

## GDP growth strong, and the output gap widens despite rapid growth in potential output

Global output growth gained momentum towards the end of 2016, and the outlook for this year has improved. Optimism has increased, although the risk to long-term global growth continues to be tilted to the downside. Strong growth in domestic economic activity is based on extremely favourable external conditions. Terms of trade have improved markedly, and exports have grown rapidly. Exports outpaced the forecast in the February *Monetary Bulletin* in 2016 and look set to do so again this year. These large external shocks have pushed the exchange rate of the króna upwards. The forecast published here assumes that the exchange rate will continue to rise through 2018, but at a slower pace than in the past year. The external shocks have also led to a rise in domestic income and wealth, which, together with strong job creation, has boosted domestic demand considerably. In spite of this, household saving has increased and national saving is at a rarely seen high. This is reflected in a large trade surplus despite rapid investment growth in the past few years.

GDP growth measured just over 4% in 2015 and surged to 7.2% in 2016. The outlook is for strong growth again this year, or 6.3%, and GDP growth for both 2016 and 2017 is estimated to be 1 percentage point more than was forecast in February. The deviation from the forecast is due to stronger-than-expected exports and more fiscal easing in 2017 than was previously projected. As in the Bank's previous forecasts, it is assumed that GDP growth will gradually ease towards its long-term trend rate as the forecast horizon progresses. It is forecast at 3½% in 2018 and 2½% in 2019.

Significant importation of labour, increased investment, and strong productivity growth in 2016 have pushed potential output growth to a level far above its long-term trend rate. In spite of this, the output gap has grown swiftly and is expected to measure just over 3% of potential output by the end of 2017, markedly above the February forecast. Offsetting this is the appreciation of the króna, which has played a key role in the adjustment of the economy to the above-described shocks.

Inflation has been at or below the Central Bank's inflation target for over three years. By most measures, inflation expectations are at target, and there are signs that a tight monetary stance has anchored them more firmly. The outlook is for below-target inflation well into 2018. It will rise temporarily to approximately 3% as the end of the forecast horizon approaches and then subside towards the target again. Because the króna has strengthened more than was assumed in February, the inflation outlook for 2017 and 2018 has improved, although increased demand pressures have eroded the outlook further ahead.

# I Economic outlook, key assumptions, and main uncertainties

## Central Bank baseline forecast<sup>1</sup>

### Improved global GDP growth outlook for 2017

In Q4/2016, global output growth exceeded the forecast in the February *Monetary Bulletin*, and the outlook for this year has improved. The International Monetary Fund (IMF) projects global growth for 2017 at 3.5%, slightly above its previous forecast. The IMF forecast also reflects increased optimism about short-term prospects for the global economy, although there are still headwinds further ahead.

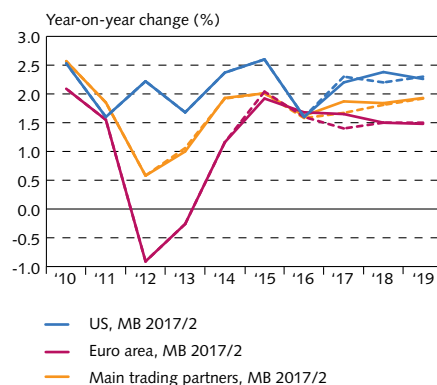
GDP growth among Iceland's main trading partners looks set to rise from last year's 1.6% to 1.9% this year (Chart I-1), some 0.2 percentage points more than was forecast in February, owing mainly to an upward revision of the output growth outlook for the UK and the eurozone to 1.7% from the February projection of 1.3-1.4%. In the US, output growth is expected to measure 2.2%, roughly the same as in the February forecast. As in February, trading partners' GDP growth is assumed to measure about 1.9% per year throughout the forecast horizon. Further discussion of the global economy can be found in Chapter II, and uncertainties in the global outlook are discussed later in this chapter.

### Some further króna appreciation through 2018

Preliminary Q4/2016 figures from Statistics Iceland indicate that the ratio of Iceland's export prices to trading partners' export prices rose quarter-on-quarter by 1 percentage point more than was assumed in the Bank's February forecast. The outlook for developments in marine and aluminium product prices has also improved this year, with relative export prices expected to rise by 4½%, nearly 2 percentage points more than was forecast in February (Chart I-2). Nevertheless, a more rapid rise in import prices will cut into this improvement in terms of trade, which is now projected at 1% instead of the 1.9% provided for in the February forecast. The outlook for the next two years is broadly unchanged, however.

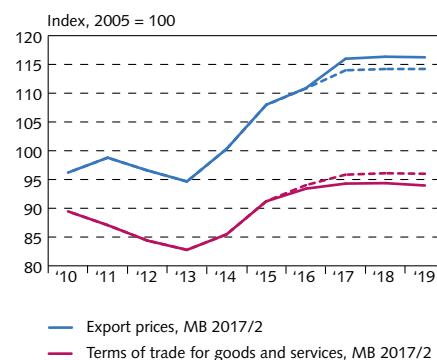
The foreign exchange market has seen some turbulence recently, in connection with the fishermen's strike early in the year and the liberalisation of capital controls in March. The króna was 3½% stronger in Q1/2017 in trade-weighted terms than was assumed in the February forecast and about 18% stronger than it was in Q1/2016. As is discussed in Chapter III, the past year's rise in the exchange rate is due largely to growth in tourism, considerably better terms of trade, and a substantial improvement in Iceland's external position. Therefore, it reflects the adjustment of the króna to a higher equilibrium real exchange rate rather than to carry trade-related inflows. The equilibrium real exchange rate is deemed to have risen somewhat, and the nominal exchange rate is considered close to its equilibrium level. Such an assessment is subject to significant uncertainty, however.

