considers the long-term real interest rate, calculated as ex post government bond yields minus yearly CPI inflation. The use of long-term interest data primarily reflects the availability of such data.

This essay is structured in the following manner: The next section will contain a theoretical framework on interest rates and will then review literature on two recent theories brought to light recently with regards to low interest rate levels, the secular stagnation and savings glut hypotheses. Section 3 will discuss the data used. Section 4 will then present the main findings and Section 5 will contain any conclusions drawn from the findings in relation to theory.

2. Theory

This section is organized as follows: after a brief literature review of the effects of low interest rates, we will then general theory on the formation of real interest rates. This is then followed by brief summaries of the secular stagnation and savings glut hypotheses as well as a discussion on the policy implications of both theories.

2.1. The decreasing interest rates and their effect on the economy

There seems to be little doubt that interest rates now are the lowest they’ve been in recent memory. Following the global financial crisis, the US Federal Reserve set its fund rate at virtually zero as part of its monetary policy crisis management. Seven years later and the rate still remains locked in place.

In Europe, several central banks, including the European Central Bank, the Danish Nationalbank, the Swiss National Bank and the Swedish Riksbank, have recently pushed short-term interest rates below zero, ranging from negative 0.2 to as low as negative 0.75 percent. The reasons for the banks lowering of their policy rates differ slightly. In Switzerland and Denmark both their currencies were pegged to the Euro and the move to negative policy rates aimed to stop capital inflows and reduce the appreciation pressure on the natural currencies (In the Swiss case the peg was abandoned in early 2015. In the case of the ECB and the Swedish Riksbank, both having flexible exchange regimes, the negative policy rates were intended to provide additional monetary room to safeguard price stability. (McAndrews 2015)

However, the recent low interest rates do not seem to be entirely the victim of recent circumstance or appearing (wholly) as a result the financial crisis. Even before the crisis, interest rates in the US as well as rest of the world had been noted as “unexpectedly low”, something Alan Greenspan (2005) referred to as a “conundrum”. Several authors have noted that interest rates seem to have been declining overall for decades now (see for instance Bernanke 2015a, Catão and Mackenzie 2006, Eichengreen (2015)) as part of a long trend. Meryn King and David Low (2014), in estimating a “world interest rate”, find that it has been decreasing steadily since 1985.

Looking further back than most and considering the very long run are Eichengreen (2015) as well as Catão and Mackenzie (2006), considering data as far back as 1870 or even 1800. They find that when compared over a period as long as this the current levels of interest rates appear less exceptional. Catão and Mackenzie (2006) note that interest rates may appear very low now from the vantage point of the 1980’s or 1990’s but less so when compared to earlier periods. Moreover, the case of long-term interest rates being below the economy’s growth rate is also not as exceptional in the historical long run. (Catão and Mackenzie 2006) Rather, as Eichengreen (2015) points out, it may be that the period of high interest rates preceding the 1980’s is the more anomalous one and that the decline in interest rates since then rather represents a “mean reversion” (Eichengreen 2015)

Having low interest rates come with a set of economic effects and consequences. The main benefit of low interest rates is that it is commonly held to stimulate economic activity. This is the basis for conventional monetary policy, to lean against wind during economic fluctuations. By lowering the interest rate, the price of borrowing becomes cheaper and business activity spurs, which can help to alleviate a recession. Similarly by raising interest rates, economic activity is dampened and can help prevent the economy overheating. Low interest rates may also affect asset prices. When interest rates are low, alternative measures to store wealth become more attractive all else equal. Increased demand for assets like housing or equities will then raise prices.

There are several potential costs associated with very low interest rates including risk of higher inflation. Low interest rates penalizes savers and those who rely heavily on interest income. If real returns become low, investors will begin to seek out higher yielding assets including more speculative activities, potentially increasing financial instability. It may be that banks and other financial institutions tend to take greater risks when rates are kept at low levels for extended periods of time. It may also lead to overinvestment in long-term assets, which will be prone to price falls should the interest rate suddenly increase again. (Kliesen 2010)

The BIS 85th annual report warns that “ultra-low” interest rates, that might be negative in real or even nominal terms, can cause serious mayhem on a financial system. They sap banks’ interest margins and returns from maturity transformation, potentially weakening credit supply. They can undermine the profitability and solvency of insurance companies and pensions funds. But they also provide risk for the real economy, as the plight of pension funds may weaken aggregate demand. Also, negative interest rates are “hardly conducive to rational investment decisions and hence sustained growth” (BIS 2015)

Also, when long-term rates are this is low, borrowing becomes very cheap, and governments may feel incentivized to address budgetary or economic issues by increased borrowing rather than imposing structural change. (BIS 2015)

2.2. Low Nominal, Real and Equilibrium and Natural Real interest rates

The shift to negative policy interest rates by some central banks has caused a stir among both the populace as well as economists. Usually dismissed as a theoretical curiosity, the argument against negative nominal interest rates have typically always been that, when faced with negative returns, any would be investor could simply alternatively hold currency instead.

Yet it isn’t costless to hold currency: It may be subject to theft and physical destruction, is expensive to store and safeguard in large quantities and becomes difficult to use for large and remote transactions. (Anderson & Liu 2013) When taking these factors into account, most economists will begrudgingly accept moderately negative nominal interest rates as a realistic possibility. Ultimately, this should mean little more than that instead of a Zero Lower Bound there is perhaps a more aptly named “Slightly Negative Lower Bound”, but this should confer little practical significance. Most economists seem content to consider zero as the practical lower bound on nominal interest rates.

A more common phenomenon than negative nominal interest rates is the case of negative real interest rates. Negative real interest rates occur when low enough nominal interest rates are faced with positive rates of inflation as per the Fischer equation:

$$r = i - \pi$$

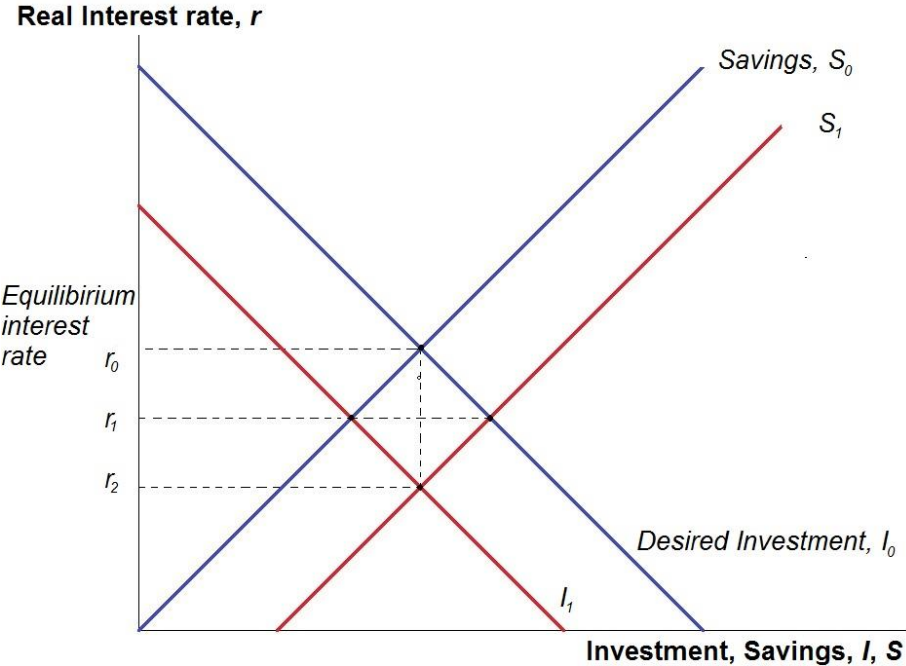
Where r is the real interest rate which equals the nominal interest rate i , minus the inflation rate π . When faced with positive inflation the real interest rate will always be lower than its nominal counterpart. A low, but still positive, nominal interest rate can thus still result in a negative real interest rate when inflation is positive and high enough. Conversely, real interest rates will be higher than nominal ones in the presence of deflation.

If an economy is hit by a bout of increased inflation this will then lead to lower real rates even if it were to be the case that nominal interest rates remain unchanged. Lowered real rates of interest will ultimately be the result of either lower nominal rates, a higher rate of inflation or both.

