

Long-term real interest rates in Iceland have fallen by a full 4 percentage points in the past twenty-five years and have probably never been lower than they are at present. A similar pattern can be seen internationally. Demographic changes and declining productivity growth have been cited as the chief causes of this trend. These factors have combined to boost worldwide saving and dampen demand for capital, thereby pressing long-term equilibrium real rates downwards. The changes have also led to a decline in the central bank rate that, other things being equal, is needed to keep inflation at target and ensure full factor utilisation – in other words, the “neutral” rate. Before the financial crisis, Iceland’s neutral real rate was estimated at 4.5%. By now, however, it is thought to have fallen to 2%.

Global interest rates have fallen to historical lows

The Central Bank of Iceland lowered its key interest rate to 3.25% in October. In the past five months it has cut the key rate by a total of 1.25 percentage points. The Bank’s interest rates are now at their lowest since the adoption of the inflation target in March 2001. As Chart 1 shows, long-term nominal bond rates have also fallen steeply and are now at their lowest in a quarter-century.¹ The same is true of long-term real rates, which have been around 1% since mid-year. Chart 1 also shows how the past few years’ decline in long-term nominal and real rates has generally gone hand-in-hand with the decline in the Central Bank’s nominal and real rates.

Charts 2 and 3 show that the decline in domestic nominal and real rates has also coincided with the decline in global interest rates. Nominal rates in major advanced economies averaged about 5% over the period from 1995 through 2007, but in the past decade they have fallen by nearly 4 percentage points, to just over 1% (even turning negative in some countries, such as Germany). Global nominal rates also fell in the 1980s, but that decline primarily reflected the drop in global inflation and inflation expectations following the inflationary 1970s. However, the decline in nominal rates since the mid-1990s coincides with the global drop in real rates. In major advanced economies, real rates averaged 2.7% in 1995-2007, whereas in the past decade they have averaged -1%. This decline of 3.7 percentage points is well in line with the drop in nominal rates.

For comparison, long-term nominal rates in Iceland averaged 8.7% in 1995-2007 but have averaged 5.7% since 2010. They have therefore fallen by 3 percentage points, about the same as in the US but slightly less than in the UK and Germany. Domestic long-term real rates have followed a similar pattern, averaging 5.1% in 1995-2007 and then averaging 2.3% in the past decade.

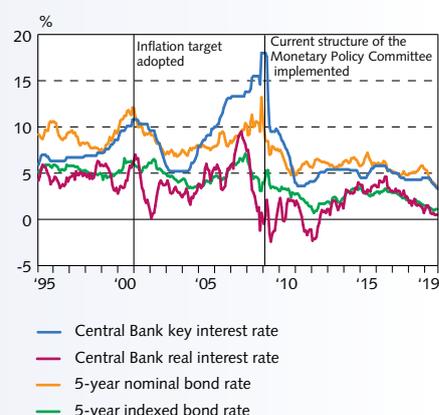
Charts 4 and 5 show clearly how unusual this is in historical terms. Chart 4 gives the key rate at the Bank of England (BoE) since its founding in 1694. Until 2008, the bank’s interest rates were never below 2%, but since then they have been below 1%, bottoming out at 0.25% in 2016. This is a lower rate than the BoE considered necessary to support the economy at several critical junctures: at the end of the English Civil War, when the bank was established; during the Napoleonic Wars early in the nineteenth century; and during both World War I and World War II in the twentieth century. By the same token, long-term interest rates are probably at an all-time low, as can be seen in Chart 5, which shows that over the past century and a half, rates have averaged 4½-5% in major advanced economies, well above the current level.

1. A comparison with data further back is complicated by the fact that for a long time, interest rates were not market-determined. It can be inferred from the data that are available, however, that interest rates in Iceland are probably at a historical low.

Box 1

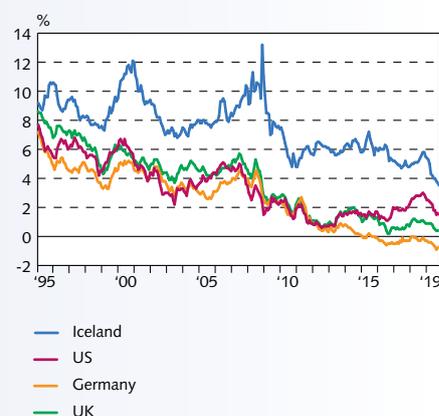
Global decline in real interest rates and the Central Bank’s neutral rate

Chart 1
Central Bank of Iceland interest rates and bond interest rates¹
January 1995 - October 2019



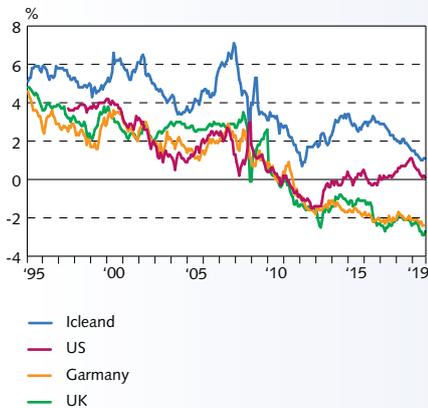
1. Real Central Bank rate based on current twelve-month inflation. Five-year rate estimated from government bond zero-coupon yield curve. Monthly averages. Source: Central Bank of Iceland.