Chart I-1  
Global output growth 2010-2019<sup>1</sup>



1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Macrobond, OECD, Central Bank of Iceland.

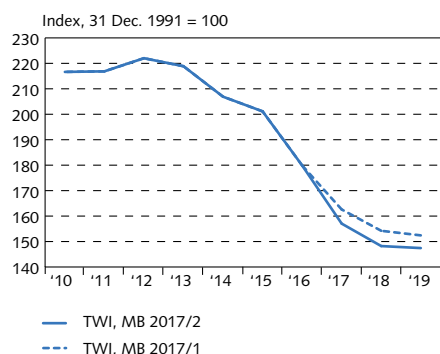
Chart I-2  
Export prices and terms of trade 2010-2019<sup>1</sup>



1. Price of Icelandic exports relative to trading partners' export prices (converted to the same currency using the trade-weighted exchange rate index). Central Bank baseline forecast 2017-2019. The broken lines show the forecast from MB 2017/1.  
Sources: Macrobond, Statistics Iceland, Central Bank of Iceland.

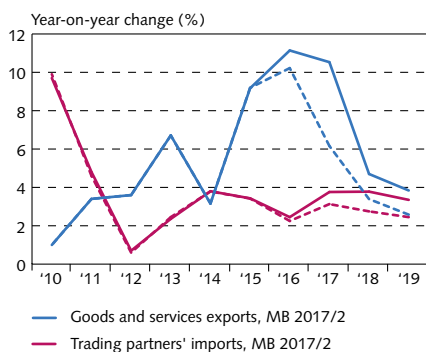
1. The analysis presented in this *Monetary Bulletin* is based on data available in mid-May.

Chart I-3  
Exchange rate 2010-2019<sup>1</sup>



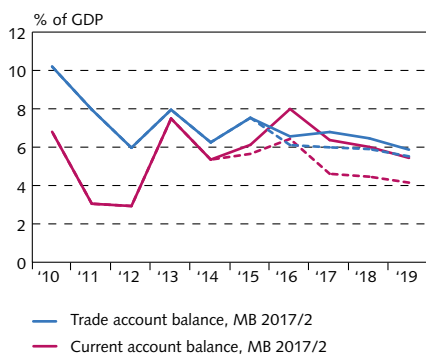
1. Central Bank baseline forecast 2017-2019. Narrow trade basket.  
Source: Central Bank of Iceland.

Chart I-4  
Exports and global demand 2010-2019<sup>1</sup>



1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Macrobond, Statistics Iceland, Central Bank of Iceland.

Chart I-5  
Current account balance 2010-2019<sup>1</sup>



1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1. Current account balance based on estimated underlying balance 2008-2015.  
Sources: Statistics Iceland, Central Bank of Iceland.

According to the baseline forecast, the króna will continue to appreciate until end-2018 (Chart I-3). The trade-weighted exchange rate index (TWI) is expected to average about 157 points this year and 148 next year. If the forecast materialises, the exchange rate will be a full 14½% higher, on average, in 2017 than in 2016 and will rise by an additional 6% in the coming two years. By 2019, the króna would be 3½% stronger than was assumed in February, although it should be noted that these forecasts are highly uncertain. The forecast implies a larger rise in the real exchange rate than previously anticipated. If this is borne out, the real exchange rate in terms of relative consumer prices will be 11% higher by the end of the forecast horizon than in Q1/2017. In terms of relative unit labour costs, the increase is somewhat larger. Further discussion of terms of trade and the exchange rate can be found in Chapters II and III.

### Strong export growth delivers a record current account surplus ...

Exports have grown rapidly in recent years. Exports of goods and services combined rose by over 11% in 2016, and in the past five years export growth has averaged nearly 7% per year, almost three times trading partners' import growth rate over the same period. The main driver of the surge is tourism, which accounts for the bulk of last year's 19% growth in services exports and the five-year average of almost 11%. Furthermore, it is because of strong growth in services exports that total exports are forecast to grow by 10½% this year, well above the February forecast of just over 6% (Chart I-4). The difference is due mainly to the prospect of an even larger increase in tourist arrivals than was previously assumed. Even though marine product exports contracted in Q1/2017 because of the fishermen's strike, they are expected to increase somewhat more this year than was forecast in February, owing to a much stronger capelin fishery than previously anticipated. In addition, aluminium exports are forecast to be stronger than previously thought. As in the Bank's previous forecasts, export growth is expected to ease in the next two years, in line with a rising real exchange rate and relatively weak global export growth. Because services exports are expected to grow more rapidly, however, the forecast for growth in total exports in the next two years has been revised upwards since February.

The trade surplus measured 6.6% of GDP in 2016, slightly outpacing the February forecast. The outlook is for a larger surplus this year as well, or 6.8% instead of the 6% forecast in February (Chart I-5). The deviation is due mainly to the prospect of stronger export growth throughout the forecast horizon. The surplus is expected to measure about 6% of GDP in 2019.

The current account surplus measured 8% of GDP in 2016, the highest ever recorded apart from 2009, when it was also 8%. Last year's surplus was due in particular to a historically high national saving rate of more than 29% of GDP (see Box 1). This year, a smaller surplus on primary income is expected to counteract a growing trade surplus, reducing the current account surplus to 6½% of GDP. The current account surplus is expected to narrow by an additional 1 percentage point over the remainder of the forecast horizon. Further discussion of the external balance can be found in Chapter IV.