In the long run, most economists believe that the real interest rate follows a long-run equilibrium. This equilibrium real interest rate, also known as the Wicksellian interest rate is based on macroeconomic factors not directly controllable by a central bank and it is also not directly observable. It is a target point around which a central bank should not stray too far away from when they set their policy interest rate.

It may help to envision the relation with the simple loanable funds setup. Figure 1 below shows the supply and demand for loanable funds, which is the same as desired savings and investment and the corresponding real rate. We see then that this is simply the supply and demand of investment. Where the curves meet determines the equilibrium price of investment - the equilibrium real interest rate. As the market clearing rate, matching the two produces the real rate of interest at which the amount that firms wish to invest equals the amount that households wish to save.

Figure 1: Supply and demand for loanable funds determines the equilibrium real rate



We can also see that shifts in either demand or supply will lead to changes in the equilibrium real interest rate. In particular, an outward shift in savings (S to S_1) or a downward shift in desired investment (I to I_1) will push the equilibrium real interest rate down (r^* down to r_1^* or even r_2^* the case of both). If it is the case the equilibrium real rate has decreased, then it should be the case then that either (or both) of the above two factors have shifted and are to the lower levels of the interest.

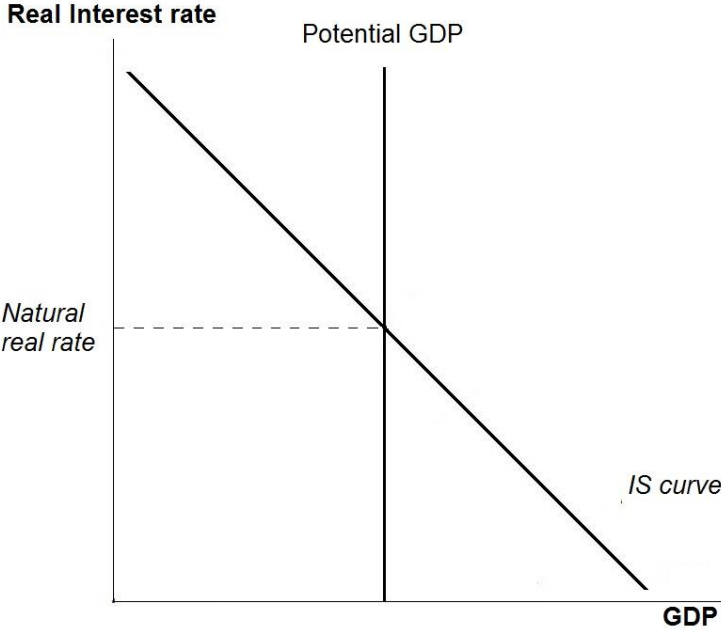
Shifts in savings can be caused by a multitude of factors, not limited to: changes in current income and expected future income, changes in uncertainty leading to precautionary saving, changes in demography, changes in public savings and financial innovation. Shifts in investments can be caused by a plethora of causes as well, including changes in investment profitability, changes in relative prices of investment goods or changes in financial intermediation. Furthermore one can consider demand of risky and safe assets. If demand for safer assets increases for whatever reason, all else equal, the rate will decrease for safe assets and increase for risky assets. (Blanchard, Furceri and Pescatori 2014)

Now we further believe that saving is a function of output as well as the real interest rate. As output increases, so does people's income and thus the amount that people wish to save. As savings increases, this pushes the real interest rate down. This means that for every level of GDP we have a corresponding equilibrium real rate and these together make up the Investment Savings (IS)-curve. If the determinants of the IS curve (investment and savings) changes this

will cause the IS curve to shift either to the left or right. In particular the IS curve will shift to the left in the case of decreased investment or increased savings.

Figure 2 below shows this relationship between the real interest rate and GDP output. Where the IS curve and the potential GDP line intersects, real GDP equals potential GDP, and the corresponding real interest rate equilibrium is the natural real interest rate. The natural real rate is the long-run equilibrium rate of real interest that corresponds to full employment. It is also the real rate of return required to keep the economy's output equal to potential output.

Figure 2: IS and potential GDP determines the natural real rate



As the equilibrium real interest rate is not directly observable, measuring it goes by way of estimation. One of the best known cases of this is perhaps Laubach and Williams (2003) who show that it is highly time-variant. Further the equilibrium real rate has declined since 1960's. Adding to this Justiniano and Primiceri (2010) also find a substantial degree of time variation in the equilibrium rate, and add that it has become negative on a number of occasions in the post-war period. Notably, they find that it has fallen sharply below towards the end of 2008.

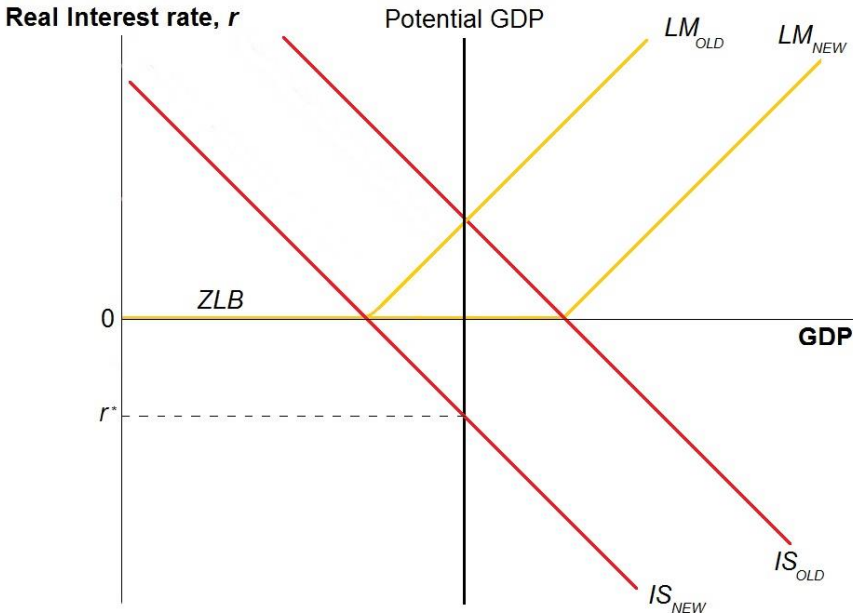
Aside from the above factors the real rate of interest can also deviate from its equilibrium rate due to monetary policy. As the market clearing rate for investment and savings, the central bank should normally wish to hold the interest rates at this level to maintain output at its potential level. It may however be the case that, a central bank wanting to, for example, achieve lower inflation, lets the real rate deviate from this natural rate for what is usually a limited amount of time. (Blanchard, Furceri and Pescatori 2014)

Monetary policy traditionally enters the above relationship through the LM curve. If the IS-curve has shifted due changes in the desired investment or savings, monetary policy can be used to adjust the supply of money so that the interest rate achieved is the natural rate and full employment is restored. But what happens if the IS curve has been shifted far enough to the left that the required natural real rate to restore full employment becomes negative?

Because of the Zero Lower Bound restriction on nominal interest rates we discussed earlier, nominal interest rates are essentially locked at zero (Note that only nominal rates are locked at

zero, the real rate achieved will be the nominal rate minus any inflation.) This means that after a certain point, increases to the money supply, shifting the LM curve to right, will not produce any effect.

Figure 3: IS-LM model with Zero Lower Bound imposed on nominal interest rates



This is essentially Paul Krugman’s liquidity trap setting. To Krugman (1998), an economy trapped in a liquidity trap may require negative interest rates to re-attain full employment, but is unable to achieve this. This may occur if the current price level is high enough compared to the long-term price level so that people expect deflation, leading to a zero nominal interest rate resulting in a high real interest rate. It may also occur if people expect a low future income, causing precautionary saving even at unfavorable interest rates. The main effect of the liquidity trap is that conventional monetary policy, manipulating the policy interest rate, becomes impotent as nominal interest is already locked at zero. (Krugman 1998 p. 150)

The secular stagnation and savings glut theories both work with the notion that the IS curve has shifted sharply to the left, necessitating negative real interest rates to restore full employment, though the theme is perhaps a bit more central to the stagnation view. What separates the two is the primary cause of this shift, in the secular stagnation view it is primarily factors leading to decreased investment, while the savings glut theory primarily points to excess global savings. The theories are looked at in more detail in the next two sections below.

