

## Improved inflation outlook if the króna stays strong

*The inflation forecast included in this edition of Monetary Bulletin reflects the substantial policy rate increases and appreciation of the króna that have taken place since the last macroeconomic and inflation forecast was published in December 2004. Assuming an unchanged policy interest rate and exchange rate over the forecast horizon, the outlook is for a reduction in the rate of inflation until next year. This will take place in spite of further rescheduling of investments in the aluminium and power sectors to this year and a demand impulse from rising asset prices. In 2006 the exchange rate effect will begin to wane and the impact of the positive output gap will dominate. Inflation is therefore likely to pick up next year and exceed the target. However, a qualification must be made that the present high real exchange rate of the króna appears to be unsustainable in the long run. Moreover, the current account deficit has already become larger than previously forecast and it will continue to grow this year. As a result, a depreciation of the króna is more likely than before, which would produce a higher rate of inflation than forecast in the course of 2006, i.e. assuming that the Central Bank does not tighten the monetary policy stance further.*

### I Overview of macroeconomic and inflation forecast

#### **Assumptions of the current forecast**

As usual, the inflation forecast is based on the technical assumption of an unchanged policy interest rate (currently 8.75%) over the forecast horizon and an unchanged effective exchange rate index from the day of the forecast, March 8, when it was close to 109. As in the last edition of *Monetary Bulletin*, which was published in December 2004, the Central Bank also publishes an alternative inflation forecast assuming that the policy rate and exchange rate move in line with expected future rates derived from current yields. The current forecast horizon is until Q1/2007.

#### **Aluminium-related investment is concentrated even more in 2005 but tighter monetary policy is beginning to impact domestic demand**

Investment in the aluminium and power sectors last year now appears to have been less than hitherto assumed. Construction plans have also been revised so that an even larger share of investments has been rescheduled to this year instead of 2006-7. Thus the outlook is still for robust GDP growth this year, at almost 6½%. This is a marginally faster rate of growth than was expected in the last Central Bank forecast, despite a downward revision of the forecast for private consumption and business investment growth, excluding power-intensive projects, which in part is probably the result of a tighter monetary stance than was assumed in December. Export growth has also been revised downwards, reflecting a sizeable increase in the real exchange rate.

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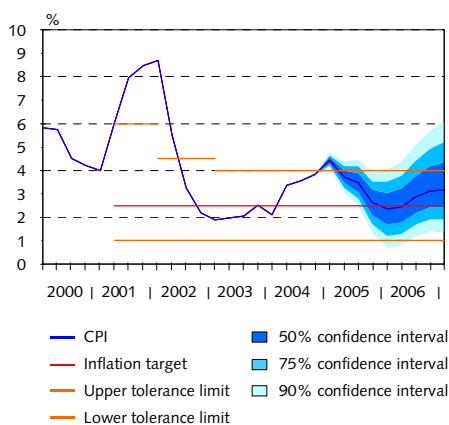
1. This article uses data available on March 18, 2005.

Table 1 Central Bank macroeconomic forecast

	Policy rate and exchange rate assumptions <sup>1</sup>								
	Current forecast			Current forecast			Change from previous forecast (percentage points) <sup>2</sup>		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Central Bank policy interest rate (%)	6.14	8.68	8.75	6.10	7.25	7.25	0.04	1.43	1.50
Foreign exchange index <sup>3</sup>	121.0	109.4	109.0	121.5	120.0	120.0	-0.4	-8.8	-9.2
	Current macroeconomic forecast						Change since previous forecast (percentage points) <sup>2</sup>		
	Billion krónur at current prices			Volume change on previous year (%)					
	2004	2005	2006	2004	2005	2006	2004	2005	2006
GDP and its main components									
Private consumption	496	555	608	7.5	8.0	6.6	0.5	-1.5	-0.2
Public consumption	228	246	265	3.6	2.5	2.5	2.3	-0.6	0.0
Gross fixed capital formation	189	270	264	12.8	33.5	-7.9	-4.5	12.9	-10.7
Industries	107	168	152	12.9	52.3	-13.0	-16.4	23.0	-15.3
Excl. power-intensive projects, ships and aircraft	71	75	76	6.7	2.7	-2.8	-2.6	-1.6	-4.8
Residential housing	46	69	81	3.0	19.5	9.6	-10.0	11.2	3.8
Public investment	36	33	31	27.3	-11.0	-8.1	45.7	-7.0	-8.1
National expenditure	910	1,071	1,137	7.7	12.5	2.2	-0.4	1.6	-2.8
Exports of goods and services	316	329	360	8.3	4.9	9.4	1.8	-0.8	0.5
Imports of goods and services	367	428	432	14.3	19.6	0.0	0.2	2.4	-8.3
Gross domestic product	859	973	1,065	5.2	6.4	6.1	-0.2	0.3	1.2
							Change since previous forecast (percentage points) <sup>2</sup>		
	% of GDP								
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Current account balance				-8.1	-12.2	-9.3	-1.6	-1.8	2.1
Output gap <sup>4</sup>				1.1	3.1	4.1	-0.6	-0.6	-0.9
							Change since previous forecast (percentage points) <sup>2</sup>		
	%								
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Main labour market aggregates									
Private sector wages, % change between annual averages				4.5	6.0	6.0	-	-	-
Labour productivity, % change between annual averages				3.1	2.5	2.4	-0.3	0.4	0.8
Unemployment, % of labour force				3.1	2.3	2.1	-	-0.1	0.3

1. Annual averages, assuming unchanged interest rates and exchange rate from the day of forecast. 2. Change since *Monetary Bulletin* 2004/4. 3. Percentage-point change in index from previous forecast. 4. As a proportion of production capacity in the economy.

Chart 1  
Central Bank inflation forecast  
Forecasting period: Q1/2005 - Q1/2007



Source: Central Bank of Iceland.

Domestic demand growth next year has been revised downwards from the December forecast as a result of the impact of monetary policy measures and the stronger króna, which to some extent channels demand abroad, as well as the rescheduling of aluminium-related investments. Nonetheless, GDP growth will remain robust and somewhat above the rate forecast in December. The main explanation is export growth driven by increased fishing quotas. Similarly, import growth will be some way down from the December forecast, also attributable to the monetary stance and rescheduling of investments in the aluminium and power sectors.

Further along the horizon, the outlook is that tighter monetary policy measures will subdue domestic demand in 2007. However, firm GDP growth is expected, driven by increased aluminium exports.

### The outlook for inflation has improved since the December forecast but it will remain above target two years ahead

The higher policy rate and a substantial appreciation of the króna subdue domestic demand and dampen rises in import prices, especially in the short term. Inflation will therefore be somewhat lower over

the forecast horizon than was forecast in December. However, it still looks likely to be above target two years ahead. The Central Bank forecasts an inflation rate around the 2½% target one year ahead, which is lower than in December when an inflation rate of just under 3% was forecast over the one-year horizon corresponding to the current one-year forecast (i.e. Q4/2005). Two years ahead, inflation is forecast at just over 3%, which is somewhat lower than the rate forecast in December, although still above target.

As in the December forecast, the Bank evaluates the upside and downside risks to the forecast as symmetric one year ahead, with an upside risk over two years. The upside risk has increased due to the greater probability of a depreciation of the króna than in the December forecast.

It is important to remember that an unchanged monetary policy stance and exchange rate are assumed over the forecast horizon. The forecast serves the purpose of guiding the Central Bank in its monetary policy decisions. It describes the way that the Bank considers developments are most likely to unfold if it takes no further measures than it has already taken. The forecast shows that the effects of monetary policy will increasingly be felt this year and in 2006. The concentration of aluminium investments in 2005 will cause economic overheating over the forecast horizon. Further Central Bank measures are likely to be needed to tackle this and the accompanying inflation. This evaluation is reinforced by the alternative forecast scenario assuming a flexible policy rate and exchange rate.

Table 2 Central Bank inflation forecast

%	<i>Percentage change on previous quarter</i>	<i>Annualised quarterly change</i>	<i>Change on same quarter of previous year</i>
2003:1	0.7	2.9	1.9
2003:2	0.5	2.0	2.0
2003:3	0.3	1.1	2.1
2003:4	1.0	4.1	2.5
2004:1	0.3	1.3	2.1
2004:2	1.7	7.0	3.3
2004:3	0.5	1.9	3.6
2004:4	1.3	5.2	3.8
2005:1	0.9	3.7	4.4
2005:2	1.0	4.1	3.7
2005:3	0.2	0.9	3.5
2005:4	0.4	1.7	2.6
2006:1	0.7	2.7	2.4
2006:2	1.1	4.4	2.4
2006:3	0.7	2.6	2.9
2006:4	0.7	2.8	3.1
2007:1	0.7	2.9	3.2

Figures indicate changes between quarterly averages of the consumer price index. Shaded area indicates forecast.

	<i>Change, year-on-year</i>	<i>Change within year</i>
2003	2.1	2.4
2004	3.2	4.0
2005	3.6	2.6
2006	2.7	3.1

Shaded area indicates forecast.

## II External conditions and exports

### Global growth slowing down

The outlook for global growth in 2005 is fairly upbeat, although the rate will probably be slower than last year. In 2004, inflation was very low and interest rates remained low, while growth was fed by rising housing and equity prices in many parts of the world. This year's outlook is that the emerging economies in Asia, South America and Europe will lead world growth, driven by strong foreign direct investment. According to *Consensus Forecasts*, global growth will be 3% in 2005, compared with 4% last year.<sup>2</sup>

The euro area and Japan are likely to hold back global growth. Japan's economy is quite dependent on exports, and exports have led growth in the euro area in recent years. The strengthening of the euro and yen against the US dollar and a somewhat lower global growth rate will curtail export growth in these countries and thereby their GDP growth, unless domestic demand picks up.

In the euro area, subdued private consumption has cramped growth and left it more dependent on exports. Germany and Italy, which have faced persistent near-stagnation, account for half of total production in the euro area. The outlook for a recovery there this year is weak, and their economies contracted in Q4/2004. Structural reforms aimed at increasing the flexibility of the German labour market have caused a temporary spike in unemployment and undermined consumer confidence.<sup>3</sup> France and Spain have published more upbeat growth figures, broadly matching the US in Q4/2004 and with a favourable outlook this year. Growth in the euro area is therefore fairly unevenly distributed. In the UK, as elsewhere, growth prospects are down compared with 2004. Housing price rises are slowing, high street sales have contracted and private consumption growth is expected to abate.

Slower growth is also forecast in the US in 2005 compared with last year, when the rate of growth was at its highest since 1999. Buoyant private consumption was one of the main drivers of growth then, but increased business investment also made a contribution. However, the widening current account deficit counteracted the increase in national expenditure, which was one of the chief reasons for the slowdown in growth in the final quarter.

Last year China recorded GDP growth of 9½% and even brisker growth in foreign trade, with imports soaring by 36%. China now accounts for a significant share of the growth in global demand. Since China's economy is now ⅔ the size of the US, developments there

2. Consensus Forecasts compiles averages from many forecasters. The figure cited here is based on growth forecasts for 69 countries accounting for roughly 85-90% of world output.

3. Unemployment in Germany has reached 5 million and is likely to rise even higher. Gross fixed capital formation in Germany is also low as German businesses opt to invest in the emerging economies of Europe and Asia. Foreign trade comprises a large share of the German economy, with a combined export and import value equivalent to almost 70% of GDP. Upswings in Germany therefore tend to be driven from abroad. Although exports rose last year in step with climbing international trade, domestic demand did not follow suit. With the subdued global outlook for this year, Germany's growth prospects have not improved either.

and in neighbouring countries are becoming increasingly important for the global economy. Although GDP growth in 2005 is expected to lose some pace, China will remain one of the fastest-expanding economies in the world. The Chinese authorities have made efforts to restrain economic activity in order to counter the current risk of overheating, but with limited success. Latest data indicate that the Chinese economy is still buoyant and private consumption and exports are continuing to surge.

Rising crude oil prices are one reason for the downturn in global growth prospects compared with last year. Average crude oil prices were almost 34% higher last year than in 2003. Oil prices have continued upwards so far this year with an average year-on-year increase of 43% in the first two months. Concerns about prolonged cold spells in the US and conceivable volatility in supply have driven up oil prices in recent weeks. Futures prices suggest that spot prices will remain high in the coming months: in February, crude oil futures had gone up by 49% year-on-year. Average petrol prices in 2004 were almost 42% higher than the year before. Like crude oil, petrol prices have still been climbing this year, although not so briskly. The year-on-year increase over the first two months of 2005 was 25%.

### Concerns about funding of the US current account deficit

The US current account deficit has been continuously widening in recent years. It was equivalent to more than 5% of GDP in 2004 and is expected to widen this year. The fiscal deficit has also been very large. In many circles there are fears that the “twin deficit” in the US could disrupt the world economy, which has caused widespread uncertainty in financial markets.

A number of factors explain the US current account deficit. A drop in private sector saving and the growing fiscal gap are part of the reason, but US GDP growth has also outpaced many of its main trading partner countries, for example Europe and Japan. Due to the relatively small share of external trade in its economy, domestic demand growth has less impact on the current account deficit in the US than in many other countries. To achieve a significant narrowing of the US deficit, domestic demand will need to drop, preferably as a result of a tighter fiscal stance, at the same time as growth picks up among its main trading partner countries, especially the euro area and Japan. If this is not sufficient, the dollar may need to fall even further below its current rate. A significant narrowing of the US current account deficit seems unlikely to happen in the near term, given the sluggish growth outlook for Europe and Japan this year. Furthermore, the dollar peg followed by many Asian countries limits the degree of adjustment that a depreciation of the dollar can bring; indeed, a large share of the deficit is towards China and other Asian countries.

The world market has mainly accommodated the US current account deficit so far through the weakening of the dollar. Since peaking in February 2002 the dollar has fallen by 28% against the main industrial countries' currencies. Nonetheless, the depreciation

Chart 2  
Crude oil and gasoline prices 2001-2005

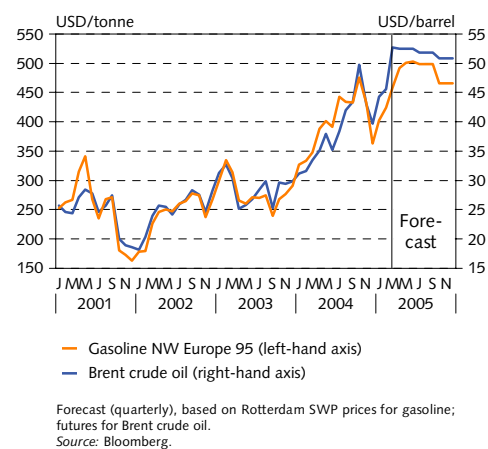
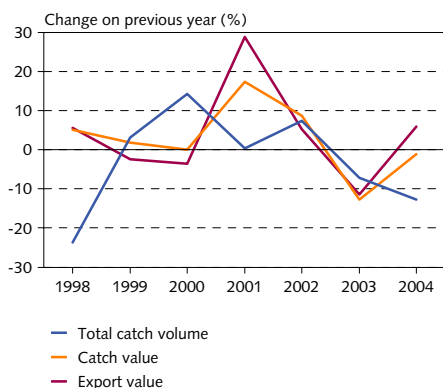
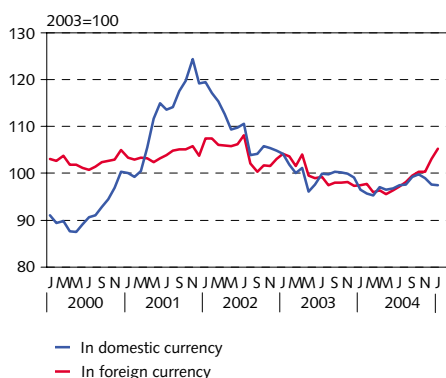


Chart 3  
Marine production 1998-2004



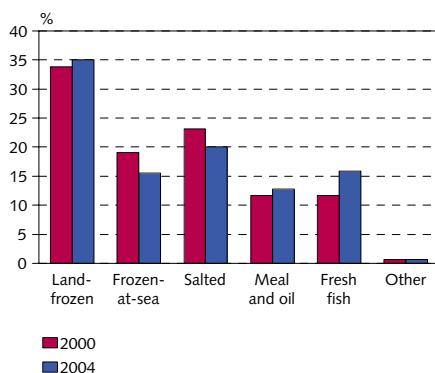
Source: Statistics Iceland.