### ... despite rapid growth in domestic demand

Households' disposable income has risen sharply in the recent term, and real disposable income has grown by an average of 7½% per year since 2014. At the same time, household net wealth has grown markedly, supported by rising asset prices and declining debt. Households have used the rise in disposable income for increased consumption spending but have also used a portion to strengthen their balance sheets and step up saving. Private consumption grew by nearly 7% in 2016, while household saving rose to nearly 11% of disposable income. Year-2016 private consumption growth turned out stronger than was forecast in February, owing in part to Statistics Iceland's revision of previous figures and an unexpectedly strong rate of consumption growth in Q4 (Chart I-6). Real disposable income is thought to have risen slightly more in 2016 than was previously projected. The rise is expected to continue this year, and household saving to grow more than was provided for the Bank's last forecast. This explains in part why private consumption is projected to grow more rapidly in coming years than was forecast in February. In spite of this, however, household savings will increase for most of the forecast horizon. Only at the very end of the period, when growth in real disposable income eases, will households begin to tap their savings once again.

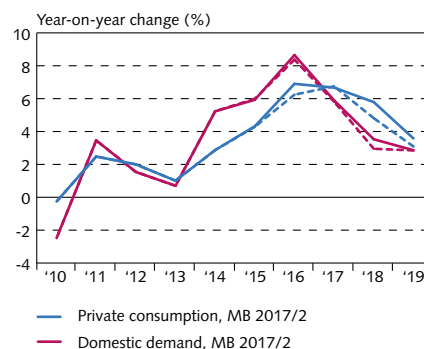
Investment has grown quickly in recent years. In 2016, it grew by almost 23% year-on-year, on the heels of nearly 17% annual growth in the two preceding years. The main driver of the increase is business investment, which has grown by an average of almost one-fourth per year in the past three years. The increase has been particularly notable in sectors related to transport and tourism. Residential investment has also picked up strongly, growing by over a third in 2016. The outlook is for a marked slowdown in investment growth this year, although growth will remain robust, or 8½%. Although this is above the February forecast, the overall outlook for 2017 and the next two years is broadly unchanged. In spite of this, the investment-to-GDP ratio will be slightly below the February forecast throughout the horizon (Chart I-7).

Domestic demand grew by 8.7% in 2017, broadly as was projected in February (Chart I-6). This is the strongest single-year growth rate since 2006. The outlook is for growth to be robust this year as well, nearly 6%, and then taper off to just over 3% in 2018. Further discussion of private and public sector demand can be found in Chapter IV.

### GDP growth well above the February forecast in 2016 and set to remain strong in 2017 and 2018

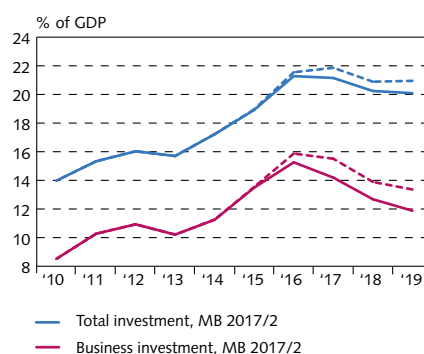
According to preliminary figures from Statistics Iceland, GDP growth picked up strongly as 2016 progressed, measuring 10.4% in H2 and 7.2% for the year as a whole (Chart I-8). This is a full 1 percentage point above the Bank's February forecast. The deviation from the forecast is attributable mainly to stronger-than-expected exports, as domestic demand grew broadly as projected. As before, strong growth in private consumption and investment pull in one direction and the negative contribution from net trade – in spite of over 11% export growth – in the other.

Chart I-6  
Private consumption and domestic demand  
2010-2019<sup>1</sup>



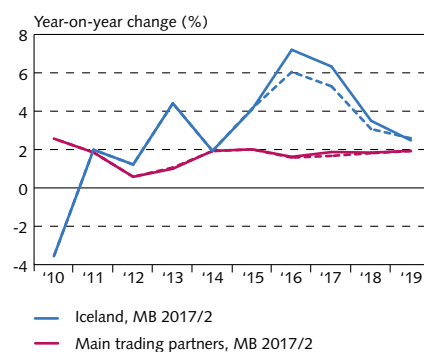
1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-7  
Investment 2010-2019<sup>1</sup>



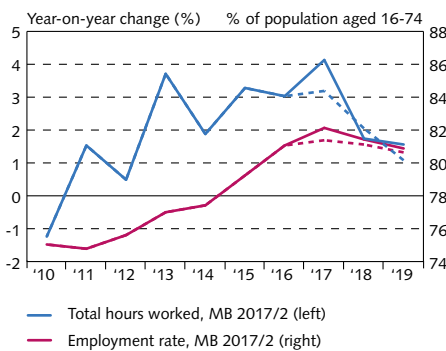
1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-8  
GDP growth in Iceland and trading partners  
2010-2019<sup>1</sup>



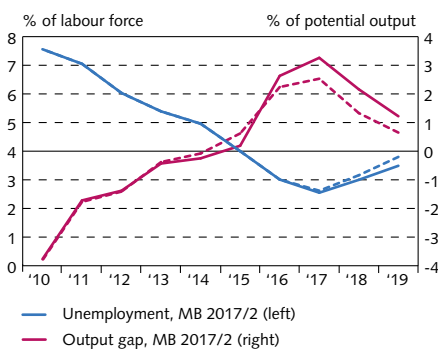
1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Macrobond, Statistics Iceland, Central Bank of Iceland.