An alternative view to these hypotheses is that the interest rates are simply kept low because we are in the aftermath of the most significant financial crisis and economic recession in recent memory. This builds on the observation that many crises leave permanent scars for the economies that are affected, a persistent loss of output that is rarely recovered, or at least remains highly persistent. (Cerra and Saxena 2008)

Because crises are typically associated with lower medium term growth (Reinhart and Reinhart 2015), there is cause to keep interest rates lower following a major crises to foster economic activity. The low interest rate would then be kept low because it is still too early to raise them and we are essentially still in an elongated recovery process.

2.3. Secular stagnation hypothesis

The term “secular stagnation” was coined by Alvin Hansen in his 1938 American Economic Association presidential address, “Economic Progress and Declining Population Growth.” Writing in the latter stages of the Great Depression, Hansen argued that, because of apparent slowdowns in population growth and the pace of technological advance, firms were unlikely to see much reason to invest in new capital goods. He concluded that meager investment spending, together with subdued consumption by households, would likely prevent the attainment of full employment for many years. Hansen did not anticipate the postwar economic boom and burst in population growth, so the secular stagnation theory fell into the background.

The theory has recently been brought forward again by Lawrence Summers who argues that Hansen’s concerns may be far more applicable in the economies of today. The weak economic performance following the Great Recession, which both US and Europe have suffered from, could possibly be indicative of what is to be the norm in the foreseeable future rather than exceptional circumstance, according to Summers. The suggestion struck a chord with many economists, and secular stagnation is again the subject of debate (see for example Eichengreen 2014 & 2015, Gordon 2014, Krugman 2014, Summers 2013, 2014a, 2014b & 2015 among others).

Eichengreen (2015) calls secular stagnation a downward tendency of the real interest rate, which reflects an excess of desired saving over desired investment. The result is a persistent output gap and/or sluggish economic growth. One of the biggest concerns of the secular stagnation hypothesis is that there may be “no attainable interest rate [that] will permit the balancing of saving and investment at full employment.” (Summers 2014b)

Normally, when an economy is hit with a shock that would cause increased precautionary saving and reduce the propensity to invest it would normally cause interest rates to fall until saving and investment are in equilibrium around the full employment level of output. But for such a change to occur in all possible circumstances it necessitates full interest rate flexibility. Because short term interest rates cannot fall appreciably below zero due to the possibility of currency substitution, short term interest rates are not fully flexible in modern economies. (Summers 2014b) The ZLB is thus a natural market imperfection that may make it impossible for investment to match saving for full employment (Summers 2015)

As such, the case of Summers’ secular stagnation is that not only has weak demand pushed interest rates towards zero, to reach equilibrium they may need to be lowered even further, but cannot, as the nominal interest rates are locked at the ZLB. The issue may be further worsened by wage and price flexibility, as more flexible wages and prices are expected to fall during output slowdowns. Such falls will then lead to an increase in real interest rates. (Summers 2014b)

This is essentially the liquidity trap setting caused by weak demand; the required real rates are negative but they stop decreasing once the nominal interest rates reach the ZLB. The result is weak economic growth, high unemployment and the death of the efficacy of conventional monetary policy. The main difference, is that while the liquidity trap has frequently been treated as the result of a temporary shock the threat of secular stagnation may persist indefinitely. (Krugman 2014)

Another key feature of Summers' hypothesis is that it may be still possible to attain full employment, but this comes at the cost of financial stability. This may take the form of financial bubbles and the like, he argues, suggesting that the US may well have entered a state of secular stagnation before the economic meltdown in 2008. The crisis was after all, he argues, caused by the bursting of the worst housing bubble in over a century, yet the bubble period preceding the crisis was characterized by rather tame economic performance in comparison. (Summers 2014b)

Summers argues that the economies of today exhibit symptoms that are consistent with what one would expect if the equilibrium real interest rate has declined. He identifies a number of reasons for this, including: reductions in demand for debt-financed investment, decline in population growth, growing inequality in income distribution, substantially lower prices of capital goods and considerable accumulation of safe assets in central bank reserves around the globe. (Summers 2014b)

Eichengreen (2015) points to rising savings rates due to the emergence of emerging markets; declining investment rates due to shortages of attractive investment opportunities, declining relative prices of investment goods, as well as declining population growth rates. Gordon (2015) points to four 'headwinds' as causing the demise of growth: (1) declining labor participation rate exacerbated by declining productivity growth, (2) absence of an educational revolution since 1970's, (3) income inequality disfavoring the 99% and thereby weakening demand and (4) the mounting of public debt. (Gordon 2015)

Summers preferred method of dealing with secular stagnation is to raise demand and consequently pull desired investment up to match savings, thereby raising the natural equilibrium rate of interest to an attainable level. Concretely he proposes raising public investment to deal with what is essentially a market failure, stating that "public investment, that would have been irrational at a high real interest rate, becomes rational at a lower rate" (Summers 2014b)

Other possibilities include reducing structural barriers to private investment, promoting business confidence, maintaining spending power through social protections and reduce inequality to redistribute income to those with a higher propensity to spend. Lastly, though Summers does not put much stock into the idea, is to simply lower the real interest rate further by inducing more inflation, which could done raising the inflation target or employing quantitative easing to reduce credit or term premiums. This may come at the price of increased financial instability (Summers 2014a)

2.4. The savings glut hypothesis

The savings glut hypothesis was first voiced by former head chairman of the US Federal Reserve, Ben Bernanke, in a speech back in 2005. Originally raised to address the often heard international criticism of the very high US current account deficits, he argued that these were a result of an international excess in saving and not just primarily US domestic policy alone:

"To be more specific, I will argue that over the past decade a combination of diverse forces has created a significant increase in the global supply of saving--a global saving glut--which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today" (Bernanke 2005)

Chief among these forces, Bernanke argued was a remarkable reversal in the flow of credit to developing and emerging-market economies, turning these economies from borrowers to lenders on international capital markets. (Bernanke 2005)

It is this resulting global excess of desired saving over desired investment, originating in large part from China and other Asian emerging market economies as well as oil producers like Saudi Arabia, that was a key factor for the low global interest rates. The inflow of foreign capital also helped to push up the value of the dollar and so contributed to the large and persistent US trade deficit. (Bernanke 2015b)

Eichengreen (2015) notes that emerging markets are “financially underdeveloped, forcing households to substitute brute force accumulation for portfolio diversification.” Lacking social safety nets in the public sector encourages precautionary saving for contingencies and old age among the population while central banks and governments rely on reserve accumulation as insurance against financial shocks. As the share of GDP of the emerging markets has risen, so too have global savings rates. (Eichengreen 2015)

The flows of capital involved have been considerable. The US expanded rapidly during the latter 1990’s and beginning of the 2000’s. Between 1996 and 2004 the US deficit grew from \$125 billion to over \$640 billion. This, however was not matched by increases in US investment rates, which remained at rough a constant around 19% of GDP. The increase was instead matched by increases in net capital flows from abroad. (Bernanke 2007) Since then Great Recession has come and gone but the situation has largely persisted.

In a blogpost from early 2015 Bernanke updated his assessment made from his 2005 and 2007 speeches and he asserted that while the savings glut had changed its characteristics following the Great Recession, it was still prevalent. The US Current account deficit peaked in 2006 at just over \$800 billion. Following the crisis, the deficit had effectively halved to \$440 billion by 2010 but still remained above \$400 billion as of 2013. The deficit was still matched by current account surpluses in Asia and to some degree in Europe, most notably Germany. (Bernanke 2015b)

Arora, Tyers and Zhang (2014) find empirical evidence that there is negative long-term relationship between 10-year US bond yields and current account surpluses in China and Japan. Because of the market for long bonds being comparatively integrated long-term bond rates are indicative of the world natural rate, thus suggesting Asia has a leading role in the expansion of global saving contributing to declining trend in real long yields since 1980. (Arora, Tyers and Zhang 2014)

The international capital inflows may not just have lowered Treasury yields but also returns on other apparently safe US assets as well, including mortgages, in the years leading up to the financial crisis. The capital inflows largely consisted of purchases of treasuries and agencies by emerging market economies seeking safe assets to invest their current account surpluses with, but also included purchases of highly rated private mortgage backed securities by other investors who sought a broader range of assets but greatly valued perceived safety. The low long-term interest rates, including mortgage rates, then added to the protracted rise in housing prices. As such it may be that international capital flows played a not insignificant role in helping to finance the housing bubble. (Bernanke et al. 2011)