Chart 4  
Estimated marine product prices<sup>1</sup>  
January 2000 - January 2005



1. An index calculated by Statistics Iceland translated into foreign currency using the export-weighted currency basket.  
Sources: Statistics Iceland, Central Bank of Iceland.

Chart 5  
Marine export composition  
2000 and 2004



Source: Statistics Iceland.

has only had a muted impact on the gap, partly because the main exporters to the US have preferred to take lower margins rather than eroding their market shares with sharp hikes in their dollar prices. Many Asian countries also peg their currencies to the dollar. A substantial further depreciation cannot therefore be ruled out in order to deal with the deficit effectively. In the late 1980s the average (trade-weighted) exchange rate index of the dollar fell by 35%, compared with 15% since 2002. However, the current account deficit then was only half its current size relative to GDP.

### Rising marine prices

Iceland's fish catch contracted in 2004, mainly due to a lower pelagic harvest, but demersal catches were strong. Landed catch value at constant prices remained unchanged year-on-year, despite lower total volume, as demersal catches are more valuable. Even though catch value was broadly unchanged, exports of marine products increased by more than 8% in volume terms. Growth was largely driven by a change in export composition. There was a surge in exports of fresh fish, which as a rule yields more value-added than other products. A shift in catch disposition of capelin and herring towards freezing and away from fish meal and oil increased the export value of pelagic products by 7 b.kr. Focused marketing, gains in yield from raw material, enhanced processing technology and the stronger position of Icelandic exporters and food producers in main European markets may also have contributed to higher marine export value.

Despite fairly subdued growth of private consumption in much of Europe, export prices of marine products have risen briskly in recent months. In foreign currency terms, marine prices have gone up by more than 10% over the past eight months, and most sharply over the past two months, after a downward trend since the first half of 2002. However, the appreciation of the króna has left product prices broadly unchanged in domestic currency terms.

Prices of virtually all products have risen during the last eight months. The explanation is a contraction in supply of main demersal species in recent years at the same time as demand has remained stable or increased. Buyers are also competing more fiercely for sought-after species such as fresh cod. Furthermore, prices of several types of products, especially frozen-at-sea fish, have readjusted after a slide in 2002-2003.

### Varying impact of the real exchange rate

The króna appreciated markedly towards the end of last year. In 2004 it was on average 8.6% stronger against the dollar than the year before, 2.4% stronger against sterling and 0.5% stronger against the euro. So far this year the króna has continued to appreciate, partly as a result of the Central Bank's policy rate hikes. In its current forecast the Central Bank uses the technical assumption of an unchanged exchange rate from March 8, which implies that the króna has appreciated by a weighted average of 10.6% year-on-year. Assuming no change in cross-currency exchange rates, this entails an average



strengthening of 14% against the dollar year-on-year, and of 10% against sterling and just over 8% against the euro.

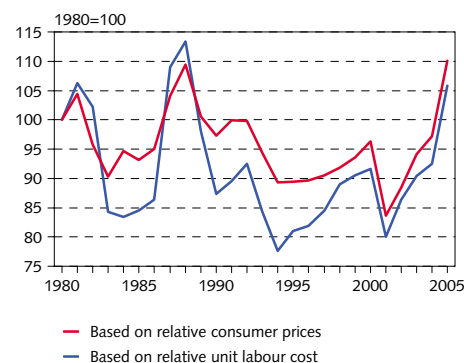
Since the outlook is for higher domestic inflation and unit labour cost increases in Iceland than among trading partner countries, the real exchange rate increase will exceed the nominal appreciation. Assuming an unchanged nominal exchange rate from March 8, the real exchange rate will strengthen by just over 13% this year and roughly 2% in 2006, based on relative consumer prices, and by somewhat more based on relative unit labour cost.

This year the real exchange rate is heading close to a historical high. In 2004 it was more than 7% above the ten-year average and 2½% higher than the twenty-year average. If the above assumptions hold, the real exchange rate based on consumer prices this year will be 20% above the ten-year average, 16% above the twenty-year average and 1% above the peak year of 1988.

Such a high real exchange rate is unlikely to be sustainable. A higher real exchange rate squeezes profit margins in the traded goods sector, to varying degrees depending on their relative domestic and foreign costs. Exporters' profits will unavoidably shrink. However, these companies are fairly flexible. For example, the composition of marine production has been altering in recent years in pace with relative prices and technical advances, although other factors have also been at work, as Chart 5 shows.

Judging by developments for the main export sectors in recent months – e.g. marine products, aluminium, pharmaceuticals, medical equipment and food processing equipment – the higher real exchange rate has not had a significant impact on exports. The reason may be that many businesses are unable to cut back supply in the short term, or that they prefer to retain an unchanged market share in the hope that the króna will not stay buoyant for long. Aluminium production is relatively immune to exchange rate fluctuations and large Icelandic manufacturers have already relocated the most labour-intensive parts of their operations abroad.

Chart 6  
Real effective exchange rate  
of the króna 1980-2005



Source: Central Bank of Iceland.

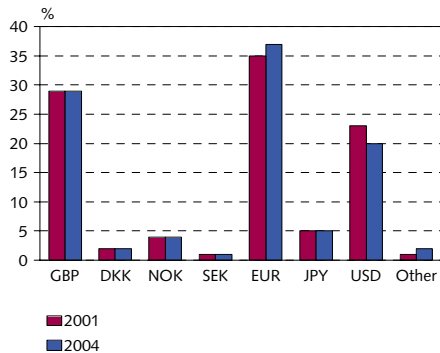
Table 3 Main assumptions for developments in external conditions

	Current forecast <sup>1</sup>			Change from previous forecast <sup>2</sup>		
	2004	2005	2006	2004	2005	2006
Marine production for export	8.1	4.0	4.5	0.6	0.0	3.5
Export prices of marine products	-0.9	6.0	2.0	-0.9	1.0	0.0
Aluminium export prices	9.6	4.2	-8.2	-3.6	6.9	-1.2
Prices of exported goods and services	-3.5	9.7	0.3	-6.2	7.3	0.1
General import prices in foreign currency	-2.5	2.3	2.2	-1.0	0.3	0.2
Of which fuel prices	35.9	33.9	-3.2	8.2	24.6	-1.0
Terms of trade for goods and services	-2.6	1.9	-1.0	-3.6	0.6	0.5
Foreign short-term interest rates	2.3	2.6	3.0	0.0	-0.9	-1.0

1. Percentage-point change year-on-year, except for interest rates. 2. Change since *Monetary Bulletin* 2004/4.

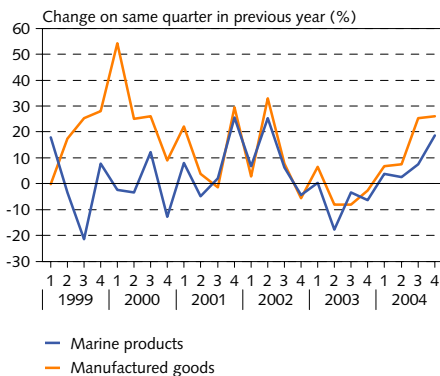
Source: Central Bank of Iceland.

Chart 7  
Currency basket for marine exports  
2001 and 2004



Source: Central Bank of Iceland.

Chart 8  
Merchandise export growth 1999-2004<sup>1</sup>



1. At constant exchange rates based on the export-weighted currency basket.  
Sources: Statistics Iceland, Central Bank of Iceland.

### Outlook for ongoing export growth

The outlook is for ongoing export growth this year, although at a rather slower rate than in 2004. Marine exports look set for robust growth this year. The total allowable catch (TAC) of demersal species for the current fishing year (from September 1, 2004 to August 31, 2005) is 15 thousand tonnes higher than for the previous fishing year. A somewhat higher TAC is expected this year for capelin and herring, and broadly the same for blue whiting. On the basis of these assumptions, catch value is expected to increase this year. For the next fishing year, quotas for cod and other major demersal species are likely to be raised. Larger demersal catches, gains in efficient use of raw material, more value-added and increased sales of fresh fish give grounds for expecting marine exports to increase year-on-year in 2005. Measured at constant prices, the forecast growth is 4% in 2005 and 4½% in 2006.

Further rises in marine prices are also expected in foreign currency terms, especially for frozen-at-sea and land-frozen products and saltfish. The Central Bank forecasts a year-on-year increase of 6% in marine prices in 2005 and 2% next year.

The slide of the dollar could affect relative distribution of exports between market regions. However, the currency weighting of exports has not altered significantly. Sales denominated in US dollars have contracted by 3% over the past three years, while euro-denominated sales have gone up by 2%.

Exports of other manufactured goods excluding the metals sector (i.e. aluminium and alloys) surged last year and further growth is expected in 2005.

Tourism revenues increased by 6% last year, at constant exchange rates. On a fairly cautious estimate, the number of tourists will increase by 10% this year, and revenues in foreign currencies by 6-7%.

On these assumptions, exports of good and services are expected to increase by almost 5% this year, which is rather less growth than had been forecast in December. In 2006, on the other hand, the outlook is for greater export growth – in spite of a higher real rate of exchange – largely driven by increased fishing quotas, but also by increased exports of aluminium.



### III Financial conditions

Overall financial conditions have tightened slightly since November. However, they are still very easy. Foreign interest rates remain exceptionally low, although US short-term rates are beginning to creep up. Domestic short-term interest rates have risen in pace with the 1½ percentage-point increase in the policy rate, which has contributed to the appreciation of the króna and thereby made foreign borrowing more expensive, assuming that the appreciation will unwind. Long-term indexed bond rates have not gone up, however. Thus the policy rate hikes have still not had a substantial impact on the financial conditions of households to date.

#### Global financial conditions are still very easy

Global financial conditions are still at one of the easiest levels for decades. While the US Federal Reserve has raised its funds rate by 1½ percentage points since backing down from its accommodative monetary policy in the summer, the European Central Bank (ECB) has maintained its key rates unchanged at 2% since summer 2003. The Bank of England's policy rate has been unchanged since August, following rises in the first half of 2004. The US funds rate is currently 2½%, which is below domestic inflation. In real terms, global short-term real rates are still generally either close to zero or negative. Nor has the US funds rate hike significantly affected long-term rates. Ten-year US Treasury bond rates, for example, have been close to 4% over the first months of 2005, only marginally above their historical low. Long-term rates in Europe are at broadly the same level. Exceptionally low interest rates are mostly explained by low inflation expectations, general confidence in monetary policy in the main economies and expectations of a cautious tightening in the years to come. At the same time, large-scale purchases of US Treasury bonds by Asian central banks have prevented interest rates from rising as a result of the US fiscal deficit. Furthermore, corporate profits have grown without a corresponding increase in investment. The result has been subdued credit demand at the same time as credit has been in ample supply. Historically low Treasury-guaranteed bond rates do not entirely account for the easier global financial conditions, since premia everywhere have been heading downwards, for both corporate borrowers and the emerging economies.

Since the recovery began just over two years ago, policy interest rates in the major economies have been rising much more slowly than during previous upswings. Most forecasts still expect both short-term and long-term interest rates to edge up slowly over the next two years, although various factors could expedite the process. Possible scenarios for speeding up the expected interest rate hikes could be a sharp cutback in US bond purchases by Asian central banks, rising inflation which would force faster monetary tightening than is currently foreseen, and a failure to rein in the huge US fiscal gap. Such a development could have major consequences for Iceland, where soaring domestic lending has largely been funded with foreign borrowing, much of it at variable interest rates. Ample credit supply,

Chart 9  
Foreign interest rate developments  
January 2, 2002 - March 10, 2005  
(daily data)

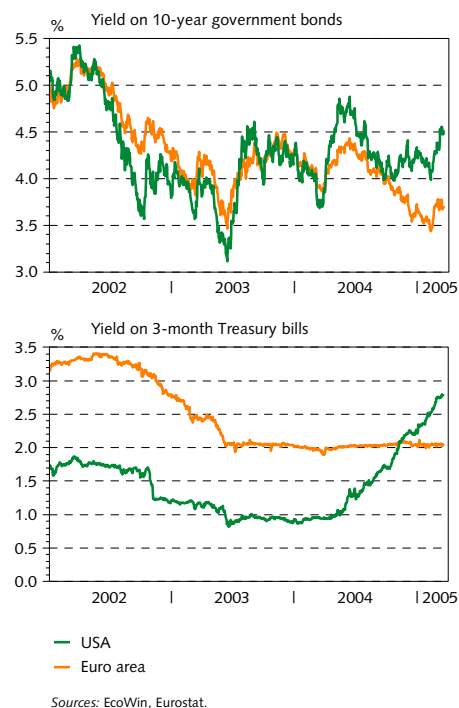
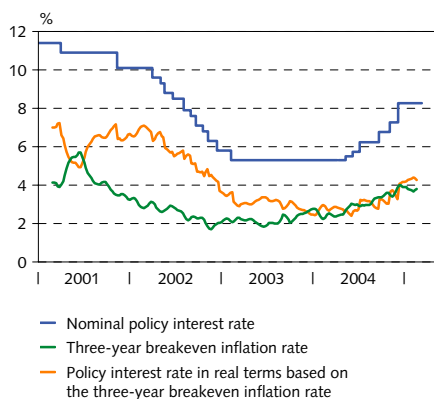
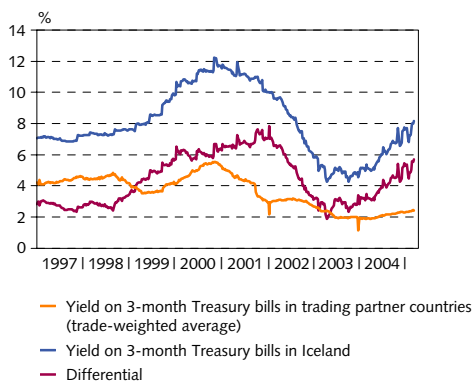


Chart 10  
Central Bank policy interest rate in real terms  
Weekly data January 2, 2001 - March 8, 2005



Source: Central Bank of Iceland.

Chart 11  
Domestic and foreign short-term interest rates and the interest-rate differential with abroad  
3-mo. Treasury bills, weekly data January 1997 - March 2005



Source: Central Bank of Iceland.

falling interest rate premia and generally low interest rates among trading partner countries can delay the transmission of policy rate changes across the interest rate spectrum in the short term, but they will not prevent it. However, as a result the effect will to a larger extent be transmitted through changes in the exchange rate (see below).

### The Central Bank raised its policy rate in December and February

Since *Monetary Bulletin* was published at the beginning of December 2004, the Central Bank has continued to tighten its monetary stance. An increase of 1 percentage point was announced in December at the same time as the Bank published its inflation forecast, and the policy rate was raised by a further half a percentage point, to 8.75%, when the Bank published its report to the Government of Iceland on inflation beyond the tolerance limit.