Chart I-9  
Total hours worked and employment rate  
2010-2019<sup>1</sup>



1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-10  
Unemployment and output gap 2010-2019<sup>1</sup>



1. Central Bank baseline forecast 2017-2019. Broken lines show forecast from MB 2017/1.  
Sources: Statistics Iceland, Central Bank of Iceland.

There are signs that GDP growth eased somewhat in Q1/2017. Clearly, the fishermen's strike early in the year caused a steep drop in marine product exports and export inventories. Because the impact is temporary, GDP growth is expected to rally in Q2 and measure 6.3% for 2017 as a whole, 1 percentage point above the February forecast. The expectation of more rapid output growth stems from the assumption that there is greater momentum in the economy, mainly because of the outlook for stronger export growth than previously assumed, but also because the new National Budget provides for more fiscal easing than had been anticipated. Robust export growth also affects the outlook for 2018 GDP growth, which is now projected at 3.5% instead of the 3.1% in the February forecast. As in February, GDP growth is expected to continue to ease over the forecast horizon, to 2.5% by 2019, which is in line with the economy's 2¾% long-term trend growth rate. If the forecast materialises, GDP growth will average 4.7% for the period 2015-2019, almost twice the estimated long-term trend rate. Further discussion of developments in GDP growth can be found in Chapter IV.

### Output gap widens rapidly despite swift growth in potential output

Total hours worked increased by 3% in 2016 and 3.5% in Q1/2017, somewhat outpacing the February forecast. As before, the rise is due mainly to a large increase in the number of employed persons, which the baseline forecast assumes will continue. Total hours are expected to keep rising through this year and to measure 4.1% above the 2016 level (Chart I-9). The working-age population grew by about 2% year-on-year, owing in part to significant importation of foreign labour. The labour participation rate is also on the rise and will be some ¾ of a percentage point higher this year than in 2016, for a total increase of nearly 3 percentage points since 2014. Notwithstanding the rise in the working-age population, the employment rate is expected to increase even further this year, to an average of 82%. If this projection materialises, the employment rate will be the highest ever recorded in annual data in the history of Statistics Iceland's labour force surveys.

Unemployment continued to decline as well, to a seasonally adjusted rate of 2.7% in Q1. It is expected to measure 2.6% for 2017 as a whole, as was forecast in February (Chart I-10). As in previous forecasts, it is projected to rise gradually to the level deemed consistent with low and stable inflation. It is forecast to average 3% in 2018 and 3½% in 2019. This is a somewhat lower unemployment rate than was assumed in February owing to the prospect of stronger output growth and an estimation of a somewhat lower equilibrium unemployment rate. By the same token, total hours are expected to increase more quickly this year than in the February forecast, and the employment rate will be higher for the entire period.

Strong demand growth and job creation have caused a persistent shortage of workers in spite of increased labour importation, and representatives of a steadily growing number of firms indicate that they are operating at or above capacity. As a result, the output gap appears

to be growing. It is estimated to measure 3½% of potential output at the end of this year (Chart I-10). It will therefore grow more rapidly than was assumed in February and will be nearly 1 percentage point more during the forecast horizon, at just under 1% of potential output at the end of the period in mid-2020.

According to the baseline forecast, potential output has grown well in excess of its long-term trend rate ever since 2015. The output gap would be even wider if the supply side of the economy were not as flexible as it is. This cyclical surge in potential output reflects a rising participation rate and labour importation-generated growth in the working-age population. The equilibrium unemployment rate has also fallen, as is mentioned above, and investment has grown swiftly. The capital stock has therefore begun to grow after shrinking by nearly 5% during the aftermath of the financial crisis. In addition, productivity growth was unusually robust in 2016 and appears likely to be strong again this year, as is discussed below. As always, the assessment of the output gap is highly uncertain. A discussion of several key uncertainties in the assessment is below, and a discussion of the labour market and factor utilisation can be found in Chapter V.

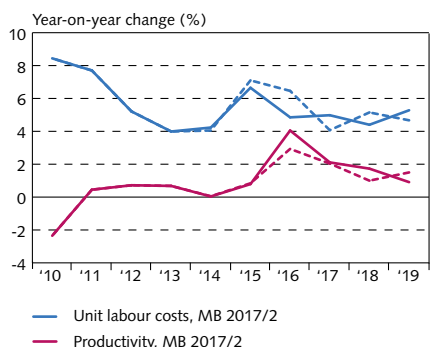
### **Inflation outlook deteriorates in the latter half of the forecast horizon**

Inflation measured 1.8% in Q1/2017, just below the February forecast of 1.9%. It tapered off slightly early in the year but picked up again in April, when it measured 1.9%. It has therefore been at or below the Central Bank's inflation target for over three years, mainly as a result of imported deflation and the appreciation of the króna. As is discussed in Box 2 in *Monetary Bulletin* 2016/4, the decline year-to-date in import prices in krónur has affected measures of inflation that exclude housing costs much more than those that include housing. As a result, there is a substantial difference between inflation as measured by the consumer price index (CPI), on the one hand, and inflation in terms of the CPI excluding housing (CPIXH) and the harmonised index of consumer prices (HICP), on the other. In terms of the CPIXH, the price level has declined by 1.8% since April 2016, and in March 2017, the HICP was down 1.4% year-on-year.<sup>2</sup> By most measures, inflation expectations are well in line with the inflation target and appear to be more firmly anchored to target than they have been in quite some time (see Box 3).