2.5. Both theories

Both the savings glut hypothesis and the secular stagnation hypothesis seek to explain the low equilibrium real interest rate as the result of a lack of demand over saving:

“There is some similarity between the global saving glut and secular stagnation ideas: Both posit an excess of desired saving over desired capital investment at ‘normal’ interest rates, implying substantial downward pressure on market rates. Both can account for slower US growth: Secular stagnation works through reduced domestic investment and consumption, the global savings glut through weaker exports and a larger trade deficit.”
(Bernanke 2015b)

There are however significant differences as well. Secular stagnation explains muted capital investment through weakened fundamentals such slow population growth, low capital intensity in new industries and declining relative prices of capital. The saving glut hypothesis in contrast primarily traces the finger back to government policy decisions as the cause of the excess of desired saving over desired investment. Another point of difference is that the former primarily focuses on factors in single countries or regions, while the latter attributes the results stemming from global interaction. (Bernanke 2015b)

These differences matter, not least because they prescribe very different policy responses. If secular stagnation is the cause for the low growth and low rates, then expansionary fiscal policy could be useful, and in the longer run, structural reform to improve the returns of capital investment, but ultimately efforts should be directed at promoting public and private investment (Summers 2015)

If the state of secular stagnation and low interest rates perpetuates, as Blanchard, Furceri and Pescatori (2014) warn they might, it will have important implications for stabilization policy. The effectiveness of even unconventional monetary policy is reduced at the zero lower bound, while fiscal policy gets a small boost, as sustaining or decreasing debt become easier at low rates. Less enthusiastic about the use of fiscal expansion for extended periods of time, Krugman (2014) warns that if we are unable to leave the state of secular stagnation and low interest rates will be the norm for the foreseeable future, considerable rethinking of macroeconomic policy may be in order.

On the other hand if the global savings glut is the cause of the low interest rates, another set of policy responses would be in order. Specifically, as a result of current (worldwide) policies, the right response would be to try and reverse these so that they no longer generate the savings glut. Freeing up international capital flows and reduce interventions in foreign exchange markets (Bernanke 2015b)

3. Data

Two data sets are examined, a “long” set and a “wide” set. The “long” data sample consists of yearly observations for 12 countries (Belgium, Canada, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, UK and USA) across 116 years (1881 to 1996). The country selection mainly reflects the availability of data. See Bordo and Jonung (2001) for full list of data sources.

The “wide” data sample consists of yearly observations for 24 OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, South Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States). The shortfall in countries compared to the full OECD roster again reflects the availability of data. The data extends for 55 years between from 1960 to 2014.

The real interest rate examined is ex post and was calculated as long-term interest rate data minus yearly CPI inflation. Other variables of interest are inflation, per capita GDP, gross capital formation and savings identified as gross capital formation + current account balance.

4. Findings

In this section I will present the main findings from studying the development of the real rate in the two data sets. This section is divided into two parts, a descriptive one where the historical attributes of past periods of low interest rates are mapped out to create an overview of how low interest rate periods in the past have looked and a cause analysis where we try to determine whether low interest rate periods have been caused by low investment or high savings.

4.1. Descriptive analysis

We begin by creating an historic overview the evolution of the interest rate incorporating both our long and wide data samples. Three variables are investigated: the *real interest rate*, the *rate of inflation* and the *rate of real GDP per capita growth*.

The focal point of the analysis is the real interest rate and how past low interest rates periods compared to the current one, and so three aspects are examined: *how frequent* low interest rates have been, *how widely spread between countries* periods of low interest were and *the length of low interest periods*.

Frequency of low interest rates

First we examine the frequency at which low interest rates has occurred in the past by examining the 12 countries with data from the late 19th century.

By defining “low interest rate periods” as periods when the real interest level in a given country was below the chosen threshold levels of 0%, 1% and 2%, respectively, we find that such periods have occurred fairly frequently and to varying degrees in each country. Table 1 below shows how many years the real interest rate went below the threshold, how big a ratio this was out of the whole sample period, and the average period length in years each low interest rate period was, for each country and each threshold level.

The country in which the real interest rate went below the threshold levels the least frequently was Germany, which in the case of a negative real rate experienced this during 14 years out of the 126 years with available data, or 11% of the time. It is likely that real interest rate was negative, or at least very low, during a portion of the missing years as these are during the two world wars, but even if this were to be the case for all of them, Germany would still have the fewest years with low interest rates.

The countries that experienced the most frequent dips below the threshold levels were France and Norway, which both experienced negative real interest rates during 37 years out of the whole 134-year period, or about 27.5% of the time. On the whole, “low interest rate” levels

occur relatively frequently, on average 20.5%, 29% and 40.5% of the time, respectively, in these countries throughout the sample period.

Table 1: Number of Low Interest Rate Periods 1881-2014 for 12 countries

	Real rate <0			Real rate <1			Real rate <2		
	years	ratio	length	years	ratio	length	years	ratio	length
<i>USA</i>	22	0,1642	2,20	36	0,2687	2,40	52	0,3881	3,06
<i>UK</i>	29	0,2164	2,64	39	0,2910	2,44	59	0,4403	3,28
<i>Germany</i>	14	0,1111	2,00	23	0,1825	2,56	34	0,2698	2,27
<i>France</i>	37	0,2761	3,70	43	0,3209	4,78	63	0,4701	3,50
<i>Canada</i>	24	0,1791	2,40	36	0,2687	2,25	53	0,3955	3,31
<i>Italy</i>	30	0,2239	3,00	33	0,2463	2,75	46	0,3433	3,29
<i>Belgium</i>	22	0,1803	1,47	33	0,2705	2,06	42	0,3443	2,33
<i>Netherlands</i>	35	0,2612	2,33	44	0,3284	2,75	57	0,4254	2,85
<i>Switzerland</i>	27	0,2015	2,08	41	0,3060	2,28	63	0,4701	3,32
<i>Denmark</i>	22	0,1642	1,57	39	0,2910	2,05	55	0,4104	2,62
<i>Norway</i>	37	0,2761	2,06	50	0,3731	2,17	64	0,4776	3,56
<i>Sweden</i>	26	0,1940	2,00	41	0,3060	2,41	59	0,4403	2,81
Average	27,08	0,2040	2,29	38,17	0,2878	2,57	53,92	0,4063	3,02

Table 2: Number of Low Interest Rate Periods 1960-2014 for 24 countries

	Real rate <0			Real rate <1			Real rate <2		
	years	ratio	length	years	ratio	length	years	ratio	length
Australia	6	0,11	6,00	8	0,15	4,00	19	0,35	3,17
Austria	2	0,04	1,00	2	0,04	3,00	13	0,26	2,60
Belgium	4	0,07	2,00	8	0,15	2,00	13	0,24	3,25
Canada	3	0,05	3,00	8	0,15	2,00	14	0,25	3,50
Denmark	5	0,09	1,25	12	0,22	2,40	16	0,29	2,67
Finland	11	0,21	5,00	15	0,28	6,00	20	0,38	6,00
France	5	0,09	2,50	10	0,18	3,33	20	0,36	3,33
Germany	1	0,02	1,00	4	0,07	1,00	8	0,15	3,00
Greece	2	N/A	2,00	7	N/A	1,75	11	N/A	5,50
Iceland	10	N/A	5,00	13	N/A	6,50	15	N/A	7,50
Ireland	12	0,22	2,00	19	0,35	3,80	23	0,42	5,75
Italy	8	0,15	2,67	8	0,15	2,67	23	0,42	3,20
Japan	8	0,16	2,00	14	0,29	2,33	16	0,33	4,33
South Korea	2	0,05	2,00	5	0,12	1,25	12	0,29	2,40
Luxembourg	6	0,13	2,00	14	0,31	3,50	19	0,42	3,80
Netherlands	9	0,16	2,25	16	0,29	3,20	23	0,42	2,88
New Zealand	15	0,27	5,00	17	0,31	4,25	20	0,36	5,00
Norway	12	0,22	2,00	19	0,35	2,38	26	0,48	4,33
Portugal	16	0,30	5,33	22	0,42	4,40	30	0,57	6,00
Spain	1	0,03	1,00	5	0,14	1,67	12	0,33	6,00
Sweden	7	0,13	1,75	14	0,25	2,00	23	0,42	2,56
Switzerland	12	0,22	2,00	22	0,40	2,44	36	0,65	4,00
UK	10	0,18	4,00	12	0,22	5,00	18	0,33	5,00
USA	7	0,13	1,75	13	0,24	2,60	24	0,44	4,80
Average	7,25	0,13	2,69	11,96	0,21	3,06	18,92	0,34	4,19

If we widen the sample to include the wider selection of countries we find that the results are similar. Table 2 below shows the corresponding data to Table 1 for the select 24 OECD countries over the period 1960 to 2014. Overall, the fraction of the total time period that was made up of “low interest rate periods” is noticeably smaller in the latter sample: on average 13%, 21% and 34% of the time, respectively, were spent below the threshold levels. This would be consistent with the view that the interest rate in the post war period has been higher.