The February hike moved the Central Bank's policy rate up to almost 3½ percentage points higher than when it began tightening monetary conditions in May 2004. However, the stance has not tightened by so much, because both the inflation rate and inflation expectations have increased at the same time. Thus the policy rate in real terms has risen by less than the nominal interest rate. There is no absolute measure of the real policy rate. The Central Bank's policy rate has a direct impact on interest rates in money markets and the market for bonds with maturities of a few years or shorter. Since demand for Central Bank repos is largely determined in these markets, traders' expectations provide an obvious gauge for the policy rate in real terms. A comparison of the spread between yields on non-indexed and indexed Treasury bonds of corresponding maturities can provide a measure of inflation expectations. A drawback at present, however, is the lack of suitable indexed benchmark bonds, so the results need to be interpreted with some qualifications.<sup>4</sup> Ignoring short-term fluctuations in the estimated breakeven inflation rate, it can be estimated that the policy rate did not begin to rise significantly in real terms until late autumn 2004, after hovering around 3% for almost two years. Recently it has been roughly 1½ percentage points higher, at and above 4%.

Although the most common measure of the policy rate in real terms is inflation expectations in the markets that are most closely linked to Central Bank activities, household and business expectations also provide a suitable gauge, since some of their debt and their short-term credit terms are impacted fairly quickly by changes in the policy rate. Household inflation expectations have been close to 4% over the past year. The policy rate is slightly higher in real terms relative to household expectations than business expectations, at roughly 4.75%. However, household expectations have a tendency to track past inflation. If the 4.7% rise in the CPI in March is

4. The bond class RIKS-05, which is used as to calculate inflation expectations, is no longer a reliable benchmark for indexed bond yields, because it matures in April and trading volume in it has virtually dried up.

incorporated into expectations, the policy rate in real terms would be 3.9%. Based on the business confidence survey (see p. 42), the real policy rate is currently 4.9%. Yet another deflator for the policy rate in real terms is given by using the Central Bank's inflation forecast instead of expectations, which yields a figure of 6.2% at present.

**Yields have risen on two-year T-notes since November, but have decreased on longer Treasury instruments**

Transmission of changes in the policy rate through the non-indexed interest rate corridor can be lagged and affected by a variety of external factors. Conflicting factors include the substitution effect due to higher short-term rates, inflation expectations, short-term interest rate developments and expectations of changes in the exchange rate. Expected yields on alternative investment forms to bonds, e.g. equities and real estate, may also come into play. Yields on two-year T-notes have risen since November. This development is as expected since instruments with a maturity of two years or less compete strongly with money market yields, which will foreseeably hold up high over their lifetime and perhaps even rise. Interestingly, yields on Treasury instruments with maturities of roughly five or eight years have gone down. This trend may reflect investor confidence in the Central Bank's ability to keep inflation under control – if so, the rise in short-term rates will only be short-lived and soon reversed. However, other factors may be at work. The drop in long-term indexed yields, following the commercial banks' entry into the mortgage loan market in competition with the Housing Financing Fund (HFF), affects yields on other bonds. Lower yields on long-term indexed bonds are likely to have prompted investors such as pension funds to focus on other types of bond. If investors expect the Central Bank to keep average inflation on target for the lifetime of the bonds, then the expected yield on T-notes in real terms is considerably higher than on indexed T-bonds, despite falling in recent months.

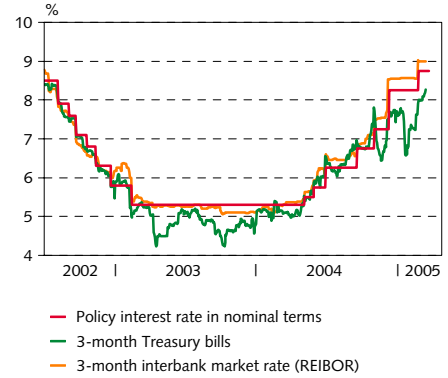
**Market agents expect policy rate hikes to continue**

Market agents' expectations about the medium-term policy rate trend can be assessed from implied forward interest rates which can be derived from the yield curve on non-indexed bonds. On the basis of this analysis, the market expects continued rises in the policy rate, which is consistent with the Central Bank's recent announcements. Forward rates imply that the policy rate will peak early in August at around 10%. Subsequently, the policy rate is apparently expected to come down gradually and reach 7½% two years later. This is a rather steeper profile than was assumed in November when *Monetary Bulletin* 2004/4 was being prepared, which probably reflects more robust demand in the economy, higher inflation and a stronger Central Bank response to this scenario than was expected then.<sup>5</sup>

5. The forward interest rate curve since November 10, 2004 has changed slightly from the presentation made in *Monetary Bulletin* 2004/4, due to a new methodology for evaluating implicit forward rates. This is discussed in Appendix 1.

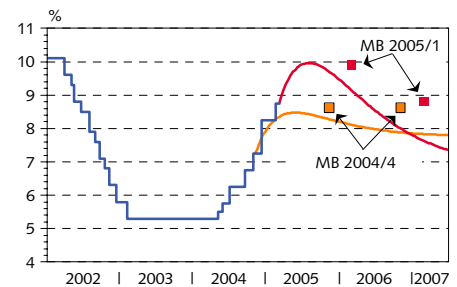
Chart 12  
Policy interest rate and other short-term market rates: Treasury notes and REIBOR

Daily data July 1, 2002 - March 10, 2005



Source: Central Bank of Iceland.

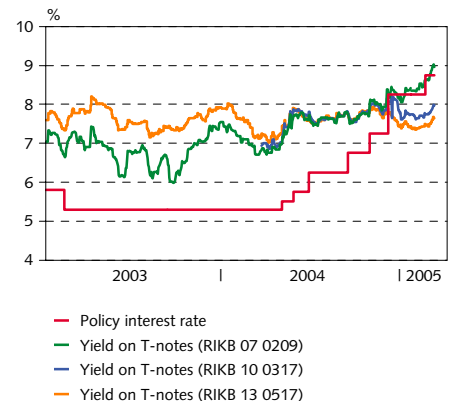
Chart 13  
Central Bank policy interest rate 2002-2007



Red and yellow lines indicate forward interest rates. Boxes indicate interest rate forecasts by financial analysts before publication of *Monetary Bulletin* (MB).  
Source: Central Bank of Iceland.

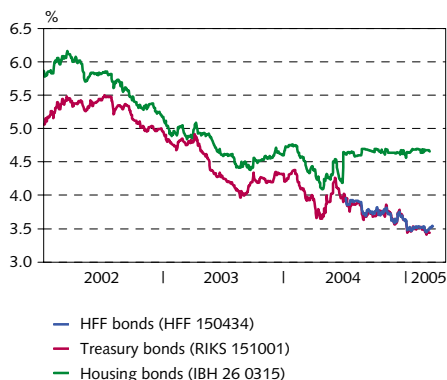
Chart 14  
The Central Bank policy interest rate and yield on Treasury notes

Daily data January 3, 2003 - March 10, 2005



Source: Central Bank of Iceland.

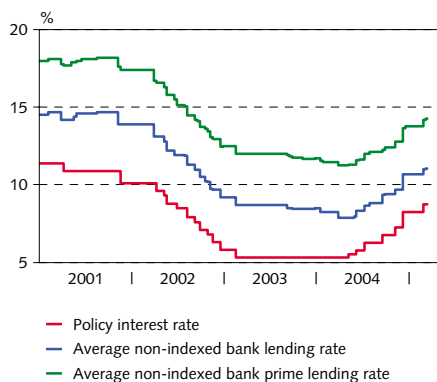
Chart 15  
Yields on indexed long-term bonds  
Daily data January 3, 2002 - March 10, 2005



Source: Central Bank of Iceland.

Chart 16  
The policy interest rate and  
non-indexed bank lending rates

On the 1st, 11th and 21st of each month  
January 1, 2001 - March 11, 2005



Source: Central Bank of Iceland.

Implied forward interest rates do not necessarily provide a precise reflection of market expectations, since investors may incorporate a risk premium that distorts them. A useful tool can be to incorporate information from the survey of financial analysts' evaluation of policy rate developments. Chart 13 shows that financial analysts appear to expect the policy rate to head downwards at a later time and slower pace than is implied by forward rates (see further Box 3).

**Non-indexed bank lending rates have risen in step with the policy rate, while indexed lending rates remain low and premia are falling**

Since the Central Bank began raising the policy rate in the spring, the commercial banks' non-indexed lending rates – both prime and average rates – have broadly tracked it. The spread between the policy rate and non-indexed prime lending rates has therefore changed little over the past year, after narrowing in 2003, since monetary policy is not expected to affect this differential. On the other hand, indexed lending rates have remained unchanged since the autumn and are now roughly one percentage point lower than at the end of 2003. Undoubtedly they have been affected by lower interest rates on indexed market securities. A number of larger corporations can tap into credit with public bond offerings. There are indications that premia on these interest rates have been falling recently, which is consistent with the international pattern. Premia on prime rates offered by banks also appear to be moving down.

**No slowdown in rapid lending growth to households and corporations**

Since the autumn, credit system lending has shown broadly the same annual growth rate as during the previous peak in 2000-2001. Total lending in 2004 increased by one-fifth, or 16% in real terms. The briskest growth was in corporate credit, at one-quarter. Lending to households was up by 14%, which was roughly the same rate as earlier in the year. The massive increase in mortgage lending by the banking sector has largely been used to prepay older loans which carried less favourable terms. Figures now available for lending growth by deposit money banks (DMBs), the HFF and pension funds indicate a broadly unchanged rate of increase so far this year. It is a cause for reflection that lending growth at present is considerably faster than when the economy began to overheat in 1998-2000, and that previous episodes of such excessive growth have been followed by severe shocks. However, this is unlikely to occur over the next two years.

Corporate credit growth was exceptionally rapid in 2004. Among other things, foreign currency-denominated lending increased significantly. At the end of January, the outstanding stock of domestic companies' foreign currency-denominated debts with credit institutions amounted to 456 b.kr., having grown by 38% over the space of one year. Buoyant demand for foreign credit is understandable in light of the favourable interest rates available, but the appreciation of the króna can eventually be expected to subdue it. In fact, the share of foreign currency-denominated loans in corpor-

Table 4 Changes in financial conditions since *Monetary Bulletin 2004/4*

	Average in the 3-week period to		Sectoral impact <sup>1</sup>			
	November 19	March 10	Households	Export and traded goods undertakings	Financial undertakings	Other businesses
Policy interest rate in real terms <sup>2</sup>	3.8	4.3	.	.	-	.
Short-term interest rate in real terms <sup>3</sup>	3.0	3.4	-	-	+/-	-
CPI-indexed domestic interest rates (yield on 40-year HFF-bonds) <sup>4</sup>	3.7	3.5	+	.	+/-	.
Average non-indexed domestic bank rates	12.6	14.0	-	-	.	-
Average CPI-indexed domestic bank rates	7.5	7.5	0	0	0	0
Foreign short-term interest rates (3-month T-bills) <sup>5</sup>	2.1	2.2	-	-	-	-
Foreign long-term interest rates (10-year T-bonds) <sup>5</sup>	3.9	3.9	0	0	0	0
Exchange rate index	120.0	109.5	+	-	+/-	+/-
Equity prices <sup>6</sup>	3,401.0	3,779.6	+	+	+	+

1. '+' indicates more favourable financial conditions, '-' less favourable, '+/-' ambiguous, '.' not applicable and '0' indicates approx. no change. 2. Deflated by 3-year breakeven inflation rate. 3. On three-month T-bills. 4. HFF = Housing Financing Fund. 5. Weighted with euro 2/3 and US dollar 1/3. 6. ICEX-15 index.

Source: EcoWin, Iceland Stock Exchange and Central Bank of Iceland.

ate liabilities with DMBs has declined slightly since mid-2004, when it was roughly 60%, although the reduction is insignificant after adjustment for the appreciation of the króna. It should be borne in mind that large-scale external investment by Icelandic companies has been partly financed through domestic banks. Thus the surge in foreign currency-denominated lending to Icelandic companies is not delivered in full into the domestic economy since the net inflow of foreign borrowing in 2004 was equivalent to 70% of GDP according to balance of payments statistics.

While some larger corporations borrow directly in international capital markets, foreign credit is mostly – and increasingly – procured through domestic credit institutions, which borrow abroad for domestic on-lending. In recent years, Icelandic banks have mainly tapped international capital markets rather than borrowing from foreign banks. This is one benefit that Icelandic banks are reaping from the mergers that have strengthened them in recent years. Combined securities issues and outstanding foreign loan stock of Icelandic banks grew by just over 82% in 2004. It should be remembered that part of the domestic banks' heavy foreign borrowing is explained by swelling balance sheets after acquisitions of financial companies in other countries.

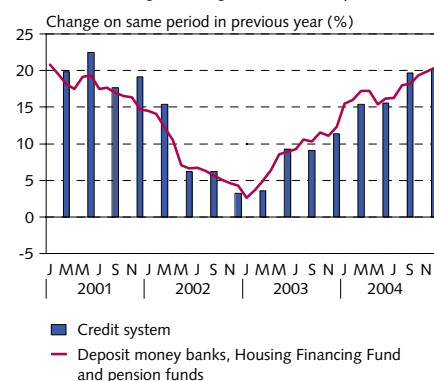
At the end of February, the banks had lent 213 b.kr. to households in the form of mortgage loans. Year-on-year growth in this credit category amounted to 139%. At the same time, mortgage lending by the HFF and pension funds has shrunk markedly. At the end of February, total household lending by these three groups had increased by less than 16%.

Growth in broad money (M3) is still very rapid, but it has slowed slightly after peaking at the end of 2003 and into last year. Although the increase in M3 appears to indicate contemporary nominal GDP growth rather signalling future inflation, it is clear that a prolonged increase in money supply on the scale witnessed in recent years is unsustainable unless it ultimately appears in the form of higher inflation.

Chart 17

## Credit growth January 2001 - January 2005

Quarterly credit system lending and monthly lending by DMBs, Housing Financing Fund (HFF) and pension funds

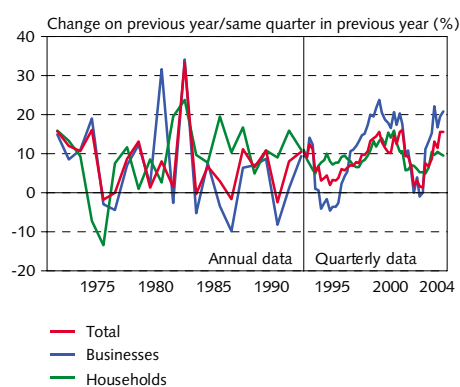


Source: Central Bank of Iceland.

Chart 18

## Credit system real growth 1970-2004

Annual data 1970-1992, quarterly data from 1992



Source: Central Bank of Iceland.



### The króna has appreciated by almost 11% from the last forecast assumption

In spite of exceptionally low foreign interest rates at present, external financial conditions in Iceland have not been completely immune to the Central Bank's monetary measures. The króna appreciated quite strongly following the Bank's policy rate hike in December. As discussed in more detail on p. 13, the real exchange rate of the króna is approaching the previous historical high for several decades. Businesses and households that borrow long-term funds at the current exchange rate can expect a sizeable depreciation of the króna during the lifetime of their loans. This raises the expected cost of foreign capital.

### Overall financial conditions somewhat tighter than in November 2004

Table 4 surveys changes in the main factors affecting the financial conditions of households, businesses and financial institutions since November. It covers the same timeframe as the corresponding weeks in the table in *Monetary Bulletin* 2004/4. No attempt is made to establish weights for individual factors, which may vary widely depending upon whether businesses, households or financial institutions are involved. Overall financial conditions can be estimated to have tightened somewhat since November, but for households the change is negligible.