Wages have risen steeply in the recent term, offsetting imported deflation and the appreciation of the króna. Wages and related expenses rose by 9½% in 2016 and have increased by 17½% in the past two years. This year's increase will be large as well, nearly 7%, but the pace will then ease in 2018 and 2019. Offsetting these hefty pay increases is last year's unusually strong productivity growth and the prospect of the same this year. As is discussed in Chapters V and

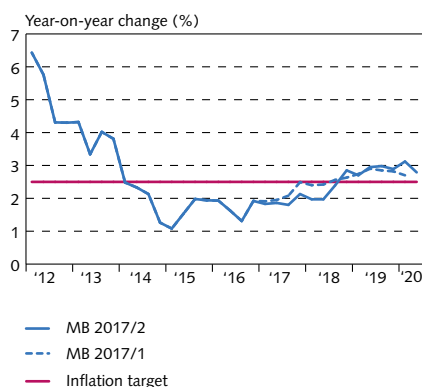
2. As is discussed in Box 2, the difference between these two measures that exclude housing costs was unusually large for most of 2016 because of differing weights assigned to expenditure factors that weigh heavily in tourists' spending in Iceland.

Chart I-11  
Unit labour costs and productivity 2010-2019<sup>1</sup>



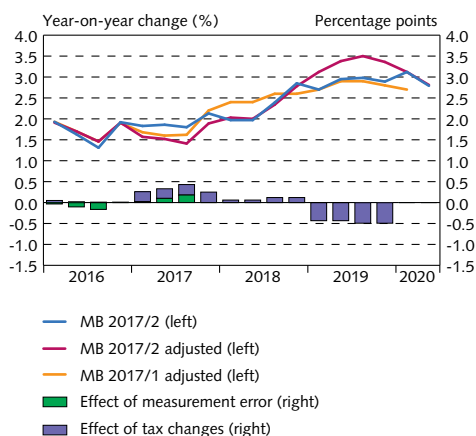
1. Productivity measured as GDP per total hours worked. Central Bank baseline forecast 2015-2019. Broken lines show forecast from MB 2017/1. Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-12  
Inflation<sup>1</sup>  
Q1/2012 - Q2/2020



1. Central Bank baseline forecast Q2/2017-Q2/2020. Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-13  
Inflation outlook adjusted for effects of measurement error and tax changes<sup>1</sup>  
Q1/2016 - Q2/2020



1. Inflation forecasts from MB 2017/2 and 2017/1, adjusted for the effects of errors in CPI measurements from March-August 2016 and changes in excise taxes at the beginning of 2017. The inflation forecast in MB 2017/2 is also adjusted for the effects of proposed changes in value-added tax as laid down in the fiscal plan. Sources: Ministry of Finance and Economic Affairs, Statistics Iceland, Central Bank of Iceland.

VI, it is possible that productivity growth has been overestimated – for instance, because of an underestimation of the increase in foreign labour. Based on these figures, productivity growth was a full 1 percentage point more in 2016 than was forecast in February. Unit labour costs therefore rose by 4.9%, not 6.5% (Chart I-11), and a similar rise is forecast for 2017 and the following two years. If the forecast materialises, there will be significant inflationary pressures from the labour market during the forecast horizon.

According to the baseline forecast, inflation will be around 2% well into 2018 and then rise to approximately 3% in mid-2019 before subsiding towards the target (Chart I-12). As is discussed in *Monetary Bulletin* 2016/4, Statistics Iceland made an error in 2016 CPI measurements, which caused an underestimation of inflation during the first three quarters of the year. Because of this, twelve-month inflation will be slightly overestimated for the same period this year. At the turn of the year, excise taxes rose on a number of products, including petrol, alcoholic beverages, and tobacco. The impact of this on the CPI is roughly equal to the aforementioned measurement error. In addition, the Government's new fiscal plan includes some changes in indirect taxes over the forecast horizon (see Chapter IV). Once adjustments are made for these factors, the inflation outlook for 2017 and 2018 is improved (Chart I-13). The situation will change at the beginning of 2019, however, when inflation is projected to be ½ a percentage point more than was forecast in February, owing to the prospect of a wider output gap than was assumed then. The uncertainties in the inflation forecast are discussed below. Developments in global prices are discussed in Chapter II, and domestic inflation and inflation expectations are discussed in Chapter VI.

## Key assumptions and main uncertainties

The baseline forecast reflects the assessment of the most likely economic developments during the forecast horizon. It is based on forecasts and assumptions concerning developments in the external environment of the Icelandic economy, as well as assessments of the effectiveness of specific markets and on the transmission of monetary policy to the real economy. All of these factors are subject to uncertainty. Below is a discussion of several important uncertainties and of how changes in key assumptions could lead to developments different from those provided for in the baseline forecast.

## Monetary policy

Before the publication of this *Monetary Bulletin*, the Central Bank's key interest rate was 5% and had declined by 0.75 percentage points year-on-year. As in previous baseline forecasts, the current forecast is based on the assumption that, during the forecast horizon, the key rate will develop in line with the monetary policy rule in the Bank's quarterly macroeconomic model, which ensures that inflation will be broadly at target over the medium term.