There is also a greater level of diffusion in the amount of years that the countries experienced low interest rates between countries: countries like Germany, Austria and Spain for instance experienced negative real interest rates less than 5 % of the whole time period while New Zealand and Portugal had negative interest rates more than 25% of the period.

Global Spread of low interest rates

Next we look at how widespread the cases of low interest rates were by examining how many countries experienced low interest rates at the same time. If most countries simultaneously experience it is likely that is due to some event that affects the economy on a global scale.

A sizable portion of countries experienced low interest rate periods at the same time. Table 2 below summarizes when at least 9 of the 12 countries in the long-run data sample were simultaneously below each threshold level. Some of these coincide with some major events, economic as well as non-economic. Notably, low interest rates occurred across most of the countries coinciding with the 1907 Bankers’ Panic, the two world wars, the first oil shock and the ensuing Great Stagflation period during the 1970’s and most recently the Great Recession in 2008 and the following current predicament.

For some countries, like Germany and the US, years of low real interest rate that coincide with these events will account for over half of the years the interest rate were below the thresholds in these countries meaning that most cases of low interest rates in these countries were likely caused by these major events. For others countries like France and Norway, they account for less than a third of the total amount of years of low interest.

The interest rates seem to move largely together even when not in conjunction to these major events. For instance all of the above countries experienced frequent sporadic bursts of low interest rates during late 19th century and start of 20th century leading up to the first world war, but what years and for how long vary from country to country.

During the First World War, the real interest rate became strongly negative for 5-6 years for all countries reflecting the sharp increase in inflation that it brought about. During the inter-war period interest rates remained high for the most part between most countries, France and Belgium being the more notable exceptions. The Second World War again saw interest rate drop as inflation spiraled and most countries experienced low interest rates during and around the 1940’s. After World War 2 until the 1970’s, some countries, like Germany, Canada and Belgium experienced very few instances of low interest rates, while others, like the Netherlands, Switzerland and three Nordic countries of Denmark Norway and Sweden experienced more.

During the 1970’s most countries experience low interest rates for some years (Germany being the one notable exception), but its length and severity vary greatly from country to country. This observation also holds true when considering the wider sample of 24 countries. From 1981 to about 2000 there are very few instances of real interest rates lower than 2% in any country.

Table 3: Globally occurring low interest rate events

Period	r<0	r<1	r<2	Event
1889	x	x	✓	
1907	x	✓	✓	1907 Banker's panic
1910	x	x	✓	
1915-1920	✓	✓	✓	World War 1
1937	x	✓	✓	
1940-1942	✓	✓	✓	World War 2
1947-1948	x	✓	✓	
1951	✓	✓	✓	
1956	x	x	✓	
1973	x	✓	✓	OPEC 1
1974-1975	✓	✓	✓	Great Stagflation
1977	x	x	✓	
2005	x	x	✓	
2008	x	x	✓	Great Recession
2010-2014	x	✓	✓	

Interesting to note, however, is that many countries, specifically Greece, Iceland, Ireland, Japan, US, South Korea, Luxembourg, Portugal, Spain, Switzerland and the US, as well as to a lesser extent Denmark, France, Germany, Italy, Netherlands and Norway, start having low real interest rates well before the meltdown in 2008, suggesting that the crisis and recession, at the very least was not the sole cause. Following 2008 only the PIIGS countries of Portugal, Ireland, Italy, Greece and Spain do not have single year of low real interest rates.

Low interest rate period length

Examining the cases of the low interest rates periods individually in each country we find that there is a general pattern of interest rate periods appearing sporadically in most countries in shorter bursts of between 1 to 3 years, as well as longer periods that sometimes spans upwards a decade or more. These longer periods typically coincide with the widely spread events identified above.

In the US for instance, most periods of interest rates below the thresholds do come in shorter spurts between one and three years long except for the following notable exceptions: a five year period (1916-1920) connecting to World War 1, a twelve year period (1941-1952, 1950 is an exception) during and after World War 2, eight years during the 1970's (1973-1980 with 1976 being an exception) and finally from 2008 and onwards (2009 being an exception). In the UK, we have a similar situation, with longer periods of low real interest rates occurring between 1915-1920, 1939-1952, 1974-1980 and 2008 onwards.

Germany is one of the countries with the fewest instances of real rates below the thresholds, and this is partly due to missing or unreliable data from around the world wars. After the wars Germany had had one of the longest periods of uninterrupted high interest rates of any of the countries. Since 1956, the real interest rate remained above the 2% threshold for nearly 50 years until 2005, meaning it was one of the few countries spared the inflation hike of the 1970's. Since 2005 only 2 years (2006 and 2009) has had interest rates above 2% threshold.

France is the country that has had the most instances of low interest rates among the countries with much available data, and is also one of the countries with the longest periods of low interest rates. Long interest rate periods are found between 1915-1920, 1923-1927, 1936-1952 (one of

the longest periods of negative real rates for any of the countries), 1973-1980 and 2008 and onwards.

A general observation can be made that the current period of low real interest rates is not exceptional in the sense that it is not longest period of low real interest rates that has been experienced. While the lengths of the periods of low interest rates will vary heavily from country to country, most of the countries have experienced longer periods of low interest rate than the current one.

To closer examine the characteristics of low interest rate periods, we will employ the following method of choosing low interest rate periods in each set to study: first we smooth the interest rate data by calculating a 3 year moving average for each country. Any period of at least 5 years in length in which the real rate MA was below the 2% threshold is then selected as a noteworthy period and examined below. We then employ simple mean comparison of select variables of these low rate periods, with the rest of the data sample.

Inflation

As this paper concerns itself with the real interest rates, the rate of inflation becomes a variable of key interest. A low real interest rate will be the result of either low nominal interest rates or a high rate of inflation or both. The difference between the real rate and inflation is of course the nominal rate. Do past periods of low real interest coincide with mounting inflation rates or not and how does this compare to the current predicament?

We know from history that many of the larger events should have caused increased inflation, such as the world wars where scarcity due to halted or decreased trade caused prices for many goods to rise significantly. Likewise, the “Great stagflation” during the 1970’s was a period triggered by the first oil shock, where a lengthy negative supply shock combined with expansionary monetary policy triggered high inflation.

Table 4 below compares the mean rate of inflation before 1961 with those experienced during periods of low interest rate of noteworthy length in each of the 12 countries in the long data set. What we see then is that not only do the low interest rate periods that include the world wars coincide with increased inflation, but so are all other periods as well. The rate of inflation still sees its greatest increase during the wars.

The mindful reader may here notice that the mean rate of inflation appears negative for most countries when we do not include the periods during which the real rates were low. This, however, should not indicate that most countries experienced deflation for the majority of the time between 1881 and 1960, but it can rather be explained by the intensity of the inflation rates experienced during the world wars. As the comparison period will include the years in which the greatly inflated war prices normalized, the mean for the whole period will appear negative.

The general observation that past episodes of low real rates have all coincided with increased rates of inflation can be extended to the countries of the wide data set as well and generally applies until the 2000’s. Tables 5a and 5b compares the mean rate of inflation experienced after 1960 in the same way as table 4, for the countries in the wide data set. The 1970’s too, as one might suspect, shows near universal increases in the rate of inflation across most countries.