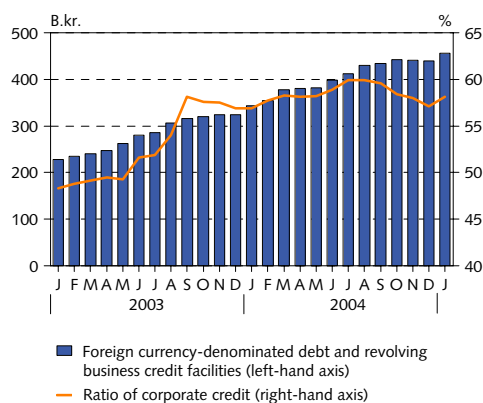
### Financial conditions remain favourable for households

Financial conditions of households are unusually easy, despite a sizeable increase in short-term interest rates since November. Price-indexed loans are by far the largest item in the household balance sheet at almost 90%. The share of indexed debt has grown recently after the banks began offering mortgage loans at lower interest rates than before, while the share of overdrafts has diminished. Only one-tenth of household debt is at variable interest rates that broadly track changes in the policy rate. Although the share of foreign currency-denominated borrowing has increased, it is still modest at roughly 7½% of total household debt. Households are still easing their debt service burdens by refinancing older loans that were on less favourable terms. Debt conversion unquestionably has a much stronger impact than rising short-term interest rates and currency risk on foreign borrowing.

### The stronger króna tightens financial conditions for businesses, but this is offset by lower corporate spreads

A rise in the policy interest rate can tighten corporate financial conditions more than those of households, because both their non-indexed variable-rate borrowing and a larger share of their total debt are denominated in foreign currencies. Policy rate hikes therefore affect the financial conditions of businesses quite strongly, through the exchange rate. However, this statement needs a number of qualifications. First, it cannot be taken for granted that the króna will appreciate after a rise in the policy rate, since other factors may operate in the opposite direction. Nonetheless, the December hike

Chart 19  
Corporate credit: foreign currency-denominated debt and revolving business credit facilities 2003-2005



Source: Central Bank of Iceland.

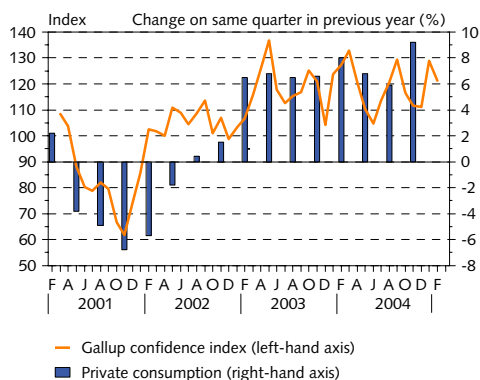


unquestionably affected the exchange rate. Second, the first-round effect of an appreciation of the domestic currency is to ease the debt service burden on all foreign borrowing. The crucial point, however, is that an appreciation makes new foreign borrowing to finance new investment less favourable, assuming that the expected equilibrium exchange rate remains unchanged. Third, the stronger króna has various other effects on operations of businesses, depending on whether they are on the export or import side and their reliance on imported inputs. Exporters are squeezed by an appreciation of the króna, while import-related activities experience the opposite effect. In all cases, however, new foreign borrowing is more expensive. Equity prices are high and represent a favourable financial condition. Listed companies procured a considerable amount of capital with equity offerings last year. Last autumn's slide in equity prices has more or less been won back in the first months of this year. Short-term interest rates have presumably risen, however, and long-term indexed interest rates have remained unchanged. There are indications of lower corporate spreads. Given that foreign borrowing accounts for 2/5 of total corporate debt, the bottom line is that the financial conditions of businesses are somewhat tighter than in November, but still favourable.

**Financial conditions of financial companies have been tightened by the stronger króna and higher policy rate**

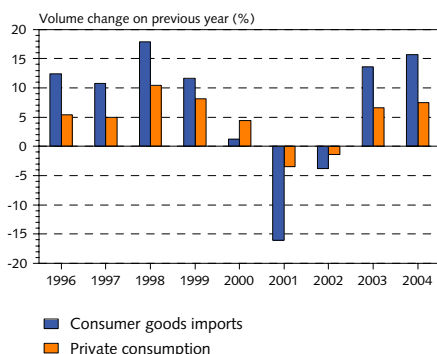
Financial companies fund their lending with foreign borrowing, bond issues in domestic or foreign currencies, deposits and Central Bank facilities. Policy rate hikes affect all these sources of funding, in different ways. All told, their financial conditions have deteriorated somewhat.

Chart 20  
Private consumption growth and the consumer confidence index February 2001 - February 2005



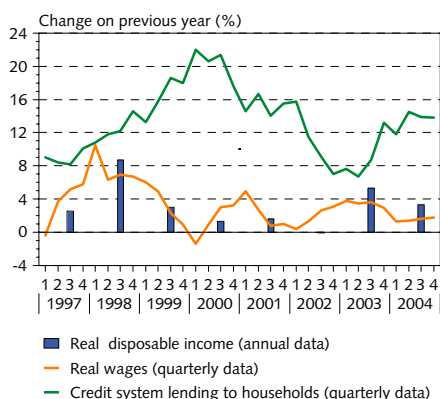
Sources: IMG Gallup and Statistics Iceland.

Chart 21  
Consumer goods imports and private consumption 1996-2004



Source: Statistics Iceland.

Chart 22  
Real wages, disposable income and lending to households 1997-2004



Sources: Statistics Iceland, Central Bank of Iceland.

## IV Domestic demand and output

On March 14, Statistics Iceland published the national accounts for 2004, which showed GDP growth of 5.2%, broadly the same rate that the Central Bank had forecast in December but with significant differences in its composition. Private consumption, public consumption and exports all increased by more than the Central Bank had forecast, but gross fixed capital formation by less.

GDP growth in Q4/2004 was lower than in the first half of the year and considerably weaker than in the preceding quarter, at 3.8%. However, private consumption in Q4/2004 soared by 9.2% year-on-year, after slowing around mid-year. The accelerated growth of private consumption is primarily explained by motor vehicle purchases and spending abroad. The downturn in growth of gross fixed capital formation that began in Q3 continued to the end of the year. Year-on-year public consumption growth in Q4/2004 was a mere one-third of the figure for the preceding three quarters, or 1.3%. On the other hand, exports rose by 13.2% from Q4/2003 and imports by more than one-fifth. Thus external trade made a negative contribution to output growth, which explains the slower output growth during the final quarter.

Gross fixed capital formation grew by 12.8% over the year, which was considerably below the Central Bank's forecast of 17.3%. Public consumption increased by 3.6% year-on-year, while the Central Bank had expected a considerably lower 1.3%. The current account deficit in 2004 was equivalent to 8% of GDP, even though exports of goods and services were up by more than 8%. Imports increased by considerably more, at above 14%, which is broadly in line with the forecast.

### Private consumption

Private consumption growth slowed slightly around mid-2004, but picked up towards the end of the year. The year-on-year increase of 7.5% was half a percentage point more than the Central Bank had forecast. Turnover figures so far this year indicate that the strong growth rate has been sustained into this year. Increased credit supply to households at lower interest rates than before, coupled with greater scope for mortgage equity withdrawal, doubtless made a strong contribution to private consumption growth towards the end of the year, while rising asset prices and real disposable income continue to drive demand.

Real wages rose by roughly 1½% year-on-year in 2004, and real disposable income per capita by 2%. A further increase of more than 4% is expected for real disposable income this year, which is some way in excess of real wages, due to lower unemployment, income tax cuts and a rise in the tax-free personal allowance.

Financial conditions of households are broadly unchanged from the autumn despite higher short-term interest rates, since only one-tenth of household debt bears interest which is sensitive to changes in the policy rate (see discussion in Chapter III).

So far this year, consumer confidence has remained broadly at the level of the year before, judging by the Gallup consumer confi-

Table 5 Indicators of demand in 2004 and in the first quarter of 2005

<i>Changes from previous years are in % unless otherwise stated</i>	Q1	Q2	Q3	Q4	<i>Past 3 months</i>	
					<i>Most recent period<sup>1</sup></i>	
Grocery turnover (in real terms)	3.8	3.4	4.3	3.3	4.5 (January - February 2005)	4.0
Payment card turnover (in real terms) <sup>2</sup>	9.7	9.7	4.9	11.3	16.2 (January - February 2005)	14.7
of which domestic	8.9	8.6	4.0	4.0	15.3 (January - February 2005)	13.6
of which abroad	27.3	29.1	18.4	18.4	34.1 (January - February 2005)	35.3
Car registrations (increase in number)	35.8	28.4	19.5	44.3	30.8 (January - December 2004)	44.3
All imports (volume change) <sup>3</sup>	23.7	18.7	13.6	16.0	16.0 (January - December 2004)	16.0
Imports of consumer goods (volume change) <sup>3</sup>	14.5	15.3	14.5	15.7	15.7 (January - December 2004)	15.7
Private motor vehicles <sup>3</sup>	24.4	24.2	24.6	35.0	35.0 (January - December 2004)	35.0
Consumer durables, e.g. household appliances <sup>3</sup>	21.7	19.4	16.3	17.1	16.9 (January - December 2004)	16.9
Consumer semi-durables, e.g. clothing <sup>3</sup>	10.7	9.9	8.8	7.5	8.0 (January - December 2004)	8.0
Food and beverages	13.8	11.8	10.5	10.2	10.2 (January - December 2004)	10.2
Gallup confidence index	18.0	-11.7	5.5	-3.2	-0.4 (January - February 2005)	1.6
Current situation	66.1	13.8	23.1	19.8	21.9 (January - February 2005)	23.8
Expectations six months ahead	2.4	-22.3	-3.5	-14.7	-11.9 (January - February 2005)	-9.8

1. Changes from a year earlier in % during the period shown in brackets. 2. Payment card turnover for both households and businesses; the bulk of payment card turnover comes from households. 3. Quarterly figures are year-to-date figures.

Sources: Cement distributors, Federation of Trade and Services, Housing Financing Fund, Land Registry of Iceland, Motor Dealers' and Services Federation, Statistics Iceland and Central Bank of Iceland.

dence survey. However, households do not seem as upbeat about the future as about the current situation. Increased inflation could be one explanation.

Asset price developments are also driving private consumption. Last autumn's downturn in equity prices has more or less been reversed. Housing prices in the Greater Reykjavík Area have also surged again following the increase in credit supply.

Credit system lending to households soared last year and showed the sharpest rise since 2000. Available data on lending to households so far this year indicate that growth is still robust.

Imports and new registrations of motor vehicles picked up in Q4/2004 after slowing in the spring and summer. However, the rate of growth in imports of other consumer goods has slowed down.

The outlook is for the strong rise in asset prices and real disposable income to continue in 2005, and employment will improve. While this will drive rapid growth in private consumption, the impact of the higher policy interest rate is likely to be felt to an increasing extent. The Central Bank has therefore revised its forecast for private consumption growth in 2005 downwards since December. It will slow down towards the end of the forecast horizon when the peak of investments in the aluminium and power sectors is passed. Private consumption is expected to increase by 8% year-on-year in 2005 and by 6½% in 2006.

## Public consumption

According to the national accounts, public consumption grew by 3.6% year-on-year in 2004. Local government consumption increased by an estimated 7% year-on-year, and expenditure by central government and the welfare system by just under 2%. The increase

in public consumption was some way above forecast, especially for the municipalities. Under the budget for 2004, central government and the welfare system would increase their consumption by 1% in real terms, and local government along similar lines. The budget for 2005 targets a 1½% increase in central government and welfare system expenditure. Local government expenditure is estimated to increase by ½%-1% over the year, compared with an average of 4.4% over the period 1998-2002. In light of the strong pressure on municipal spending caused by higher operating costs for primary schools and kindergartens, along with the local elections scheduled for next year, the Central Bank forecasts 2½% growth in public consumption in 2005. This rate of growth is forecast to be broadly retained in 2006 – which is still below the average for recent years – based on clear declarations made in the government's medium-term fiscal programme.

### Gross fixed capital formation

Gross fixed capital formation slowed down over the course of 2004, with an increase of 18% in the first half of the year but 9% in the second half. Gross fixed capital formation grew by just below 13% over the year, while in December the Central Bank had forecast more than 17%.

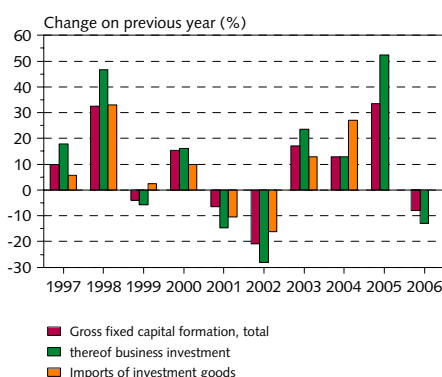
According to the current forecast, total gross fixed capital formation will increase by 33½% this year, followed by a contraction of almost 8% in 2006 when investments in power stations and aluminium smelters are scaled down. Compared with the December forecast, this represents considerably more investment this year and less in 2006. Much of the explanation lies in the rescheduled investments for the aluminium industry, as described below.

### Business investment

Business investment increased by just under 13% in 2004, compared with the December forecast of almost 30% growth. The discrepancy is explained by an apparent shortfall in the expected amount of investment in the aluminium and power sector. Last year, investment in the aluminium and power sectors amounted to roughly 29 b.kr., equivalent to just under 3½% of GDP. In other sectors, business investment growth was also below the Bank's December forecast. Investments in power stations and aluminium smelters accounted for roughly 15% of total gross fixed capital formation in 2004 and 27% of business investment.

Investments in the power and aluminium sectors will be the main driver of business investment growth this year. According to the most recent plans, a greater share of construction work has been rescheduled from 2004, 2006 and 2007 to 2005 (see Box 1). Latest estimates by the developers assume that more than one-third of total investment cost will be incurred this year, amounting to 85 b.kr. These projects are estimated to account for almost 9% of GDP, almost one-third of total gross asset formation and more than half of business investment this year. The remainder will be made over the following two years with 73 b.kr next year and a decrease to 20 b.kr. in 2007.

Chart 23  
Gross fixed capital formation and imports  
of investment goods 1997-2006<sup>1</sup>



<sup>1</sup> Central Bank forecast for gross fixed capital formation and business investment in 2005-2006.  
Sources: Statistics Iceland, Central Bank of Iceland.

The total cost of the aluminium-related investment projects has decreased by 9% on account of the appreciation of the króna, but also in real terms. The relative shares of foreign cost and imported inputs have increased, as has the foreign labour requirement, which hitherto has been larger than originally assumed.

At the same time as investment is stepped up in the aluminium and power sectors, it is likely to contract in others. This is indicated by the findings of a survey conducted by Gallup, on behalf of the Central Bank and Ministry of Finance, among the largest businesses in Iceland in terms of turnover. Fisheries companies appear to be planning the sharpest cutbacks in investment, although these may be overestimated because a number of major investments in trawlers went unreported in the survey. Retail and services businesses plan to increase their investment, as do those in the industrial and manufacturing sector. These findings are consistent with a survey of investment plans conducted by the Confederation of Employers (SA) in January.

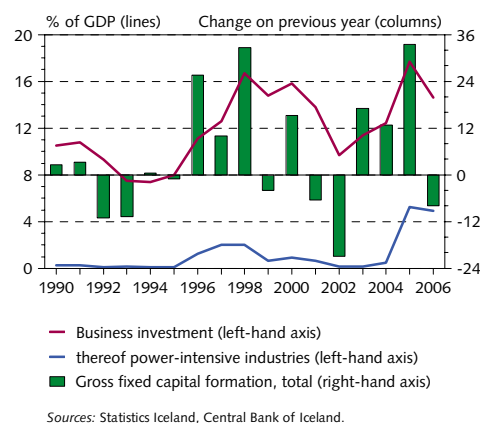
Although the Gallup survey indicates that domestic investment will drop this year, the growth potential of listed companies at least is still fairly strong. Robust growth characterised non-financial companies listed on Iceland Stock Exchange (ICEX) in 2004. According to financial statements published by more than 80% of listed industrial companies, turnover increased by more than one-quarter year-on-year in króna terms in 2004, compared with 10% the previous year. An estimated 80% of turnover was external, either export revenues or generated by operations outside Iceland. EBITDA as a ratio of turnover was virtually unchanged year-on-year, at just under 12%, and their equity ratio of around 35% was broadly unchanged as well. Cash from operations has increased by more than one-third year-on-year. Gross profits improved in manufacturing and transport but deteriorated in the fisheries and marine exports sector.