### Increased optimism about the global economy, but the risk profile remains tilted to the downside further ahead

As is discussed earlier in this chapter, the global economy appears to have picked up in late 2016, and international markets have turned bullish, as can be seen in rising share prices and long-term interest rates, increased optimism among households and businesses, and reduced risk premia in global financial markets (Chart I-14). Furthermore, markets appear to have responded well to the new US president's stated plans for increased infrastructure investment, tax cuts, and deregulation of financial markets, although the scope and timing of actual measures remains uncertain. The global GDP growth outlook for 2017 and perhaps into 2018 could therefore be underestimated in the baseline forecast.

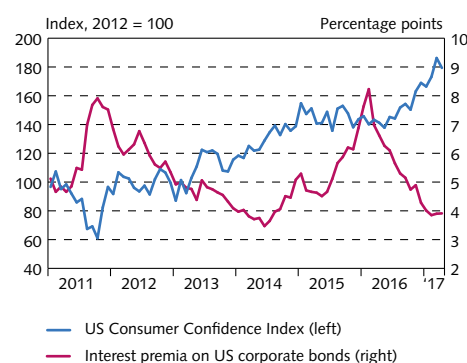
Further ahead, however, the risk profile for global GDP growth is tilted to the downside, largely for the same reasons as in the Bank's previous forecasts. There is the risk that the UK's exit from the European Union will disrupt the integrated network of world trade. This, together with a growing tendency towards protectionism, could catalyse events that cut into cross-border trade, thereby slowing the global economy. The GDP growth outlook is also uncertain in China, one of the most important drivers of global growth. Asset prices have risen steeply in China, and it appears that GDP growth is more credit-driven than before. As a result, the GDP growth outlook appears somewhat fragile, and a sudden correction in asset prices could severely test the resilience of the Chinese financial system. Financial conditions in emerging market economies could also deteriorate quickly with an appreciating US dollar and rising interest rates. As before, many advanced economies are facing a variety of challenges related to weak productivity growth and an aging population.

It can be seen from the above that demand growth in Iceland's main trading partner countries could be underestimated in the short run but overestimated in the longer term. Furthermore, increased geopolitical uncertainty or a sudden surge in oil prices could cause a turnaround in Iceland's exports and terms of trade. The effects of the recent rise in the real exchange rate on the competitive position of Iceland's tradable sector could also be underestimated. As a consequence, the possibility cannot be excluded that the export growth assumptions in the baseline forecast, especially for the long term, are too optimistic.

### With lower króna the output gap would be wider and inflation and interest rates higher

The appreciation of the króna has been a key factor in the economy's adjustment to shocks in the recent term and is likely to remain so. The baseline forecast assumes that the exchange rate will continue to rise through 2018, slowing economic activity and shifting a portion of demand out of the domestic economy. By cutting into GDP growth and lowering imported goods and services prices, the appreciation of the króna counteracts domestic inflationary pressures. This enables the Central Bank to keep inflation at target with lower interest rates than would otherwise be possible.

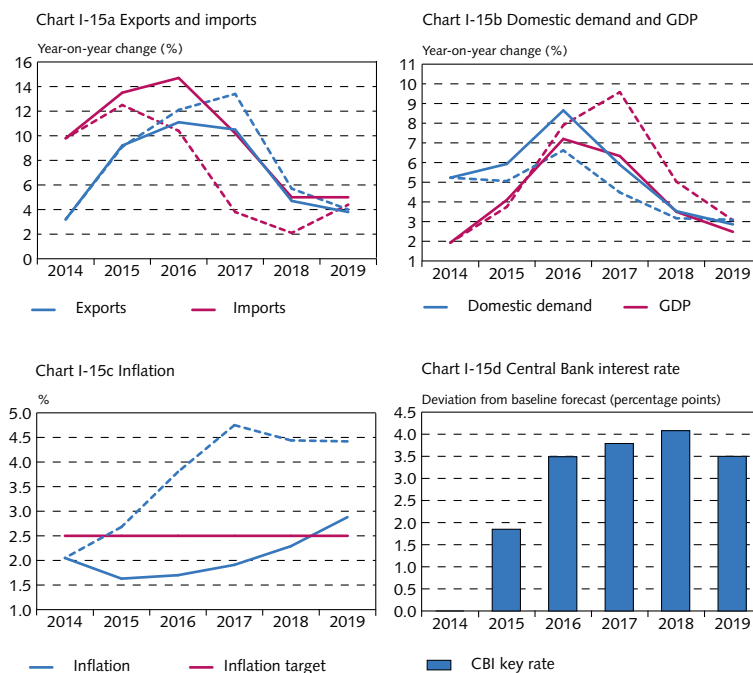
Chart I-14  
Consumer confidence and credit spreads<sup>1</sup>  
January 2011 - April 2017



1. US Consumer Confidence Index and interest premia on speculative-grade US corporate bonds.  
Sources: Federal Reserve Bank of St. Louis Federal Reserve Economic Data (FRED) database, Macrobond.



Chart I-15  
Alternative scenario assuming lower ISK exchange rate<sup>1</sup>



1. Alternative scenario assuming that the trade-weighted exchange rate index remains unchanged at 207 points from 2014 onwards. The baseline forecast in MB 2017/2 is shown with solid lines and the alternative scenario assuming a lower ISK exchange rate with broken lines.

Sources: Statistics Iceland, Central Bank of Iceland.