Table 4: Inflation rates 1881-1960

Country	Belgium		Canada		Denmark		France		Germany		Italy	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1881-1960	-2,03	1881-1960	-1,12	1881-1960	-1,65	1881-1960	-0,95	1881-1960	0,93	1881-1960	-0,46
<i>Low Interest Rate Periods</i>	1923-1929	13,10 (-4,45)***	1905-1913	2,55 (-4,49)***	1911-1920	11,74 (-5,15)***	1914-1921	16,62 (-3,05)**	1914-1922	169,36 (-1,37)	1914-1922	20,46 (-3,55)***
			1915-1920	11,22 (-4,88)***	1938-1943	7,78 (-2,36)*	1923-1929	12,20 (-3,30)**			1936-1948	51,70 (-2,03)*
			1936-1943	2,73 (-3,61)***	1938-1952	5,13 (-4,01)***	1936-1953	22,94 (-5,70)***				
			1945-1952	5,85 (-3,70)***								
Country	Netherlands		Norway		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1881-1960	-2,31	1881-1960	-2,40	1881-1960	-1,73	1881-1960	-1,68	1881-1960	-2,10	1881-1960	-1,60
<i>Low Interest Rate Periods</i>	1914-1919	12,29 (-4,99)***	1911-1920	13,93 (-3,47)***	1912-1919	14,65 (-3,51)***	1914-1919	14,57 (-4,12)***	1897-1901	1,72 (-2,26)**	1915-1920	12,35 (-4,94)***
	1937-1958	6,31 (-5,58)***	1936-1947	4,95 (-3,62)***	1935-1943	5,04 (-3,88)***	1937-1943	6,10 (-3,90)***	1910-1920	9,55 (-4,48)***	1940-1953	5,29 (-4,43)***
			1949-1955	6,56 (-3,99)***	1947-1959	4,05 (-4,37)***			1935-1953	4,50 (-6,74)***		

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: See Bordo and Jonung (2001)

Table 5a: Inflation rates 1961-2014

Country	Australia		Austria		Belgium		Canada		Denmark		Finland	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	4,06	1961-2014	3,19	1961-2014	3,21	1961-2014	3,31	1961-2014	4,84	1961-2014	3,35
<i>Low Interest Rate Periods</i>	1972-1980	10,94 (-5,85)***	1973-1977	7,66 (-6,25)***	1973-1978	8,86 (-4,02)***	1974-1980	9,35 (-9,65)***	1963-1968	6,31 (-1,56)	1972-1982	11,64 (-7,15)***
			2010-2014	2,23 (2,46)**	2010-2014	2,00 (1,82)			2008-2014	1,93 (4,35)***	2008-2014	2,00 (1,95)*
Country	France		Germany		Greece		Iceland		Ireland		Italy	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	3,11	1961-2014	1,45	1961-2014	3,98	1961-2014	2,32	1961-2014	2,86	1961-2014	4,06
<i>Low Interest Rate Periods</i>	1973-1982	11,06 (-10,55)***	2010-2014	1,52 (-0,24)	2003-2008	3,37 (0,67)	2000-2014	5,52 (-3,65)***	1971-1983	14,27 (-8,41)***	1973-1982	16,32 (-11,17)***
									2000-2008	4,01 (-1,91)*		

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, OECD

Table 5b: Inflation rates 1961-2014

Country	Japan		South Korea		Luxembourg		Netherlands		New Zealand		Norway	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	2,36	1961-2014	7,04	1961-2014	2,89	1961-2014	2,60	1961-2014	3,94	1961-2014	3,33
<i>Low Interest Rate Periods</i>	1969-1986	9,24 (-3,78)***	2010-2014	2,35 (3,66)***	1972-1977	8,01 (-5,10)***	1963-1967	4,84 (-3,42)**	1966-1983	10,49 (-5,02)***	1963-1983	7,37 (-4,95)***
	2002-2014	0,07 (4,14)***			2003-2007	2,35 (1,36)	1971-1978	7,84 (-6,99)***			2009-2014	1,79 (3,20)***
					2009-2014	1,85 (1,70)	2010-2014	1,91 (1,57)				
Country	Portugal		Spain		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	5,14	1961-2014	4,62	1961-2014	3,32	1961-2014	1,24	1961-2014	2,69	1961-2014	2,90
<i>Low Interest Rate Periods</i>	1962-1986	14,07 (-4,33)***	2002-2008	3,27 (2,05)**	1962-1967	4,46 (-1,50)	1962-1969	3,49 (-6,02)***	2008-2014	2,91 (-0,39)	1973-1981	9,04 (-6,65)***
	2001-2008	3,00 (2,18)**			1971-1982	9,42 (-6,98)***	1971-1977	5,92 (-3,74)***			2005-2014	2,29 (1,34)
							1979-1985	4,16 (-5,12)***				
							2004-2013	0,57 (1,83)*				

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, OECD

After 2000 however we seem to have a near opposite scenario, with inflation rates noticeably lower or largely unchanged compared to the longer average mean. Notable exceptions are Iceland and Ireland that experienced increased inflation beginning from 2000 compared to before. This sets the current experience apart from previous episodes in that the low interest rates are a result of low nominal interest rates alone, whereas high inflation had a hand in most of the past spells of low real rates.

GDP outcome

The period of following the Great Recession has not only seen low interest rates but sluggish economic performance as well. Do any previous periods share this dynamic? Table 6 compares means of per capita growth rates before 1971 with those during low rate periods.

There appears to be little in the way of systematic outcome when comparing per capita GDP growth rates during low real interest rate periods before 1970. What's more the effect of low real interest rates appear to have little effect on GDP growth rates. The periods that see the biggest switches in GDP growth rates are unsurprisingly those periods which again include the world wars, and the switches go both ways.

As such any change during these periods should naturally be caused by their respective wars, increased productivity due to the mobilization of production resources during war time booms in cases where GDP rose, and war destruction of assets and reduced trade opportunities in those cases where GDP fell, rather than indicating any pattern of low real rates coinciding with lower or higher growth rates.

Among the periods remaining, few seemed to coincided with noteworthy changes in GDP growth rates, four cases present an exception, France, Italy, Netherlands, and Norway, all in the late 50's and 60's all show increased GDP growth rates, which should be indicative of the post-war boom more than anything else.

Tables 7a and 7b show the corresponding comparisons after 1971 for the countries in the wide data set. The 1970's saw very little change in the average GDP growth rates with most countries not experiencing any statistical difference between their means. The exceptions are Italy and Norway who experienced higher growth rates.

During the 2000's most countries see a noted decrease in GDP growth rates. Germany, Greece, Iceland, Ireland, Spain and Switzerland stand apart in that they have no statistically significant difference in their means. Among these we have Germany which was managed to weather the recent crisis very well, three countries whose low interest rate periods do not include the crisis years itself (Greece, Ireland and Spain). Furthermore we have Luxembourg which stands further apart in that it experienced no real change in its growth rate during the period of 2003-2007, while they decrease significantly during the period of 2009-2014.

This seems suggestive that overall, past and present periods of low real interest rates has seldom seen it affect GDP growth rates. The periods with the greatest changes included in them the two most destructive conflicts in human history, with all that that entails, as well the most severe economic crisis in recent memory.

Table 6: GDP per capita growth rates 1881-1970

Country	Belgium		Canada		Denmark		France		Germany		Italy	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1881-1970	2,58	1881-1970	1,36	1881-1970	2,57	1881-1970	1,71	1881-1970	1,67	1881-1970	1,85
<i>Low Interest Rate Periods</i>	1923-1929	2,86 (-0,22)	1905-1913	3,40 (-1,06)	1911-1920	0,92 (0,83)	1914-1921	-0,73 (0,50)	1914-1922	-1,85 (0,98)	1914-1922	0,05 (1,47)
			1915-1920	0,22 (0,35)	1938-1943	0,49 (0,24)	1923-1929	3,98 (-1,20)			1936-1948	1,26 (0,11)
			1936-1943	8,08 (-2,95)**	1938-1952	2,21 (0,26)	1936-1953	2,88 (-0,31)			1962-1966	3,97 (-2,32)**
			1945-1952	0,92 (0,29)	1962-1967	3,45 (-0,70)	1957-1964	4,76 (-3,55)***				
Country	Netherlands		Norway		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1881-1970	1,82	1881-1970	1,76	1881-1970	2,68	1881-1970	1,40	1881-1970	1,06	1881-1970	1,08
<i>Low Interest Rate Periods</i>	1914-1919	0,81 (0,21)	1911-1920	2,45 (-0,31)	1912-1919	-0,04 (-1,32)	1937-1943	-0,57 (1,76)	1897-1901	2,05 (-0,42)	1915-1920	0,61 (0,12)
	1937-1958	2,87 (-0,29)	1936-1947	2,36 (-0,26)	1935-1943	2,11 (-0,52)	1961-1968	2,84 (-1,65)	1910-1920	0,09 (0,62)	1940-1953	3,86 (-1,20)
	1962-1968	3,80 (-2,11)**	1949-1955	3,01 (-1,66)	1947-1959	2,83 (-0,25)			1935-1953	1,95 (-0,97)		
			1961-1970	3,36 (-2,16)**	1961-1966	3,92 (-1,47)						