Financial conditions of businesses have weakened since *Monetary Bulletin* was published in December, primarily due to the impact of policy rate hikes on the exchange rate and because of higher short-term interest rates (see the section on the financial conditions of business in Chapter III above). A stronger króna makes foreign borrowing to finance domestic investment less attractive. However, a sizeable share of recent corporate borrowing has been used to fund external investment. Lending to the corporate sector increased by almost 300 b.kr in 2004, or more than 25%. Foreign currency-denominated borrowing in 2004 increased most sharply at the beginning of the year, probably in connection with leveraged buyouts, then declined until the spring. If the króna remains strong, a decline can be expected in foreign funding for deploying domestically.

The Central Bank forecasts that total business investment will increase by just over 52% this year, but by less than 3% excluding projects for power-intensive industry, ships and aircraft. Business investment will then drop year-on-year in 2006, as investment in the aluminium and power sectors ebbs. A contraction of almost 13% is forecast for total investment next year, and almost 3% excluding projects for power-intensive industry, ships and aircraft.

Chart 24

Gross fixed capital formation: businesses and power-intensive industries 1990-2006





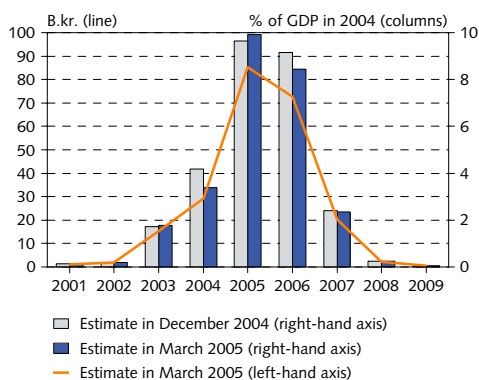
## Box 1

### The aluminium industry investment projects

Chart 1

#### Aluminium and power sector investments: total investment cost 2001-2009

Construction of Fjarðaál smelter, expansion of Norðurál smelter and related power facilities

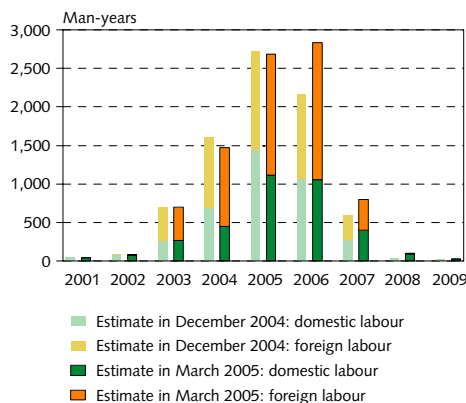


Source: Central Bank of Iceland.

Chart 2

#### Aluminium and power sector investments: labour use 2001-2009

Construction of Fjarðaál smelter, expansion of Norðurál smelter and related power facilities



Source: Central Bank of Iceland.

Investment projects in the aluminium and power sectors are now in full swing. This year's investment volume is estimated at 85 b.kr., or just over one-third of total investment cost for these projects. Construction activity will peak this year. Individual project phases are at various stages of completion relative to schedules. It is estimated that just over 40% of work on the Kárahnjúkar hydropower station has been completed. Work on the smelters – involving the expansion of Norðurál at Grundartangi north of Reykjavík, and construction of the Fjarðaál (Alcoa) smelter in Reyðarfjörður, east Iceland – is at a much earlier stage, but on schedule. The Alcoa smelter is scheduled to go on stream in spring 2007 and the expanded Norðurál plant in autumn 2006. The following summary of projections for these investments describes the changes that have occurred since the last survey of smelter and power station construction in *Monetary Bulletin* 2004/4.

Total cost of all the investments, i.e. the expansion of the Norðurál smelter by 122 thousand tonnes per year (tpy) and related power facilities, the Kárahnjúkar power station and the Alcoa smelter, is somewhat lower in króna terms according to latest estimates than was assumed in the macroeconomic forecast published in *Monetary Bulletin* 2004/4. Construction cost for the smelters and power facilities has been revised downwards in real terms, and the appreciation of the króna has reduced the cost even further when measured in domestic currency. Cost has decreased more in króna terms for the smelters, where foreign cost accounts for a much larger proportion than for power station construction. More than 2/3 of smelter construction cost is foreign-denominated, compared with just over half for the power stations. Nonetheless, these lower costs have little effect on the overall investment picture. A more important consideration is that some investments have been rescheduled from 2004, 2006 and 2007 to 2005. Investment cost in 2005 is heading for the equivalent of almost 10% of last year's GDP, a rather higher share than hitherto assumed.

Labour use is also clearly far in excess of earlier assumptions. The labour requirement for the combined investments in the aluminium and power sectors has grown by 800 man-years in all. Imported labour will more than meet this additional requirement. Thus the share of domestic labour employed on the projects is heading lower than previously estimated. Roughly 65% of the labour force is now expected to be imported, compared with the 52% assumed earlier. The largest share of foreign labour use will be at Kárahnjúkar power station, where it is currently close to 4/5 of the labour force. Up to 3/4 of the labour force employed on constructing the Alcoa smelter is expected to be imported. It has proved difficult to recruit Icelandic construction workers and skilled labour for these projects. The projected share of foreign cost has grown to just over 61%, compared with the earlier 57%.

#### Public sector investment

According to provisional data from Statistics Iceland, investment in public works and buildings increased by more than 27% year-on-year in 2004 to 35½ b.kr., which is a considerably higher figure than the Central Bank had estimated in December, when it forecasted a contraction of 18%. One explanation for this discrepancy would appear to be that central government investment in 2003 has been revised downwards. Investment was also much higher than was



Table 6 Profitability of listed companies 2003-2004

% of turnover	EBITDA		Net earnings	
	2003	2004	2003	2004
Fisheries	20.8	17.7	8.5	12.1
Manufacturing	16.7	18.7	8.2	10.4
Marine exports	3.1	1.5	0.6	0.3
Transport	7.0	10.7	2.3	4.1
ITC	19.2	19.6	4.5	8.2
Other	26.7	23.5	14.3	11.3
Total	12.2	11.7	4.6	6.1

Source: Central Bank of Iceland.

assumed in autumn 2004. Most of the discrepancy apparently lies in local government construction projects.

On the basis of the budget for 2005, the supplementary budget for 2004 and the details that are available about municipal budgets, the Central Bank now forecasts a decrease in central government investment this year while local government investment will remain broadly unchanged. All in all, public sector investment is expected to contract by 11% this year. A further decrease is expected in 2006.

### Residential construction

According to Statistics Iceland's national accounts, residential construction growth was much less in 2004 than the year before, at 3% compared with 13.4%. The increase in 2004 was also considerably lower than the Central Bank had forecast on the basis of information from construction contractors, high housing prices, soaring demand, easier credit supply and lower mortgage interest rates. However, estimates of residential construction investment are highly uncertain and figures may conceivably be revised later. Also, some of the investment that was forecast for 2004 may not appear until data are published for 2005.

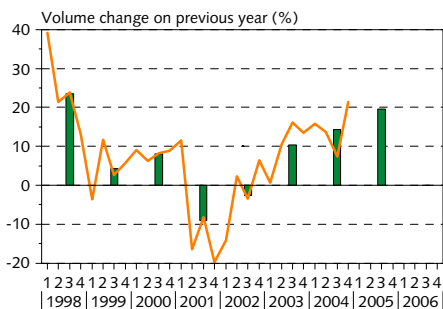
Most indications are that residential construction will go on increasing this year. Demand has been gathering pace in recent months. Disposable income is expected to increase, unemployment is falling, housing prices are rising faster and have reached record levels, and mortgage terms are more favourable and credit supply more forthcoming than ever before. A drop in residential construction in 2004 may simply imply more investment this year than had previously been forecast. The Central Bank forecasts that residential construction will increase by one-fifth this year and almost 10% in 2006. One of the strongest factors impacting residential construction this year is high housing prices.

A fairly strong correspondence seems to exist between the "Q ratio" (the ratio of market prices of housing to the construction cost index) and the scope of residential construction. When housing prices rise by more than construction cost, contractors should have an incentive to build more housing.<sup>6</sup> Residential construction was at a

6. See e.g. a detailed discussion in *Efnahagsleg áhrif breytinga á fyrirkomulagi lánsfjármögnunar íbúðarhúsnæðis* (The economic impact of changes to housing finance arrangements), a report by the Central Bank to the Minister of Social Security, June 28, 2004.

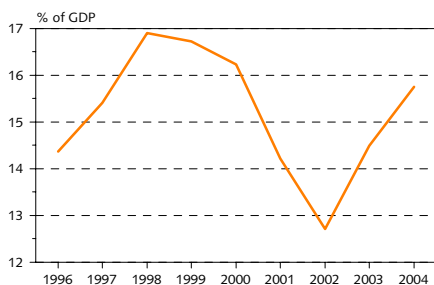
Chart 25  
Import growth 1998-2006

Line indicates change on same quarter in previous year.  
Columns indicate annual changes.<sup>1</sup>



1. Central Bank forecast for annual changes 2005-2006. Change in 2006 is forecast at zero.  
Sources: Statistics Iceland, Central Bank of Iceland.

Chart 26  
Imports of consumer and investment  
goods 1996-2004



Source: Statistics Iceland.

low in 1999, measuring just over 3½% of GDP, but climbed steadily to 5½% of GDP in 2003. Over the first two months of this year, housing prices in the Greater Reykjavík Area had increased by 30% on average year-on-year. They more than doubled over the period 1997-2004, while the construction cost index rose by less than 40% over the same time. Housing prices went up by more than 13% year-on-year in 2004 while the construction cost index rose by only just over 6%.

Municipal construction officials expect a 12% increase in residential housing space (in m<sup>2</sup>) over this year, on the back of a 15% increase in 2004. Construction volume has grown faster than the population recently, probably because young people are investing at an earlier age in new housing instead of renting. Mortgage loans offered by the commercial banks with a higher loan-to-value ratio, longer maturity and lower interest rates than before ought to support this development.

Turnover in the housing market and the number of housing transactions surged after the banks began offering new mortgage loans at the end of the summer. From July to December 2004, turnover increased by 84% and over 65% more housing transactions were made than over the corresponding period the year before. Most indications are that housing demand will remain buoyant. Over the first two months of 2005, turnover increased by 80% year-on-year and the number of transactions by 66%.

## Imports

According to the national accounts, imports increased by 14.3% in 2004, which is close to what the Central Bank had forecast in December. Imports surged by 21.3% in the last quarter after smaller increases in the preceding two quarters. Consumer goods imports were particularly buoyant in 2004, mainly in the first half of the year and again towards the end. Most of this growth can be attributed to imports of motor vehicles and household appliances. Imports of investment goods also ran high in 2004, dipping around the middle of the year but picking up again towards the end. Tourism expenditures, measured at constant exchange rates, increased by 24.3% and expenditures on transport and communications showed a similar rate of growth at 25.4%.

Robust import growth appears to have been sustained so far this year. Over 2005 as a whole, imports are expected to increase by almost 20%. Brisk growth is forecast in private consumption and a substantial increase is also expected in imports of investment goods for the aluminium and power sectors. Moreover, the króna is considerably stronger this year, spurring imports even further. Imports are not expected to increase in 2006, since rescheduling of aluminium-related investments to this year will cause a corresponding drop in imports for them next year.

## GDP growth and the output gap

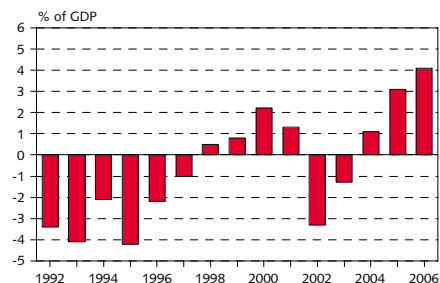
According to Statistics Iceland's provisional estimates, GDP grew by 5.2% in 2004, i.e. close to the Central Bank's December forecast of 5.4%. The GDP growth forecast for the current year has been revised upwards since December to almost 6½%. Greater investment than previously forecast is the main explanation. Forecasts for private consumption and investment excluding the aluminium and power sectors have been revised downwards from December, in part due to the tighter monetary stance since then. Nonetheless, the tightening does not fully counteract the effect of increased gross fixed capital formation. National expenditure will grow by roughly 1½ percentage points more than was forecast in December.

The forecast for national expenditure growth in 2006 has been revised downwards since December. Rescheduling of investment in the aluminium and power sectors to this year is the main explanation. The effect of Central Bank policy rate hikes will also be stronger, for example with smaller increases in private consumption and investment excluding the aluminium and power sectors. However, as a result of faster export growth and substantially lower import growth, GDP will grow faster in 2006 than forecast in December.

National account figures for 2004 were accompanied by a revision of earlier statistics. It transpires that the economy contracted sharply in 2002 – by 2%, which is far in excess of previous estimates. The revision has a considerable impact on estimations of the output gap,<sup>7</sup> which turns out to have been negative by just over 3% of GDP in 2002 and by more than 1% in 2003. This may explain the apparent discrepancy between the state of the labour market and potential production capacity. According to revised estimates based on the new data published by Statistics Iceland in March, and taking into account the stronger króna and higher policy rate, the output gap was positive by roughly 1% of GDP in 2004 and will widen to 3% this year and 4% in 2006. Thus the output gap is smaller than forecast in December, when it was expected to peak at 5% in 2006.

This estimation is based on the assumption of an unchanged policy rate and exchange rate from the day of forecast. In spite of the higher policy rate and strong króna, the outlook is still for substantial and mounting pressures in the economy, other things being equal. Tighter economic policies would ease these imbalances and thereby reduce inflationary pressures.

Chart 27  
The output gap 1992-2006<sup>1</sup>



1. Central Bank forecast for 2005-2006.  
Source: Central Bank of Iceland.

7. A detailed account of the Central Bank methodology for estimating the output gap is given in Appendix 2.

## V Public sector finances

According to provisional data from Statistics Iceland, the general government balance improved from a deficit of 8 b.kr. in 2003 to a surplus of 5 b.kr., or by the equivalent of 1.6% of GDP. The local government balance deteriorated by an estimated 9 b.kr., while the Treasury balance improved by 22 b.kr., the equivalent of 2.6% of GDP.

The improvement in Treasury finances exceeded the budget target, which was 15 b.kr. Behind this improvement lay far greater increases in revenues and expenditures than had been expected at the beginning of 2004 – partly due to more robust growth of GDP and national expenditure over the year. Developments are discussed in more depth in Box 2. Treasury revenues (excluding privatisation proceeds) were budgeted to rise by 5% but the result appears to be close to 12%, or 8% in real terms. Expenditures were budgeted to rise by a nominal ½% but decrease by 3% in real terms year-on-year, assuming average tax write-offs and pension fund transfers. According to provisional data from Statistics Iceland, the increase turned out to be 3%, implying that Treasury expenditures were broadly unchanged in real terms.

The budget for 2005 assumes a 5% increase in revenues and expenditures, leaving the Treasury outcome unchanged between the years. It continues to follow the Treasury's medium-term programme which assumes modest expenditure growth in 2006 and rather more in 2007. However, the programme also assumes that the growth in revenues will slow down when investments in the aluminium and power sectors come to an end, compounded by the impact of tax cuts. Presumably the Treasury will move into deficit then.