Chart I-15 illustrates possible economic developments if the króna had not appreciate as it has. The alternative scenario assumes that the TWI remains unchanged at 207 points from 2014 through the end of the forecast horizon. This implies an end-2016 exchange rate about a fifth below the actual one and an end-2019 exchange rate about a fourth below that assumed in the current baseline forecast. Other things being equal, a lower exchange rate would have caused external trade to develop quite differently than it in fact did, as Chart I-15a shows. According to the alternative scenario, year-2016 export growth would have been about 1 percentage point stronger than it actually turned out, and it would have been even stronger this year, other things being equal, or over 13% instead of the forecasted 10½%. Export growth would probably have been stronger in 2018 as well, but from 2019 onwards it would have been broadly as is assumed in the baseline forecast. The difference in import growth is even more pronounced. Without the appreciation, import growth would have been about 1 percentage point weaker in 2015 and more than 4 percentage points less in 2016. Other things being equal, the difference would have been greatest in 2017, when imports increase by nearly 4% in the alternative scenario, as opposed to more than 10% in the baseline forecast. Growth would also be weaker in the next two years.

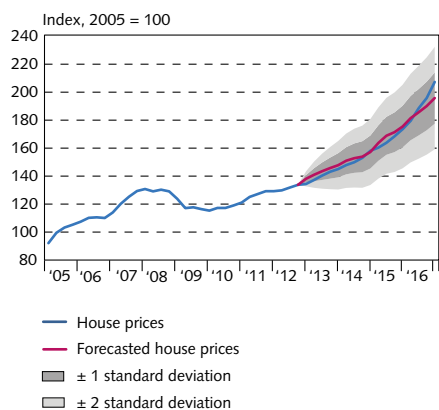
One reason for weaker import growth in the alternative scenario is that the lower exchange rate also tempers domestic demand: a lower exchange rate cuts into real wages, and this plus higher interest rates (see below) slows down consumption and investment spending. As Chart I-15b shows, domestic demand growth would probably

have been 1-2 percentage points weaker in the past two years if the exchange rate had remained unchanged since 2014. The difference is therefore somewhat less than for imports, which shows that a lower exchange rate tends to direct a relatively larger share of households' and businesses' spending towards domestic goods and services. Because of this and strong export growth, GDP growth is much stronger in the alternative scenario than in the baseline forecast, in spite of weaker growth in domestic demand. Other things being equal, with a lower exchange rate, GDP growth would have measured 7.9% in 2016, or 0.7 percentage points above the actual figure, and in the alternative scenario it would be 9½% this year, a full 3 percentage points more than in the baseline forecast. The outlook would also be for stronger GDP growth in 2018 and 2019 if the króna had developed as in the alternative scenario.

Therefore, without the appreciation of the króna, the output gap would be even larger than it actually is. Import prices in krónur would also have fallen more steeply in the past two years and the increase over the forecast horizon commensurably larger. As Chart I-15c indicates, inflation would therefore have developed very differently than it actually has. It would probably have risen to target by 2015 and to nearly 4% in 2016. According to the alternative scenario, inflation would have continued to rise this year, measuring about 4½% throughout the forecast horizon. Other things being equal, significantly higher inflation would have called for a markedly tighter monetary stance so as to bring inflation back to target over the medium term. According to the endogenous interest rate path, the Bank's key rate would have had to be over 9% in 2016, or 3½ percentage points higher than it actually was, and that 3½-point difference would have held throughout the horizon (Chart I-15d).

It is appropriate to take simulation exercises like these with a grain of salt. For instance, the exercise above ignores how an unchanged exchange rate would have come about under these conditions. Presumably, keeping the exchange rate at this low level would have required action by the Central Bank, such as intervening even more heavily in the foreign exchange market than it actually did. Such measures would not have been without side effects, but these are not included in the exercise. Nevertheless, the alternative scenario shows clearly how important a role the appreciation of the króna has played in the adjustment of the economy to increased export growth and improved terms of trade. The appreciation has both slowed economic activity and directed a share of the boost in income from the shocks towards imports. If the króna had not appreciated as it has, the strain on domestic resources would therefore have been even greater. In addition, the rise in the exchange rate has eased demand pressures by facilitating importation of new production inputs – both labour and capital – to address the growth in economic activity. The alternative scenario also shows how important a role the króna has played in transmitting the monetary stance to the real economy. Without the currency appreciation, higher Central Bank interest rates would have been needed to prevent a widening output gap and steep pay rises from unmooring inflation and inflation expectations from the target.

Chart I-16  
Actual and forecasted house prices<sup>1</sup>  
Q1/2005 - Q1/2017



1. The forecast of house prices is obtained with a dynamic forecast from Q1/2013 through Q1/2017, using the house price equation in the Bank's macroeconomic model.

Sources: Statistics Iceland, Central Bank of Iceland.

### Housing inflation to ease from 2018 onwards

Real house prices rose by 11.4% in 2016 and have risen nearly 50% from the early 2010 trough. The increase is similar to that during the period from the beginning of 2004 until year-end 2007, and real house prices are now slightly above their end-2007 peak. As is discussed in Chapter III, the increase is similar in terms of the ratio of house prices to construction costs, but less for house prices relative to wages or disposable per capita income.