Chart 2
Nominal government bond rates¹
January 1995 - October 2019



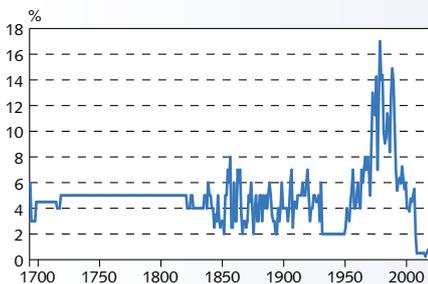
1. Nominal five-year rate estimated from government bond zero-coupon yield curve. Monthly averages. Sources: Thomson Reuters, Central Bank of Iceland.

Chart 3
Real government bond rates¹
January 1995 - October 2019



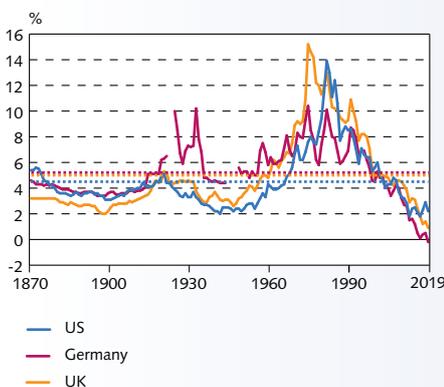
1. Real rate on five-year government bonds estimated from zero-coupon yield curves of indexed rates except for Germany (real rate based on five-year inflation expectations). Monthly averages.
Sources: Bundesbank, Thomson Reuters, Central Bank of Iceland.

Chart 4
Bank of England key interest rate 1694-2019¹



1. Year-end figures except for 2019. The 2019 figure is the end-October interest rate.
Source: Bank of England.

Chart 5
Long-term interest rates in the US, Germany, and the UK 1870-2019¹



1. Ten-year government bond rate (annual average). Data for 1870-2016 are from the database of Jordá *et al.* (2019). The 2019 average is based on available data year-to-date. Broken lines show averages for the entire period.
Sources: Jordá *et al.* (2019), Thomson Reuters.

What explains the past two decades' declining interest rates?

In general, long-term real interest rates are determined by how much wealth individuals want to hold at a given real interest rate – i.e., the supply of savings – and how much firms are willing to invest at a given real rate – i.e., demand for capital. The underlying reasons for the fall in international real rates could therefore be reflected both in factors that encourage individuals to save more than before and in factors that have caused a slowdown in global investment.

The factor generally considered most important in explaining the worldwide decline in real interest rates over the past two decades is increased worldwide saving, which in turn stems from an aging population caused by lower birth rates and increased longevity (see, for instance, Rachel and Smith, 2015, and Brand *et al.*, 2018). In general, people accumulate savings during their working lives and tap them upon retirement. As the average age of the population has risen, people's tenure in the job market has grown longer, as has the time they have to amass savings. This is compounded by the fact that people expect to live longer after they retire, which increases the need to build up savings for their old age. Added to this is a greater tendency among emerging market economies and other small countries to self-insure by building up contingency funds in the wake of the Asian crisis of the 1990s, as well as increased caution among households and businesses in the wake of the recent global financial crisis, which prompted an increase in precautionary saving. Moreover, increased income inequality in some advanced economies may have led to an increase in global saving, as higher-income individuals tend to save proportionally more than those with lower incomes.

In the developed world, investment has also been unusually weak in historical context in the past decade. To some extent, this is a consequence of the financial crisis and the uncertainty that took hold afterwards. On the other hand, it is also likely that the reduction in investment activity is linked to the fact that expected returns on investment are weaker than before, as can be seen in a slowdown in productivity growth among advanced economies. There is debate about the extent to which weaker productivity growth reflects the repercussions of the financial crisis versus the extent to which it is a symptom of deeper and more persistent factors (see, for example, Summers, 2014). In any event, it is likely that declining demand for capital at a given real interest rate level, which can be seen in weaker investment activity, has played a part in the worldwide drop in real interest rates in the past two decades.