Provisional national accounts data from Iceland Statistics show a 5 b.kr. deficit in the local government sector last year. The municipalities' balance deteriorated by more than 9 b.kr. year-on-year. According to aggregates from the municipalities' budgets for 2005 and revised budgets for 2004 published by the Association of Local Authorities, their nominal revenues should increase by almost 12% year-on-year in 2005, but tax revenues by only 10%. Expenditures including capital expenses and investments are projected to grow by 4% in nominal terms. If this scenario holds, local government finances will improve significantly and climb into the black. However, municipalities have often run up heavy outlays in the year before local government elections.

There has been little reduction in net Treasury debt in recent years, partly because of the emphasis on improving the position with respect to civil servants' pension fund commitments. Pension fund liabilities and deposits in the Central Bank have not been accounted for on the same principles as other liabilities. Net Treasury debt edged up in 2004, when discretionary payments to pension funds and the increase in deposits in the Central Bank outstripped the budget surplus plus foreign exchange gains. However, total debt went down quite substantially. The surplus for 2004 amounted to 8 b.kr., plus 25 b.kr. in collected credits and foreign exchange gains of 10 b.kr., while payments into pension funds and the account with the Central Bank were 19 b.kr. Total measured debt therefore decreased by more than 20 b.kr.

The public sector balance is estimated to have improved by roughly 22 b.kr. year-on-year in 2004, equivalent to just under 3% of GDP. The improvement is entirely the result of a turnaround in the Treasury outcome, since the local government balance appears to have worsened. To some extent the Treasury's improvement can be attributed to tighter expenditure control after a sharp expansion in 2003. However, part of the improvement was caused by faster growth in output and demand than had been assumed when the budget for 2004 was passed. The budget estimated GDP growth at 3.5%, but the national accounts now show a figure of 5.2%. It is interesting to examine the extent to which the improved Treasury outcome can be traced to higher levels of GDP growth and national expenditure.

Assessments of the cyclical impact on central government finances assume broadly smooth or inelastic growth in the production capacity of the economy, with real growth fluctuating in either direction around it. Production is therefore either more or less than production capacity. The difference between the two is known as the output gap (for an assessment of production capacity and the output gap, see Appendix 2). The cyclical impact on central government finances may be defined as the change in the balance of the Treasury or public sector as a whole which, other things being equal, may be attributed to changes in the output gap.

In the Central Bank's estimations of the cyclical impact on public sector finances, the working hypothesis has been that each 1% increase in the output gap increases public sector revenues by just over 2%.<sup>1</sup> The following analysis of the components of this rule examines two revenue items: personal income tax paid by individuals to central and local government, and consumption taxes, i.e. value-added tax, import duties, commodity charges and the like.

Simulations indicate that when average wages rise by 1%, the total yield from municipal income tax will increase, other things being equal, by 1% and income tax paid to the Treasury by 2%.<sup>1</sup> A 1% increase in employment, on the other hand, increases municipal and central government income tax equally if wage distribution remains unchanged, by 1% like the tax base. The budget assumed a 5% rise in wages, 2% increase in employment and 3½% growth in GDP. The tax-free personal allowance was raised by 2½%. On the basis of these parameters, total income tax revenues could be expected to increase by 8½% year-on-year and the central government's share by around 10%. The budget premisses seem to have been realised. Provisional figures indicate that the Treasury's personal income tax revenues increased by 12%, somewhat in excess of the calculated estimates. In cash terms the difference is more than 1 b.kr. However, household income would only have needed to grow by a further 1½% on top of current forecasts in order to account for this discrepancy. It should also be borne in mind that few data on wage developments in 2004 are available yet.

Consumption taxes are statistically easier than the income tax, since they are flat-rate without increments or tax-free thresholds of any kind. The taxes under consideration here yielded 105 b.kr. in 2003, or 13.3% of GDP, and according to the budget estimates they should have yielded 5½% more in 2004 than the previous year. According to provisional cash basis figures, the year-on-year increase

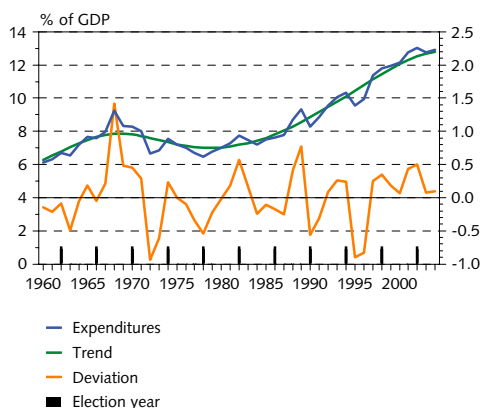
## Box 2

### Budgetary effect of the boom

1. In the chapter on public sector finances in *Monetary Bulletin* 2004/4, a factor of 1.1% was wrongly cited. That figure applies to revenues as a proportion of GDP, and naturally increases by less than revenues when GDP grows as well.

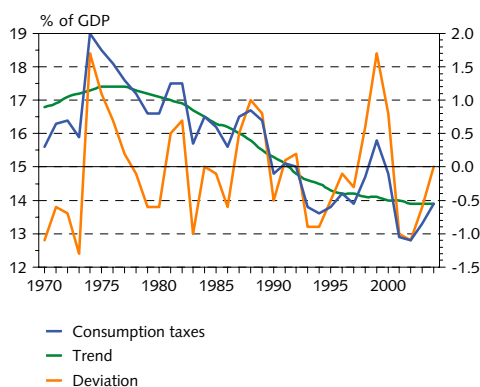


Chart 1  
Local government expenditures 1960-2004



Sources: National Economic Institute (abolished), Statistics Iceland and Central Bank of Iceland.

Chart 2  
Consumption taxes 1970-2004



Sources: National Economic Institute (abolished), Statistics Iceland and Central Bank of Iceland.

was 13½%. Empirical evidence suggests that for every additional 1% that GDP rises, the proportion of consumption taxes to GDP rises by 0.13% on average. Part of the reported increase is explained by the tendency for consumption to grow faster than GDP during upswings. However, an analogous increase is seen if private consumption is used as a reference instead of GDP. The only explanation for such peaks is a change in consumption patterns, for example with more spending on motor vehicles, household appliances and other high-tariff goods, which apparently was the case during the upswings in 1987, 1998-2000 and last year.

According to budget assumptions for 2004, the output gap would narrow by half a percentage point year-on-year and nominal GDP would rise by 5½%. According to the present Central Bank macroeconomic forecast, the gap shrank by 2½ percentage points and nominal GDP rose by 12%. Accordingly, consumption tax yields should have risen by around 14½%, raising an additional 10 billion krónur for the Treasury. The preliminary figure of 13½% comes surprisingly close, given the nature of the calculations.

Under the Central Bank working hypothesis mentioned at the outset, expenditures are assumed to follow GDP, i.e. public sector expenditures as a share of GDP are assumed to remain unchanged by the economic cycle. Although there are weak indications that public sector expenditures fall proportionally at the start of an upswing, this decrease appears to be reversed in the second year. As an exception to this assumption, account is taken of higher expenditures on unemployment benefits during downturns. The correlation between unemployment and the economic cycle is very clear, even though it has changed over time and the equilibrium rate of unemployment is now higher than before. Under the working hypothesis, a 1 percentage-point downturn in the output gap is assumed to raise unemployment by 0.2% of the labour force. It has been estimated that this would cause unemployment benefits as a proportion of GDP to rise by 0.03%, but recent developments suggest that 0.04% might be a more accurate figure. On the basis of the Central Bank output gap forecast, unemployment should have been expected to decline with a corresponding reduction in expenditure on unemployment benefits amounting to roughly 1 b.kr. between the years. Instead, payments into the Unemployment Insurance Fund increased by around ½ b.kr. between years according to provisional data. In fact, this is consistent with other labour market data and recent international experience of a jobless recovery. In Iceland, an exceptionally high level of imported labour recently also makes the current upswing unusual.

The budget was passed with the ambitious target of improving the Treasury balance by 20 b.kr. – which was achieved. Higher output and demand than assumed in the budget must be expected to have generated an extra 10 b.kr. in Treasury revenues from indirect taxes, in addition to the fact that revenues from capital income tax and corporate income tax exceeded the budget estimates by 5-6 b.kr. Thus the budget targets were attained with the help of a large cyclical boost, leaving a smaller fiscal impulse than had been aimed for to counter overheating.

Tight finances last year added an estimated 4-5 b.kr. to the municipalities' gross liabilities and 3-4 b.kr. to their net liabilities. In recent years, net local government debt has hovered around 7½% of GDP in spite of deficits. The main explanations are privatisation of assets and GDP growth.



## VI Labour market and wage developments

### Clear turnaround in the labour market

Indicators show a clear turnaround in the labour market last autumn. After a slow start towards recovery, slack in the labour market is now expected to have vanished and increasing pressures will build up in the coming months. Seasonally adjusted unemployment has declined steadily since summer 2004 and was down to 2.4% in February. Unemployment dropped by half a percentage point year-on-year in 2004 to 3.1%, as the Central Bank had forecast in December.

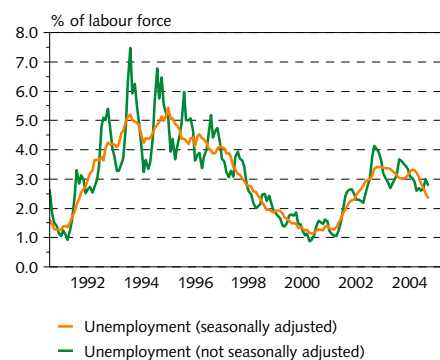
Statistics Iceland's labour market survey shows signs of an increase in labour use measured in terms of the number of employed in Q4/2004, both from the preceding quarter and year-on-year. However, labour market participation and total hours worked were still lower in Q4/2004 than in the final quarter of 2003. The pattern varies depending upon sex, age and region. An increase in average working hours among the youngest age group (age 16-24) is a clear indication of firming demand. There has also been a sizeable rise in the number of employed in the oldest age group (55-74), accounting for more than half of the year-on-year increase in Q4/2004. Labour use increased in the Greater Reykjavík Area but contracted in regional Iceland. For females in regional Iceland, the situation appears to have deteriorated on all fronts, with higher unemployment and reductions in both the number of employed and the labour participation rate. Part of the explanation probably lies in growing exports of fresh (i.e. unprocessed) fish to European markets, together with rationalisation in the retail and service sectors in regional Iceland.

Other indications of growing labour demand are the increase in registered vacancies among employment agencies and increased issues of new labour permits. Only about one-third of new labour permits issued last year were connected to construction of the Kárahnjúkar power station, while permits for employees in fish processing, processing of agricultural products, skilled construction work and services also showed a marked rise. It should be borne in mind that the large number of work permits issued for Kárahnjúkar gives a misleading picture of how much foreign labour is involved, because of the high labour turnover rate there.

### More imported labour needed to keep wage pressures in check

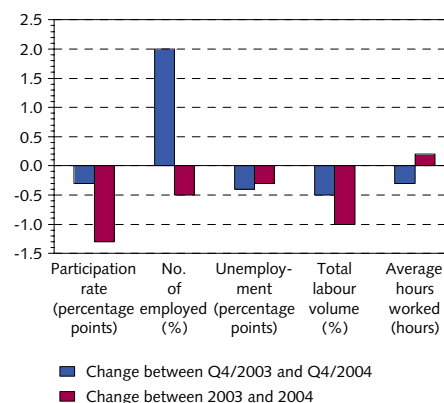
Although aluminium-related investments are also being launched closer to the Greater Reykjavík Area, the share of domestic labour employed on these projects is not expected to increase much, since there is only a small pool of spare experienced or skilled labour. In east Iceland, intense activity in connection with aluminium projects has provided the local labour force with ample work and this situation looks set to continue. While the labour requirement for aluminium industry investments in the vicinity of the capital is considerably less, domestic labour is unlikely to be available to meet more than a small part of it. Whether wage pressures develop this year and in 2005 will depend to some extent on the scope of labour imports.

Chart 28  
Unemployment January 1991 - February 2005



Sources: Directorate of Labour and Central Bank of Iceland.

Chart 29  
Labour use in 2004



Source: Statistics Iceland.

### **Labour demand on the increase in the services sector**

Businesses are upbeat about the outlook, judging from a confidence survey conducted by Gallup for the Central Bank and Ministry of Finance in February. More companies plan to recruit staff and fewer to make redundancies over the next half-year than in a comparable survey conducted in September. A larger increase in recruitment is foreseeable in the Greater Reykjavík Area than was expected in the last survey, while the predicted trend for regional Iceland is downward. Companies in the manufacturing and services sectors plan more recruitment than they had foreseen in September, and advertisements for vacancies indicate growing demand for labour in services. The position in fisheries has changed quite sharply as far more companies now plan to cut back staffing than in earlier surveys – which is not surprising in light of the strong real exchange rate of the króna and the greater scope for rationalisation in the sector offered by recent wage agreements. Gallup's findings are in line with a survey of business investment plans conducted by the Confederation of Employers (SA) in January.

### **Wage changes are still in line with forecasts**

So far, wage changes are in line with the Central Bank's assessment of the costs implied by wage settlements. However, the most recent statistics on wage developments in the private sector indicate that wage pressures were beginning to build up towards the end of last year. In January, the wage index had risen 6.6% year-on-year and real wages by 2½%. Most wage-earners received a pay rise of at least 3% in 2004, and private sector employees and some local government employees received a negotiated 3% increment in the New Year. Wage agreements have been made with the largest groups of public sector employees, but the impact of the new deals is not yet reflected in Statistics Iceland's wage index.

### **Slightly more unemployment forecast than in December but wage developments broadly unchanged**

Given the robust GDP growth witnessed over the past two years and in historical terms, wage rises have by and large been moderate. Wages rose by 4.7% year-on-year in 2004. This is the smallest increase since 1995, when unemployment was roughly 5% but the rate of inflation was lower, so that real wages rose by almost 3% then, compared with 1½% last year. Pressures will mount in the labour market over the next two years, which will test whether wage developments remain in line with the frameworks laid down in settlements. Private sector wage agreements contain a review clause for November this year and, bearing in mind inflation developments and wage settlements by other sections of the workforce, the outlook for whether a wage review will be triggered or not is quite ambiguous. However, the monetary stance has been tightened substantially. According to the main forecast, wage developments will be broadly unchanged from December and unemployment virtually the same this year, but higher in 2006. Productivity will be somewhat higher than in the December forecast.

## VII External balance

### The current account deficit in 2004 was far in excess of forecasts

According to the Central Bank's provisional balance of payment statistics, the current account deficit in 2004 was substantially wider than the Bank had forecast in the beginning of December. Measuring almost 70 b.kr., the deficit was equivalent to roughly 8% of GDP, compared with the December forecast of 6½%. The discrepancy is partly explained by a greater-than-expected deficit in Q4/2004, and also by revised figures for the preceding quarters. Revised current account balance figures for previous years have also revealed that the deficit was larger than had previously been estimated.

Table 7 Revised current account statistics 2000 - 2004

%		2000	2001	2002	2003	Q1-Q2	
						'04	2004
Current account	Revised	-10.5	-4.6	1.1	-5.3	-7.7	-8.1
	Previous	-10.2	-4.1	1.2	-4.1	-6.6	.
Merchandise account	Revised	-5.7	-0.8	1.8	-2.0	-3.2	4.3
	Previous	-5.7	-0.9	1.7	-2.1	-3.2	.
Service account	Revised	-1.8	-0.2	0.0	-1.1	-2.7	-1.7
	Previous	-1.4	0.2	0.2	-1.0	-2.3	.
Balance on income	Revised	-2.9	-3.4	-0.8	-2.1	-1.7	-2.1
	Previous	-2.9	-3.4	-1.1	-1.0	-1.0	.