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: See Bordo and Jonung (2001)

Table 7a: GDP per capita growth rates 1971-2014

Country	Australia		Austria		Belgium		Canada		Denmark		Finland	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1971-2014	1,79	1971-2014	2,02	1971-2014	1,90	1971-2014	1,64	1971-2014	2,13	1971-2014	2,53
<i>Low Interest Rate Periods</i>	1972-1980	1,54 (0,50)	1973-1977	3,55 (-1,53)	1973-1978	2,81 (-0,73)	1974-1980	2,18 (-0,88)	2008-2014	-0,91 (3,32)**	1972-1982	3,22 (-0,71)
			2010-2014	0,75 (1,34)*	2010-2014	0,44 (2,90)***					2008-2014	-1,16 (2,44)**
Country	France		Germany		Greece		Iceland		Ireland		Italy	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1971-2014	1,59	1971-2014	1,95	1971-2014	-0,09	1971-2014	3,71	1971-2014	4,04	1971-2014	1,14
<i>Low Interest Rate Periods</i>	1973-1982	2,46 (-1,25)	2010-2014	1,89 (0,06)	2003-2008	3,25 (-2,12)*	2000-2014	1,63 (1,71)	1971-1983	2,70 (1,26)	1973-1982	3,01 (-1,83)*
									2000-2008	3,06 (0,69)		

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, OECD

Table 7b: GDP per capita growth rates 1971-2014

Country	Japan		South Korea		Luxembourg		Netherlands		New Zealand		Norway	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1971-2014	2,91	1971-2014	6,36	1971-2014	3,85	1971-2014	1,93	1971-2014	1,31	1971-2014	2,36
<i>Low Interest Rate Periods</i>	1971-1978	3,25 (-0,31)	2010-2014	3,22 (3,00)***	1972-1977	1,85 (0,92)	1971-1978	2,39 (-0,63)	1971-1983	1,31 (0,00)	1971-1983	3,58 (-2,25)**
	2002-2014	0,81 (2,62)**			2003-2007	2,98 (0,68)	2010-2014	0,10 (3,00)***			2009-2014	-0,30 (3,78)***
					2009-2014	-0,19 (2,23)**						
Country	Portugal		Spain		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1971-2014	2,34	1971-2014	1,89	1971-2014	1,81	1971-2014	1,13	1971-2014	2,52	1971-2014	2,25
<i>Low Interest Rate Periods</i>	1971-1986	2,69 (-0,26)	2002-2008	1,39 (0,83)	1971-1982	1,49 (0,49)	1971-1977	0,66 (0,37)	1971-1981	1,75 (0,80)	1973-1981	1,85 (0,42)
	2001-2008	0,75 (1,84)*					1979-1985	1,65 (-0,62)	2008-2014	-0,12 (2,77)**	2005-2014	0,64 (2,36)**
							2004-2013	1,26 (-0,18)				

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, OECD

Summary

In this section we have mapped the general appearance of low real rates historically and made observations on low rate periods in terms of their frequency, length and global spread and how inflation and GDP growth developed during them. From these observations a general pattern seems to emerge: while negative or low real interest rates have not been infrequent in the past, they typically have appeared sporadically and lasted only for short spurts of between 1 and 3 years. The general exception to this is when a major event, economic or otherwise has taken place, and ushered in lengthy periods of high inflation.

This seemed to be the case with both world wars and the Great Inflation of the 1970's, which involved most of the world's countries, where most experienced lengthier periods of lower real rates along with increased rates of inflation, but also applies to most other lengthier episodes of low real rates as well. In many of these cases the higher inflation and lower real rates would often persist for several years after the event has ended. While increased inflation has gone hand in hand with past bouts of low interest rates, the same can generally not be said of GDP growth rates, which had typically only been noticeably affected during the world wars.

The latest predicament breaks the mold as most countries have generally been experiencing lower rates of inflation since the beginning of the 2000's or even before, not higher, making it unique in this regard. GDP growth rates has also been affected, with most countries experiencing lower growth following the crisis, though this partly because of the crisis itself. Also, as many countries began experiencing low interest rates well before the crisis, it stands to reason that the crisis should not be the sole perpetrator to the low rates. In the next section we will examine whether if we can determine if there is an underlying reason that the interest rates have been declining.

4.2. Cause analysis

Here we will examine whether there were noticeable changes in the investment or savings over GDP ratios during low interest rate periods after 1960, which would give wind to either secular stagnation or savings glut hypotheses respectively. Though the main period of interest is the latest bout of low interest rates, the 1970's provide a contrasting case where data is available.

Investment

A systematic drop in investment would mean that most countries are investing less now than previously, leading to a lower equilibrium real rate, and a shift of the IS curve to left. Tables 8a and 8b compares the means of Investment over GDP ratio with from 1961 to 2014 with those experienced during the low interest rate periods in each country of the wide data sample.

During the 1970's most countries that experienced lower real interest rates also tended to invest to a higher degree during this time than otherwise. The notable exceptions are Australia and USA, whose investment ratio's remained stable and Luxembourg which invested noticeably less. The result should primarily reflect that as, the periods of low real rates during this time were caused by inflation brought about by a large negative supply shock and expansive monetary policy, aggregate demand would have remained stable (and then gotten boosted by said monetary expansion) meaning that the incentive for investment should have been greater.

Table 8a: Investment/GDP ratio 1961-2014

Country	Australia		Austria		Belgium		Canada		Denmark		Finland	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	27,94	1961-2014	26,25	1961-2014	22,74	1961-2014	21,97	1961-2014	22,47	1961-2014	25,13
<i>Low Interest Rate Periods</i>	1972-1980	27,88 (0,08)	1973-1977	30,18 (-3,48)***	1973-1978	27,53 (-6,19)***	1974-1980	24,78 (-5,38)***	2008-2014	19,71 (3,13)***	1972-1982	30,09 (-3,83)***
			2010-2014	23,25 (5,39)***	2010-2014	23,09 (-0,56)					2008-2014	22,25 (3,19)***
Country	France		Germany		Greece		Iceland		Ireland		Italy	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	22,39	1961-2014	24,08	1961-2014	20,89	1961-2014	20,65	1961-2014	18,97	1961-2014	21,20
<i>Low Interest Rate Periods</i>	1973-1982	25,57 (-4,49)***	2010-2014	19,45 (7,31)***	2003-2008	24,96 (-2,49)**	2000-2014	21,80 (-0,56)	1971-1983	26,58 (-7,67)***	1973-1982	25,15 (-5,68)***
									2000-2008	26,33 (-7,17)***		

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, WDI

Table 8b: Investment/GDP ratio 1961-2014

Country	Japan		South Korea		Luxembourg		Netherlands		New Zealand		Norway	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	29,34	1961-2014	30,67	1961-2014	20,09	1961-2014	22,52	1961-2014	22,83	1961-2014	24,74
<i>Low Interest Rate Periods</i>	1970-1978	34,52 (-4,38)***	2010-2014	30,85 (-0,18)	1972-1977	18,06 (1,88)*	1971-1978	24,73 (-2,99)**	1971-1984	25,91 (-2,94)***	1965-1983	31,70 (-6,02)***
	2002-2013	21,67 (11,68)***			2003-2007	19,91 (0,29)	2010-2014	19,39 (5,32)***			2009-2014	26,59 (-1,91)*
					2009-2013	17,16 (4,02)***						
Country	Portugal		Spain		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	24,28	1961-2014	22,05	1961-2014	23,70	1961-2014	26,70	1961-2014	19,94	1961-2014	22,50
<i>Low Interest Rate Periods</i>	1970-1986	28,37 (-2,62)**	2002-2009	23,25 (-1,49)	1971-1982	27,62 (-3,79)***	1965-1969	32,10 (-5,79)***	1970-1981	22,95 (-4,35)***	1973-1980	23,22 (-1,32)
	2001-2008	24,44 (-0,13)					1980-1985	29,90 (-2,86)***	2008-2014	16,72 (6,72)***	2005-2013	20,30 (2,88)**
							2004-2013	24,42 (2,41)**				

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, WDI

By contrast, the latest episode has seen the majority of affected countries invest less than before. The list of exceptions is longer than last time this time around, with notable exceptions being Greece, Ireland, and Norway which invested more, as well as Belgium, Iceland, South Korea, Portugal and Spain whose investment ratios remained stable. Of note is that among these, all countries except for Belgium are countries which began experience low real interest rates well before the crisis, including the 4 of the PIIGS countries who because of their special restrictions imposed on them, had to endure high real rates during the crisis.