The same trends can be observed in Iceland

Chart 6 shows how these underlying factors have developed in Iceland over the past quarter-century. As can be seen, population growth has been slower, on average, in the post-crisis period, owing to the offsetting effects of a lower birth rate and a steep rise in immigration by foreign nationals. A large percentage of these foreign nationals are of working age, and this, together with a longer average life expectancy, has significantly lowered the dependency ratio, in a pattern similar to that in other advanced economies. As the chart shows, the decline in the dependency ratio is due primarily to a reduction in the percentage of persons under age 16, while the percentage of persons aged 75 and over has risen.² Predictably, these demographic changes have coincided with a steep rise in national saving, although it is likely that increased saving is also a precaution-

2. Unlike what has been seen widely in other countries, labour participation among the elderly has remained broadly unchanged in Iceland. An increase in the number of working elderly could mitigate the need to accumulate savings to finance spending in later life.

ary response to the lessons from the financial crisis. Furthermore, in recent years, investment activity has been weaker than it was before the financial crisis, although it has picked up somewhat in the past few years. This coincides with a reduction in average productivity growth relative to the pre-crisis average.

The Central Bank's neutral rate has probably fallen

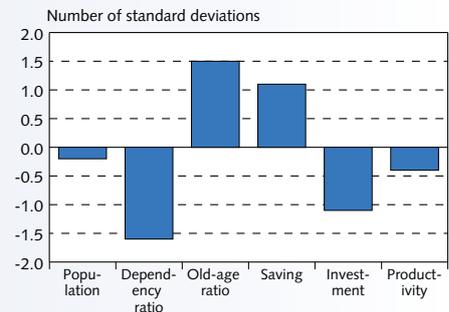
The steep decline in global real interest rates suggests that the long-term equilibrium real rate – i.e., the real rate that balances supply and demand for capital – has fallen. This affects monetary policy formulation worldwide, as a lower long-term equilibrium real rate means that the central bank rate needed to keep inflation at target and ensure full factor utilisation is lower than before. In other words, the neutral central bank rate is probably lower than it used to be.³ Although the above-described changes in the proclivity to save and invest are probably the main reasons for the gradual decline in the neutral rate, other factors that could cause it to fluctuate around its long-term equilibrium level have pulled in the same direction. For example, uncertainty grew and risk premia rose during the aftermath of the financial crisis. This led to a deterioration in private sector financial conditions (absent changes in central bank rates), and all else being equal, lower interest rates were needed to achieve monetary policy goals. The increased levies imposed on the financial system during the post-crisis period, with the aim of boosting the system's security and resilience, probably had a similar impact.

Although the neutral rate is important for understanding monetary policy and its formulation, as well as understanding how interest rates move over time, it cannot be used directly to guide specific interest rate decisions, as the neutral rate cannot be observed and must therefore be estimated using statistical methods, and such estimates are always subject to uncertainty. A number of recent studies indicate, however, that it has fallen markedly in recent decades (see, for instance, International Monetary Fund, 2014; Rachel and Smith, 2015; and Brand *et al.*, 2018). The findings of Holston *et al.* (2017) suggest, for example, that in major advanced economies, the neutral real rate during the pre-crisis period was 2-2½%, whereas it is now 1½% in the UK and Canada, ½% in the US, and about 0% in the euro area (Chart 7). This represents a decline of 1-2½ percentage points. A similar trend has been seen in the other Nordic countries. Before the financial crisis, the neutral rate was estimated at 2-3% in Norway and Sweden, whereas it is now estimated to have fallen to 0-1% in Norway and ½-2% in Sweden.⁴

The method used most often to estimate the neutral rate is based on Laubach and Williams (2003). The Laubach-Williams model estimates the neutral interest rate from its theoretical long-term relationship with the economy's trend growth rate.⁵ Among other methods, Daniélsson *et al.* (2016) use a version of this method, adjusted for small open economies (see Kirker, 2008), to estimate the neutral real rate in Iceland. Chart 8 shows an updated estimate of the rate, together with the Central Bank's real rate as measured in

3. This interest rate is variously referred to as the neutral interest rate, the short-term equilibrium interest rate, or the natural interest rate.
4. See "Estimates of the neutral real interest rate" in Norges Bank's *Monetary Policy Report* 2/2018 and "The repo rate in the long run" in the Swedish Riksbank's February 2017 *Monetary Policy Report*.
5. In essence, the estimate of the real neutral rate is based on its long-term relation with potential output: $r^n = (1/\sigma)g + z$, where r^n is the neutral real rate, σ is the intertemporal elasticity of substitution, g is the trend rate of GDP growth, and z captures other economic factors (domestic and international) that affect the neutral rate. Because none of these variables is directly observable, they must all be estimated with the help of an underlying macroeconomic model.