The recent increase in house prices has broadly been consistent with developments in the underlying determinants of house prices according to the Bank's macroeconomic model. Chart I-16 compares actual house prices with a dynamic forecast using the house price equation from the Bank's model, from Q1/2013 through Q1/2017. As the chart illustrates, the past four years' rise in house prices is broadly in line with what could have been expected based on the historical relationship between house prices, disposable income, and real interest rates. However, it can be seen that house prices begin to rise faster than forecast near the end of the horizon, although the forecast error is well within the 95% confidence interval. This is also in line with statistical test results, which indicate a growing mismatch between house prices and their usual determinants beginning in H2/2016 or the beginning of 2017.<sup>3</sup>

According to the baseline forecast, the twelve-month rise in house prices will peak this year and then ease from 2018 onwards, as the supply of housing increases and income and demand growth move towards their long-term trend rate. The possibility cannot be ruled out, however, that house prices will deviate even further from developments in wages and income, particularly if the rise in prices is driven by borrowing based on the assumption that house prices will remain high. Under such conditions, imbalances in the economy could develop even more rapidly, exacerbating the risk of a hard landing later on. Neither is it impossible that house prices will rise more slowly than is forecast; for instance, if the strong income growth of the recent past reverses because of external shock such as erosion of terms of trade or a contraction in exports. This could be followed by a drop in household income and wealth and a contraction in demand, including demand for housing. Other things being equal, growth in economic activity would then slow down more markedly than is assumed in the baseline forecast.

### Demand growth has been addressed with importation of resources and improved utilisation of them

As is discussed earlier in this chapter, Iceland's GDP growth has been strong in recent years and is expected to remain so this year. Growth has been well in excess of the long-term trend growth rate of the

3. Using the GSADF test, a one-sided unit root test that seeks to detect an explosive root in asset prices [P. C. B. Phillips, Y. Wu, and J. Yu (2011), "Explosive behavior in the 1990s NASDAQ: When did exuberance escalate asset values?", *International Economic Review*, 52, 201-226]. This statistical test unequivocally indicates housing bubble formation during the prelude to the financial crisis in 2008. At that time, house prices were also rising far more than was indicated by the house price equation in the Bank's macroeconomic model.

economy and will continue in that vein. The output gap has therefore widened and is estimated at 2½% of potential output in 2016, followed by 3⅓% in 2017. It would be even more, however, if potential output were not also estimated to have grown much faster than its long-term trend rate. Potential output is estimated to have grown by about 3¾% in 2015 and 4½% in 2016. If it had grown at the long-term trend rate, the 2016 output gap could have been more than twice as large as is currently estimated, other things being equal. According to the baseline forecast, potential output will continue to rise quickly this year and in 2017 but will ease gradually towards its trend rate as the forecast horizon progresses.

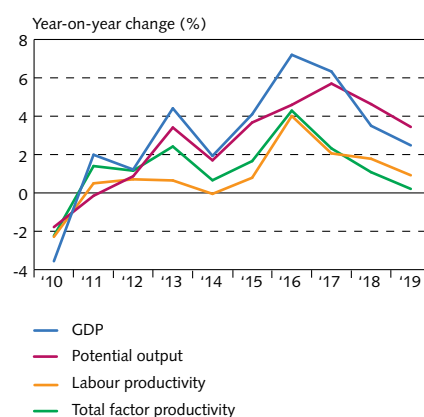
As is discussed earlier in this chapter, the unusually strong cyclical expansion of potential output stems from several factors. Production factors – labour and capital – have increased markedly, but factor utilisation has also improved. Productivity growth was unusually robust in 2016 and is projected to be strong in 2017 as well.<sup>4</sup> As Chart I-17 indicates, growth in total factor productivity appears to explain the lion's share of 2016 and 2017 productivity growth, while the contribution from growth in the capital stock is relatively small, although it will increase over the course of the forecast horizon.<sup>5</sup> This development shows how flexible the supply side of the economy is: when negative economic shocks strike, supply contracts, but in the recent past it has grown rapidly, with large-scale importation of production inputs and better utilisation of them. As is discussed above, the appreciation of the króna plays an important role here: it lowers relative prices of imported inputs, thereby facilitating the adjustment of the economy to the shocks of the past several years.

There are limits, however, to how flexible the supply side of the economy can become, as can be seen, for example, in persistent wage pressures and firms' growing difficulties in staffing available positions. It is also uncertain how long the past few years' rapid growth in potential output can last. Estimating this is difficult, as it relies to a degree on interpretation of variables that are not directly observable. If growth in potential output is overestimated, this implies that the output gap and underlying inflationary pressures are underestimated in the baseline forecast, and the opposite applies if potential output is underestimated.

### Inflation outlook uncertain, as before

The issues described above show clearly that the inflation outlook for the next three years could easily deviate from the scenario presented in the baseline forecast. The inflation outlook could turn out poorer than in the forecast if domestic demand is underestimated or the

Chart I-17  
Labour productivity and underlying factors  
2010-2019<sup>1</sup>



1. Labour productivity is given as GDP per total hours worked. Total factor productivity is given as the deviation of GDP from the output level obtained with full factor utilisation using the production function in the Bank's macroeconomic model. Central Bank baseline forecast 2017-2019.

Sources: Statistics Iceland, Central Bank of Iceland.

4. As is discussed in Chapter V, last year's productivity growth rate probably reflects to some extent a measurement error due to an underestimation of the foreign labour force. This need not change the estimate of growth in potential output, however: productivity growth would then be weaker and the increase in the working-age population correspondingly stronger. As is discussed in Chapters V and VI, the overestimation of productivity growth could also be related to an overestimation of GDP growth for the year, owing to an underestimation of the GDP price deflator. If this is indeed correct, it is likely that growth in potential output in 2016 was overestimated as well.

5. Total factor productivity growth is the portion of increased output over and above the increase in inputs of capital and labour. For further information, see Chapter V.