Savings

Like a decrease in investment, if a country has an increased savings rate it would all else equal mean shift of the IS curve to the left. Here we employ the same definition for savings as Eichengreen (2015) in that savings is defined as national savings and is the sum of investment and the current account balance. While it may be noted that the global aspect of savings glut hypothesis is lost when countries are judged individually, if go by the Feldstein-Horioka puzzle, investment and savings ratios across countries do not appear to be wholly uncorrelated, something which should be case if we had completely free capital movements. A systematic increase in savings could still indicate the presence of a savings glut, and it should still contribute to raising the rate in their respective countries.

Tables 9a and 9b compares the means of Savings over GDP ratio with from 1961 to 2014 with those experienced during the low interest rate periods in each country of the wide data sample. Due to shortfall in observable data some countries will lack observations completely. Few countries have enough observations that they stretch back to include the 1970's, and among the five that do, France, UK and USA had a higher savings rate during their respective low real rate periods, while Finland and the Netherlands generally showed little change by comparison.

During the periods of low interest rates starting in the 2000's there is a fairly even split between countries that saved more and countries that saved less. Among the largest group of countries, those that increased savings we find Austria, Denmark, Germany, Ireland, South Korea, Netherlands, Norway and Spain, while among those who saved less were Belgium, Finland, Iceland, Japan, Luxembourg (2009-2014), the UK and USA. Greece, Luxembourg (2003-2007), Portugal, and Switzerland didn't see any particular changes in their savings rate.

Summary

Perhaps owing to the outlooks of their respective periods, the examined countries reacted very differently during 1970's and during the latest bout of low interest rates with regards to Investment. Perhaps owing to the intact demand level, the increased rate of investment during the 1970's may simply reflect firms acting opportunistically as the environment for investing grew more favorable. The low interest rates as of late have however seen mostly the opposite behavior as investment has dwindled following the Great Recession. A general decline in the investment rate would contribute to lower the equilibrium real rates.

Savings rates changed in most countries during the latest low rate periods, and the changes have gone both ways with just a few more countries having increased their savings rates as those which decreased theirs. The results suggests saving behavior to have changed due to the crisis with few rates remaining stable, but it is difficult to show whether this clearly indicates a savings glut. At the very least, those countries with a higher savings rate would have downward pressure on their equilibrium real rates.

Tables 9a: Savings/GDP ratio 1961-2014

Country	Australia		Austria		Belgium		Canada		Denmark		Finland	
	Period	Mean	Period	Mean	Period	Mean	Period	Mean	Period	Mean	Period	Mean
High Rate Mean			1961-2014	0,25	1961-2014	0,26			1961-2014	0,23	1961-2014	0,26
Low Interest Rate Periods			2010-2014	0,26 (-2,58)**	2010-2014	0,23 (3,14)***			2008-2014	0,25 (-2,44)**	1972-1982	0,27 (-1,68)
											2008-2014	0,23 (2,32)**

Country	France		Germany		Greece		Iceland		Ireland		Italy	
	Period	Mean	Period	Mean	Period	Mean	Period	Mean	Period	Mean	Period	Mean
High Rate Mean	1961-2014	0,22	1961-2014	0,25	1961-2014	0,17	1961-2014	0,19	1961-2014	0,20		
Low Interest Rate Periods	1973-1982	0,25 (-4,78)***	2010-2014	0,26 (-2,38)**	2003-2008	0,15 (0,59)	2000-2014	0,13 (3,80)***	2000-2008	0,24 (-3,18)***		

T-values for comparing means, assuming differing variances, included in parenthesis.

Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)

Sources: IMF, OECD, WDI

Tables 9b: Savings/GDP ratio 1961-2014

Country	Japan		South Korea		Luxembourg		Netherlands		New Zealand		Norway	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	0,32	1961-2014	0,32	1961-2014	0,30	1961-2014	0,26			1961-2014	0,31
<i>Low Interest Rate Periods</i>	2002-2013	0,25 (7,75)***	2010-2014	0,35 (-4,12)***	2003-2007	0,30 (-0,52)	1971-1978	0,26 (-0,47)			2009-2014	0,39 (-5,58)***
					2009-2013	0,24 (5,79)***	2010-2014	0,28 (-4,34)***				
Country	Portugal		Spain		Sweden		Switzerland		United Kingdom		United States	
<i>High Rate Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>	<i>Period</i>	<i>Mean</i>
	1961-2014	0,16	1961-2014	0,21			1961-2014	0,34	1961-2014	0,19	1961-2014	0,21
<i>Low Interest Rate Periods</i>	2001-2008	0,15 (0,75)	2002-2009	0,23 (-2,32)**			1980-1985	0,33 (1,70)	1970-1981	0,23 (-7,69)***	1973-1980	0,23 (-4,45)***
							2004-2013	0,35 (-0,75)	2008-2014	0,14 (6,06)***	2005-2013	0,16 (8,76)***

T-values for comparing means, assuming differing variances, included in parenthesis.

*Asterisks indicate statistical significance by *** ($P \leq 0.01$), ** ($P \leq 0.05$) and * ($P \leq 0.1$)*

Sources: IMF, OECD, WDI

5. Conclusion

The current period low interest rates shares some superficial features with past episodes but also stands apart from them in several regards. In real terms, the current spell of low interest rates has not been the longest, nor has it been the most severe case ever experienced. For many countries the most severe cases of low rates came in particular with the Second World War, and the length of the period of low real rates following this surpasses the current bout for many countries. That many countries are all experiencing low real rates at the same time is also not unusual.

The current period however stands apart from past episodes, however, in that those past episodes were almost always accompanied by increased rates of inflation, while instead the latest bout of low rates appears to be the result of low nominal interest rates alone for most countries, with many countries actually having notably lower rates of inflation compared to their long-term averages.

For many countries the latest bout of low real rates came on the heels of the Great Recession, but as noted, the rates in many countries had begun to grow low well before then, suggesting that crisis alone is not the ultimate catalyst of the low rates. Of course, whether there exists additional underlying problems driving the interest rate down or not, the crisis-triggered recession still exacerbated the state of low rates, as central banks across the globe slashed nominal interest rates as part of crisis management.

Can the underlying reason interest rates has been lowered be drawn to secular stagnation or a savings glut? It remains difficult to say one way or the other, historically there appears to be no period of low interest rates that either theory apply neatly to, but neither does the current bout resemble past, and both theories can account for what we're seeing now.

As such the findings do not conclusive point in any one direction as to what is the cause of the of the low rates of interest, but even so in many countries investment has weakened, savings has increased and policy rates were lowered to their limits since the crisis, all of which would contribute to lower real interest rates even in the absence of inflation. Also, both Bernanke and Summers posit the possibility that the current natural equilibrium rate compatible with full employment could be negative, and because of the low rate of inflation, it is possible that the real rate achieved falls short of this.

Finally, the economy is not the same animal today that it was it was a hundred or even thirty years ago. While it goes beyond the scope of this essay to examine how the different makeup of the economies would have reacted to their circumstances in each case, I will offer some conjecture on the differences of the latest periods.

The Great Inflation of the 1970's is the most readily comparable period of lower real rates to the current one. Both were cases in which we had low interest rates amidst expansive monetary policy. In the 1970's expansive monetary policy was employed in response to the negative supply shock caused by the mounting oil prices. The result was inflation rates spiraling out of control. "Too much money chasing too few goods." In 2008 unprecedented levels of monetary policy was employed to combat the worst economic recession in recent memory. Yet the monetary expansion this time around failed to create any noteworthy increase in inflation, with instead many countries experiencing lower inflation. Why?

One explanation should lie in the absence of a supply shock in the latter case. Another could be perhaps be found in that during the 1970's most economies still had extensive capital controls. By contrast, by the time of the Great Recession, most capital controls had been liberalized allowing for asset prices rather than CPI to absorb the effects of the monetary expansions.

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