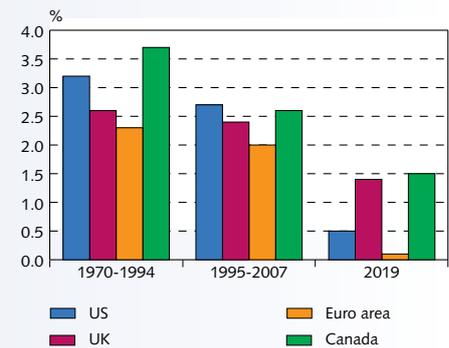
Chart 6
Change in factors underlying saving and investment decisions in Iceland¹



1. Change between 1995-2007 average and 2008-2018 average as a ratio to total sample standard deviation. The dependency ratio is the population under age 16 and over age 74 as a share of the working-age population. The old-age dependency ratio is the population over age 74 as a share of the working-age population. For population and productivity, a comparison of average growth rates for the periods is shown. For national saving and investment, a comparison of average ratios to GDP is shown.

Sources: Statistics Iceland, Central Bank of Iceland.

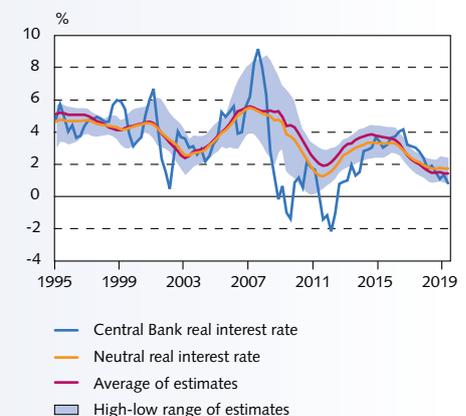
Chart 7
Neutral real central bank interest rates in selected advanced economies¹



1. The estimate for 2019 is the H1/2019 average.

Source: Holston *et al.* (2017).

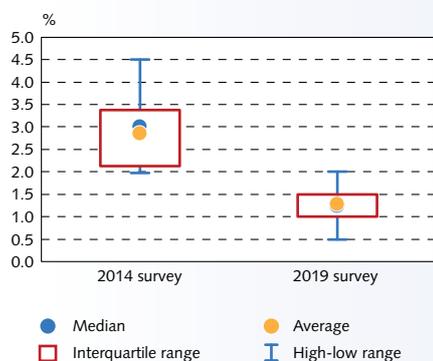
Chart 8
Central Bank of Iceland neutral real interest rate¹
Q1/1995 - Q2/2019



1. Observed real rate based on current twelve-month inflation. Neutral real rate estimated according to Kirker (2008). The average and the high-low range of different estimates based on various versions of the Kirker (2008) and Berger and Kempa (2014) models.

Source: Central Bank of Iceland.

Chart 9
Market agents' estimate of the neutral real rate¹



1. Survey taken among market agents in August 2014 and May 2019. Respondents were asked, "What domestic real interest rate would in your view be sufficient to ensure that output was at its long-term potential and inflation at target?".
Source: Central Bank of Iceland.

terms of current twelve-month inflation. As the chart indicates, the neutral rate appears to have fallen below its pre-crisis level. It averaged 4.3% in 1995-2007, then fell to an average of 2.8% after the financial crisis, and has averaged 1.9% in the past three years. Inevitably, the estimates are subject to uncertainty, particularly for the period including and surrounding the financial crisis. The chart shows, for example, the high-low range of the estimate using various versions of the Kirker (2008) and Berger and Kempa (2014) models. The estimates range from 3% to 5½% before the crisis but have declined to 1¼-2¾% in the past three years.

The underlying assumption concerning the neutral real rate in the Central Bank's baseline forecasts reflects this estimate. Before the financial crisis, the Bank's baseline forecasts assumed that the neutral real rate was 4.5%, which is consistent with measured real rates in 1995-2007. After the crisis, the real rate is assumed to have fallen to 2%, which is in line with the average of measured real rates over the last decade. This is a more pronounced decline than in the Bank's previous estimate, according to which the neutral real rate had fallen to 3% after the crisis. However, the revised assumption concerning the neutral real rate is closer to market agents' estimates, which average about 1¼%, according to a recent Central Bank survey (Chart 9).

The Bank's neutral real rate is therefore estimated to have fallen by 2½ percentage points from its pre-crisis level. This is in line with the decline in the US and the eurozone, as Chart 7 indicates. The nominal interest rate that corresponds to a neutral monetary stance – i.e., the rate that is neither expansionary nor contractionary – has therefore fallen significantly in the past decade. If the neutral real rate is 2%, the corresponding neutral nominal rate is 4.5% (the neutral real rate plus the Bank's 2.5% inflation target), whereas before the crisis it was 7%.⁶ The Bank's key interest rate is currently a full 1 percentage point below this neutral level, which means that monetary policy is highly expansionary during the current slowdown in activity.

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6. When comparing neutral nominal rates with those in other countries, it is important to bear in mind that Iceland's inflation target is 0.5 percentage points higher than that in other advanced economies.