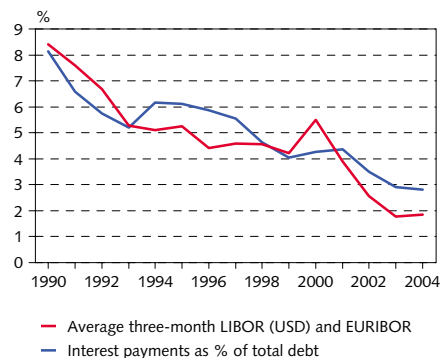
Source: Central Bank of Iceland.

The balance on the service account deteriorated by 5.8 b.kr in 2004. A large increase was recorded on the expenditure side for both tourism and travel. The deficit on income amounted to 17.7 b.kr., marginally above the December forecast. Revised statistics for the first three quarters of 2004 revealed a larger deficit than had previously been estimated, and interest payments also rose sharply towards the end of the year. Foreign debt grew by 40% in 2004 and accounts for the lion's share of the increase in debt service, while higher foreign short-term interest rates have also had some impact.

### A record current account deficit is on the cards this year, even though low global interest rates are holding back the deficit on income

The current account deficit appears set to widen even further this year. The Central Bank forecasts a deficit equivalent to more than 12% of GDP, which will be a historical high if it occurs. It will occur under quite different economic conditions from those prevailing in 2000. The real exchange rate is currently much higher than then and global interest rates have been at a historical low. Thus the deficit on income has not grown in pace with foreign debt: foreign debt has quadrupled over the past seven years but interest payments have little more than doubled over the same period. Foreign interest rates look likely to rise in the near future, although the Central Bank forecasts that the recovery will be slow. Debt service and the deficit on income can therefore be

Chart 30  
Foreign debt service and foreign short-term interest rates 1990-2004  
Average annual interest rates



Source: Central Bank of Iceland.

expected to increase over the forecast horizon, but only gradually. Interest rates could conceivably rise faster. For each percentage point that average interest rates rise, the deficit on income can be expected to widen by just over 1 percentage point of GDP. This implies that if interest rates return to the level of a decade ago, the current account deficit could grow by several percentage points and even exceed the Central Bank's forecast.

### **Massive capital inflows to fund the current account deficit and external investment raise doubts about long-term exchange rate stability**

Developments last year resemble the events of 2000 insofar as the wide current account deficit then was accompanied by substantial capital outflows on portfolio and direct foreign investment by residents. The "basic balance" is defined as the current account balance plus net foreign direct investment and residents' portfolio investment abroad. In 2000 the basic balance, defined in these terms, was equivalent to 20% of GDP. Overdependence on capital inflows put the króna under fierce pressure when investments declined and capital inflows waned. Last year the basic balance was even more negative than in 2000, at 34% of GDP, since net foreign direct investment and portfolio investment abroad both soared at the same time as the current account deficit widened. Unlike 2000, however, it can be stated categorically that the current account deficit, at least, will widen even further.

**Table 8 Basic balance in selected years**

%	1998	2000	2004
Current account	-6.9	-10.5	-8.1
Merchandise account	-4.4	-5.7	-4.3
Balance on income	-2.2	-2.9	-2.1
Debt service balance	-3.0	-3.6	-2.6
Basic balance (current account + foreign direct and portfolio investment by residents)	-9.8	-20.8	-34.0

Source: Central Bank of Iceland.

Capital inflows to Iceland have never before reached the scale witnessed last year. Capital movements reached a record level in 2004 and net inflows according to the balance of payments accounts amounted to almost 148 b.kr. Admittedly, the item "errors and omissions" was exceptionally large at 78 b.kr. and how this capital was actually deployed remains uncertain at the moment.

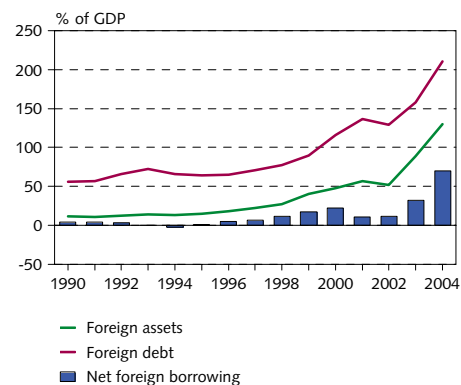
One main reason for hefty capital inflows is large-scale foreign borrowing by domestic banks, especially through issuance of euro medium-term notes. Net foreign borrowing last year was equivalent to 70% of GDP. Of course, the increase in external debt has been matched to some extent by foreign asset formation. The largest item is foreign lending by Icelandic banks, which grew by almost 135 b.kr. between February 2004 and February 2005. Direct holdings of foreign assets almost doubled year-on-year in 2004, and portfolio

holdings also swelled. For the first time ever, foreign assets of the Icelandic economy exceeded GDP by the end of the year. Nonetheless, the net external position deteriorated last year by the equivalent of more than 17% of GDP, and the deficit at the end of the year amounted to 87% of GDP. The external debt position turned down by even more and was equivalent to 131% of GDP at the end of the year. However, the exceptionally large errors and omissions item could mean that net debt is overestimated.

The swelling of both assets and debts in recent years complicates analysis of the macroeconomic impact of exchange rate movements and also the impact of capital movements on the exchange rate. Nonetheless, the deteriorating debt position definitely leaves the economy more exposed to volatility in foreign interest rates and the exchange rate. Furthermore, the wide current account deficit increases the likelihood of exchange rate volatility.

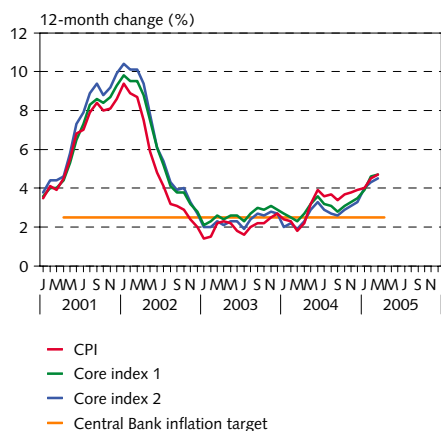
As pointed out elsewhere, the real exchange rate of the króna is currently at one of its highest levels ever. In light of the current account deficit and historical experience, it is only a matter of time when the exchange rate begins reverting to its long-term equilibrium. When and how quickly this happens is highly uncertain and introduces a major uncertainty into the macroeconomic forecast presented here.

Chart 31  
Foreign assets, foreign debt  
and net foreign borrowing 1990-2004



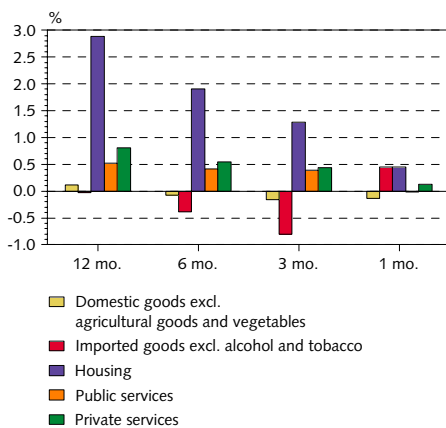
Source: Central Bank of Iceland.

Chart 32  
Inflation January 2001 - March 2005



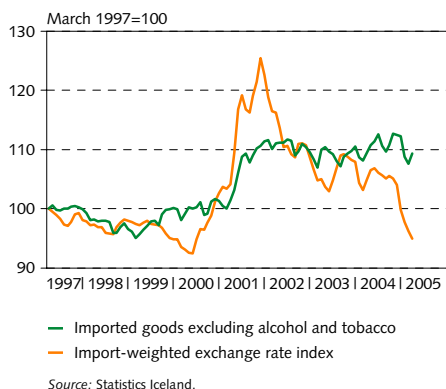
Source: Statistics Iceland.

Chart 33  
Components of the CPI in March 2005  
Contribution to CPI inflation  
in past 1, 3, 6 and 12 months



Source: Statistics Iceland.

Chart 34  
Exchange rate and import prices  
March 1997 - March 2005



Source: Statistics Iceland.

## VIII Price developments and inflation forecast

### Price developments

Inflation has risen sharply since the last Central Bank forecast was published in December 2004. Two factors in particular have been crucial for price developments in recent months: surging demand for housing and the appreciation of the króna. These are counteracting forces, but the demand impulse has proved the stronger until now.

### Inflation beyond the tolerance limit in Q1/2005

Inflation continued to accelerate from the end of last year. In February it breached the upper tolerance limit when the twelve-month increase in the CPI measured 4.5%. In March it gathered even more pace and reached 4.7%, triggering an open letter from the Bank to the Government which is published elsewhere in this *Monetary Bulletin*. Average inflation in Q4/2004 was 3.8%, which is 0.1 percentage point higher than the Central Bank had forecast in December.

Statistics Iceland publishes two indicators of underlying inflation. Core index 1 excludes agricultural products, vegetables, fruit and fuel, while Core index 2 furthermore excludes changes in prices of public services. Around mid-2004 the gap between total CPI inflation and core inflation widened, but this year it has been narrowing and has now almost closed. In March the twelve-month average rise in Core index 1 was almost the same as in the CPI, while Core index 2 went up by 4.5%.

### Prices of most imports dropped year-on-year ...

The appreciation of the króna in recent months has constrained rises in the CPI components which are most sensitive to exchange rate movements, and has even brought down some prices. The króna strengthened by almost 8% over the twelve months to the end of February, based on monthly averages.

Prices of imported goods excluding alcohol and tobacco were virtually unchanged year-on-year in March, and had decreased if the rise in petrol prices is excluded as well. Imported food and beverage prices went down by almost 6% in March from the previous month, and by 7% compared with a year before. While this is partly caused by the strong króna, a price war was also under way in the retail sector at the time the CPI survey sample was taken.

Petrol prices dropped sharply at the beginning of the year, reflecting a downturn in world markets and the appreciation of the króna, then inched up again in February and March. At the beginning of March, petrol prices were roughly 10% higher than a year before.

Prices of imported consumer durables are less sensitive to short-term exchange rate movements. For example, the depreciation of the króna in 2001 was only reflected in imported motor vehicle prices to a slight degree. In March 2005, they had risen by just under 1% year-on-year, and increases that took place last year appear to have unwound to some extent in recent months. Further reductions can be expected in the coming months if the króna remains strong or continues to appreciate.



Over the past twelve months, domestic goods prices have increased by 1.8%. Agricultural products only compete indirectly with imports and higher prices for them have made a sizeable contribution to higher domestic goods prices. Prices of domestic goods excluding agricultural products and vegetables have risen by less, or 1.1%.

**... but prices have risen in the non-traded goods sector – especially for housing and public services**

In the non-traded goods and services sector, soaring demand is reflected in inflation. The clearest instance is housing price increases, but prices of local private sector services and public services have also risen some way in excess of the inflation target.

A wave of price rises has swept the housing market in recent months. Record monthly increases have been witnessed for housing in the Greater Reykjavik Area and prices have also spiralled in other parts of the country. In March, the twelve-month nationwide increase in market prices for housing (based on three-month averages) measured 24%. The main reason for the boom is fierce competition in the mortgage loan market in recent months. This has produced a much wider raft of options for homebuyers, lower mortgage interest rates, higher loan ceilings and longer maturities (see Appendix 4). Prices of detached housing have gone up most sharply, by 37% over the past twelve months, while apartments in condominiums have risen by 26%. Average housing prices in regional Iceland have increased by 13% over the past twelve months.

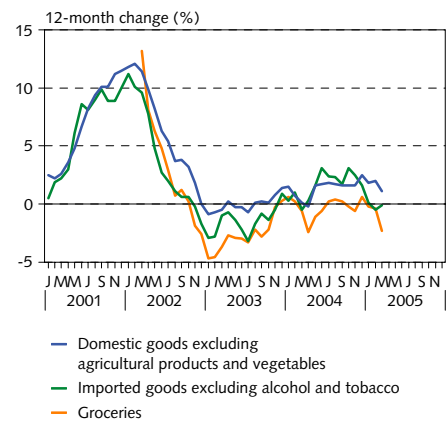
In March, the twelve-month increase in prices of public services was 7%, far in excess of the CPI as a whole. Rises extend to a range of public services, including a sharp hike in household electricity and heating costs at the beginning of the year, by more than 12% from December.

**Some measures of inflation expectations remain broadly unchanged from three months ago, other measures marginally higher**

Some measures of inflation expectations have been heading upwards over the past quarter. In March, inflation expectations (measured in terms of the yield spread between non-indexed and indexed three- and five-year Treasury bonds) averaged 3.8%. The January figure was broadly the same. However, this measure of inflation expectations is not sufficiently reliable at present due to the lack of a suitable indexed benchmark bond, as pointed out above.

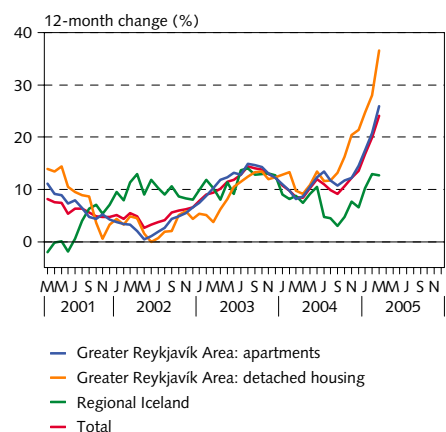
In a survey of household inflation expectations produced by IMG Gallup for the Central Bank four times a year – most recently at the end of February and beginning of March – households forecast average inflation of 4.1% over the next twelve months, which is marginally up from the previous survey in November 2004, but the median was unchanged. Interestingly, inflation expectations are lower than measured inflation, which they generally track. The forecast is closely in line with that of financial market analysts shown in Box 3. However, market analysts predict higher inflation over next year.

Chart 35  
Goods prices January 2001 - March 2005



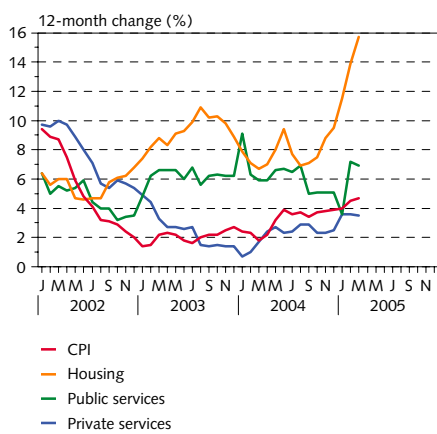
Source: Statistics Iceland.

Chart 36  
Market prices of housing  
March 2001 - March 2005



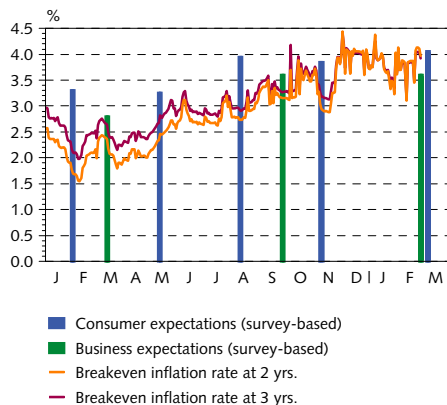
Source: Statistics Iceland.

Chart 37  
Prices of housing and services  
January 2002 - March 2005



Source: Statistics Iceland.

Chart 38  
Inflation expectations 2004-2005  
Daily data on the breakeven inflation rate<sup>1</sup>  
January 5, 2004 - March 10, 2005



1. The spread between yields on non-indexed and indexed Treasury bonds of corresponding maturities.  
Source: Central Bank of Iceland.

## Inflation forecast

Since the Central Bank published its last inflation forecast in December 2004, it has raised its policy interest rate by 1½ percentage points and the króna has appreciated by more than 9%. As usual, the Bank's main forecast is based on the technical assumption that both the policy rate and the exchange rate remain unchanged from the day of the forecast.

### Underlying inflation pressures have eased since December ...

Since December, new data have been published on economic developments in 2004 and so far this year. As discussed above, they indicate that the output gap was rather more negative in 2002 than had earlier been assumed. The Bank's two-year forecast also implies a downward revision to the positive output gap over this period, due to both revised historical data and a tighter monetary stance than had been assumed. Nonetheless, output will grow faster than capacity, so that the output gap will still widen over this horizon.

As in the December forecast, labour market slack is expected to disappear in the first half of this year and unemployment to continue falling over the forecast horizon, leaving it below a level compatible with price stability two years ahead. Unit labour costs will rise in step with labour market pressures above a level compatible with the inflation target over the period, but productivity gains will keep the increase lower than was forecast in December.

The króna has appreciated substantially since the Central Bank published its last forecast at the beginning of December. Global inflation for last year was also slightly lower than assumed in the forecast then. However, the outlook two years ahead remains broadly unchanged. If the króna stays at its current strong value the inflation rate will clearly slow down in the near future, provided that lower import prices are transmitted to domestic retail prices. If the pass-through is full and relatively rapid, year-on-year inflation in the second half of this year and first half of 2006 could drop quickly and move some way below the target. Under a floating exchange-rate regime, however, such a development is fairly unlikely. A more probable outcome is a smaller pass-through than is implied by models based on historical data from the fixed exchange-rate period. One explanation of why retail prices remain sticky against exchange rate changes may be uncertainty about whether the currency appreciation is permanent. Domestic retailers could seize the chance to raise their mark-ups instead of lowering imported goods prices by the full amount that the króna has strengthened – especially in the present buoyant demand climate – to prepare themselves for a presumed weakening later. This is consistent with the experience of other countries with a floating exchange rate and also with Iceland's own episode of exchange rate volatility in 2001. The forecast therefore assumes that the recent appreciation of the króna will only imperfectly be passed through to domestic prices over the forecast horizon.

### ... but inflation will remain above target two years ahead

Inflation is forecast to fall quite rapidly in the fairly near term due to the exchange rate impact outlined above and some base-line effects

due to the surge in inflation in spring 2004. According to the forecast, inflation will be close to the 2½% target in Q1/2006, which is a lower rate one year ahead than was forecast in December, when it was almost 3% to the same quarter (and 3½% over the corresponding one-year horizon). Later in 2006, however, inflation is forecast to gather momentum, driven by mounting demand pressures and the dwindling impact of the currency appreciation. Two years ahead, inflation is now forecast at marginally above 3%, well below the December forecast of more than 4% to the same quarter (and 3½% over the corresponding two-year horizon). Inflation is also expected to remain above 3% until the end of 2007, assuming an unchanged policy rate. In other words, inflation will stay above the target at the end of the forecast horizon, even though the long-term inflation outlook is slightly better than in December.

### Upside risk increases further

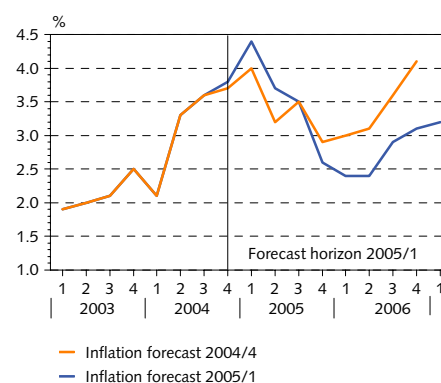
Inflation prospects are always fraught with uncertainty. The main forecast may be seen as the most probable outcome based on an unchanged policy rate and (strong) exchange rate. Since developments are unlikely to unfold exactly as forecast, it is vital to take into account the entire risk profile in monetary policy decision-making.<sup>8</sup>

The risk profile of the forecast is broadly comparable with that from December 2004. The main risks involve the impact that the new climate in the domestic mortgage loan market will have on private consumption, the possibility of wage settlements being revoked later this year, whether the fiscal stance will be sufficiently tight and developments in the exchange rate and other asset prices. Table 9 summarises the main asymmetric uncertainties in the forecast.

On the other hand, the risk two years ahead is likely to be more asymmetric than in the December evaluation. Macroeconomic imbalances are still intensifying. The króna has strengthened even further and the current account deficit has widened, increasing the probability that the currency will slide. Also, the forecast horizon now extends to the general election year of 2007. There has been a tendency to ease fiscal policy in the run-up to elections. Thus the risk of a lax fiscal stance is greater than previously assumed. Both these factors create an upside risk which has probably increased since the last forecast. Offsetting them is the ongoing surge in housing and equity prices, which could increase the probability of a sharp downward adjustment later along the forecast horizon. All told, the overall risk is estimated more to the upside than was assumed in December.

As before, estimates of forecast uncertainty based on historical forecast errors are likely to exaggerate to some extent the uncertainties that lie ahead, since they tend to be unduly influenced by the recent period of high and variable inflation.

Chart 39  
Revised Central Bank inflation forecast



8. A more detailed discussion of probability distribution calculations in the inflation forecast is given in Appendix 3.

### Box 3

## Financial market analysts' assessments of the economic outlook

The accompanying table shows the economic forecasts of financial market analysts at the end of February. Participants in the survey were the research departments of Íslandsbanki, KB banki, Landsbanki, and Economic Consulting and Forecasting. An immediately striking feature of the forecasts is the wide divergence between the highest and lowest values, in particular for inflation and GDP growth but also for the exchange rate index and ICEX-15 equity index. There is more disagreement than often before about economic developments over the next two years.

Analysts have revised their inflation forecasts for 2005 and 2006 upwards in line with the recent development of the CPI, which has been characterised by a surge in housing prices. They expect an average rate of inflation of 4.1% over 2005, and 4% year-on-year – i.e. at or above the upper tolerance limit of the inflation target. The Central Bank forecasts a much lower rate of inflation, but it should be underlined that it assumes an unchanged policy interest rate and exchange rate over the forecast horizon. The Central Bank forecasts 2.6% inflation over 2005, and 3.6% year-on-year. Respondents differ markedly about the inflation outlook for 2006. They forecast a sharp rise in inflation over 2006, at 5.9%, and 4.9% year-on-year. In contrast, the Central Bank forecasts 3.1% over 2006 and an average of 2.7% year-on-year.

Forecasters are more upbeat about GDP growth than they were in November, expecting 5.8% growth in 2005 and 4.3% next year. As before there is a considerable difference between the highest and lowest forecast values. The Central Bank's GDP growth forecast is rather higher, at 6.4% this year and 6.1% in 2006.

On average, respondents forecast an exchange rate index of 122 twelve months ahead, implying a sizeable depreciation of the króna from its value in recent weeks – the exchange rate index has fallen steadily (i.e. the króna has strengthened) since the beginning of December. Two years ahead they forecast that the króna will slide further, bringing the exchange rate index down below 130.

The Central Bank raised its policy interest rate to 8.75% on February 22. Analysts expect further hikes in the coming months,

#### Overview of forecasts by financial market analysts<sup>1</sup>

	2005			2006		
	Average	Lowest	Highest	Average	Lowest	Highest
Inflation (within year)	4.1	3.2	5.0	5.9	4.5	8.2
Inflation (year-on-year)	4.0	3.5	4.8	4.9	3.5	7.3
GDP growth	5.8	4.5	6.5	4.3	2.5	5.5
	One year ahead			Two years ahead		
The effective exchange rate index of foreign currencies vis-à-vis króna (Dec. 31, 1991=100)	122.0	115.0	130.0	130.6	125.0	137.0
Central Bank policy interest rate	9.9	9.8	10.0	8.8	7.0	10.0
Nominal long-term interest rate <sup>2</sup>	7.9	7.5	8.8	7.3	7.0	7.8
Real long-term interest rate <sup>3</sup>	3.5	3.2	3.7	3.5	3.3	4.0
ICEX-15 share price index (12-month change)	5.0	-15.0	20.0	10.7	-19.3	29.0
Housing prices (12-month change)	13.8	10.0	20.0	16.5	5.0	26.0

1. The table shows percentage changes between periods, except for interest rates (percentages) and the exchange rate index for foreign currencies (index points). Participants in the survey were the research departments of Íslandsbanki, KB banki and Landsbanki, and Economic Consulting and Forecasting. 2. Based on yield in market makers' bids on non-indexed T-notes (RIKB 07 0209). 3. Based on yield in market makers' bids on indexed HFF bonds (HFF 150644).

Source: Central Bank of Iceland.

almost unanimously forecasting a policy rate of 9.9% one year ahead, then expect a reduction to 8.8% two years hence.

Opinions are sharply divided over future equity prices. Two forecasters expect them to rise next year, while one predicts the status quo and one a decrease. Forecasts two years ahead are even more divergent.

As in recent surveys, forecasters agree that real estate prices will rise both one year and two years ahead.

Chart 40 presents the estimated confidence intervals for the next two years. The entire shaded area shows the 90% confidence interval; the two darkest ranges show the corresponding 75% confidence interval and the darkest range shows the 50% confidence interval. The uncertainty increases over the horizon of the forecast, as reflected in the widening of the confidence intervals.

#### Less probability of inflation being above target two years ahead

Since December, the probability that inflation will be above the target at the end of the forecast horizon has decreased. Similarly, there is a greater probability that inflation will be within the upper tolerance limit.

### Inflation forecast based on a flexible policy rate and exchange rate

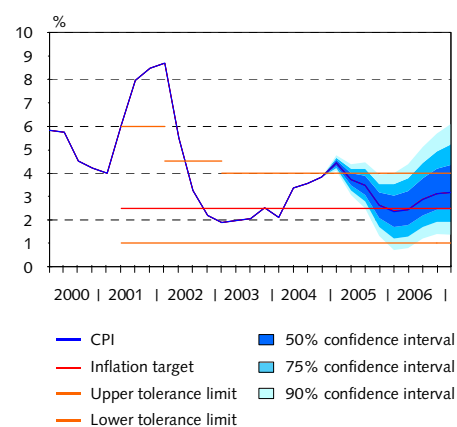
As pointed out elsewhere, the main forecast is based on the technical assumption of an unchanged policy interest rate and exchange rate from the day of the forecast. Thus the chief function of the forecast is to present the Bank's view of the way economic developments may unfold if it leaves the monetary stance unchanged. The forecast therefore provides the Central Bank with a guideline for its interest rate decisions, so that the policy rate can be set such that the target can be attained.

Such a forecast does not need to present a realistic account of how economic developments will unfold under conditions like the present heavy macroeconomic imbalances, since it is unrealistic to assume that the Central Bank would simply remain passive and not take measures in response to it.

For this reason, in the December *Monetary Bulletin* the Bank presented an alternative inflation forecast based on variable interest rates and exchange rate. Implied forward rates are used, as shown in Chart 13 on p. 17. In this scenario, the Bank's policy rate continues rising until August 2005 when it peaks at 10%, then declines for the rest of the forecast horizon. This implies a policy rate almost 0.75 percentage points higher this year than in the main forecast, and just over 0.1 percentage point lower next year.

The exchange rate is also allowed to develop in line with uncovered interest parity, i.e. on the basis of market expectations of the future development of the interest-rate differential with abroad (using trade-weight short-term forward rates), but incorporating an exchange rate risk premium. On the basis of forward rates, both domestic and foreign interest rates will rise in the near future and then

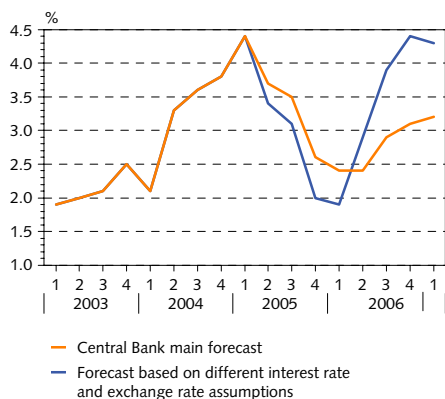
Chart 40  
Central Bank inflation forecast  
Forecasting period: Q1/2005 - Q1/2007



Source: Central Bank of Iceland.



Chart 41  
Inflation forecast based on different interest  
rate and exchange rate assumptions



turn downwards in the second half of this year, but more rapidly abroad. Thus the interest-rate differential gradually widens over the period. Consequently, the króna will gradually depreciate and the exchange rate index will be close to 120 at the end of the forecast horizon. It should be reiterated that the interest rate and exchange rate paths used in this alternative scenario do not imply any view or forecast on the part of the Bank regarding how they will actually develop over the forecast period.

Chart 41 presents an inflation forecast based on this development of the exchange rates and interest rates. As in the main forecast, exchange rate movements are not assumed to be passed through in full to domestic prices in the short run.

This forecast implies that inflation could decline more rapidly than is shown in the main forecast, to 2% at the end of this year. Afterwards it picks up rapidly to reach almost 4½% at the end of the horizon. This is because the monetary stance is tighter than in the main forecast for the first part of the period, and the króna remains fairly strong. Domestic demand growth is therefore more subdued in 2005 than in the main forecast. Towards the end of this year and in 2006, however, the króna increasingly gives way and the policy rate drops, which fuels demand even further and contributes to a higher inflation rate than in the main forecast.

Table 9 Main asymmetric uncertainties in the inflation forecast

Uncertainty	Explanation	Inflationary impact
Private consumption	The impact of lower long-term interest rates and easier credit access, and their potential wealth effect, on private consumption could be underestimated	Risk of the króna depreciating and thereby of underforecasting inflation
Exchange rate developments	The impact of currency appreciation on domestic prices could be underestimated	Risk of overforecasting short-term inflation
	Wide current account deficit and increasing inflation expectations for the coming years could create downward pressure on the króna	Risk of the króna depreciating and thereby of underforecasting inflation
Wage developments	Adverse inflation prospects and the outcome of specific wage agreements could lead to renegotiation of general wage agreements	Risk of underestimated wage rises and thereby of underforecasting inflation
Fiscal policy	The fiscal stance could be easier than assumed in forecasts, especially with a general election scheduled for 2007	Risk of underestimated positive output gap and thereby of underforecasting inflation
	The impact of planned tax cuts on future income expectations could be underestimated, so their demand impulse could be correspondingly greater	
Asset prices	Short-term: Housing price rises over the coming months could be underestimated	Risk of underforecasting short-term inflation
	Long-term: Asset prices could fall, reducing private consumption later in the forecast period	Risk of overestimated positive output gap and thereby of overforecasting inflation
Central Bank risk profile	One year ahead	Two years ahead
Monetary Bulletin 2004/1	Symmetric	Upward
Monetary Bulletin 2004/4	Symmetric	Upward
Monetary Bulletin 2005/1	Symmetric	Upward

Table 10 Probability ranges for inflation over the next two years

Quarter	Inflation				
	Under 1%	In the range 1% - 2½%	Under 2½%	In the range 2½% - 4%	Over 4%
Q1/2005	< 1	< 1	< 1	2	98
Q4/2005	2	42	44	52	4
Q4/2006	2	21	23	43	34

The table shows the Bank's assessments of the probability of inflation being in a given range, in percentages.

Implied forward interest rates thus appear excessively optimistic about how soon the downward policy rate cycle can start. To ensure that the target is attained, the policy rate probably needs to remain high past this autumn, especially if the króna begins to weaken substantially. In that case even further rises in interest rates cannot be ruled out.

## IX Monetary policy

### **The Central Bank's latest policy rate rises have largely resulted in a tighter monetary stance**

At the same time as *Monetary Bulletin* 2004/4 was published at the beginning of December, the Central Bank announced a policy rate hike of 1 percentage point. The policy rate was raised again in February, at the same time as the Central Bank published its report to the Government of Iceland on inflation beyond the tolerance limit. The monetary stance is therefore considerably tighter than was assumed in the December inflation forecast, at least provided that inflation expectations have not risen substantially. As it happens, expectations in the bond market are rather uncertain at the moment due to the lack of a suitable indexed benchmark, as mentioned above. Business and household confidence surveys, on the other hand, suggest that inflation expectations are broadly unchanged from previous surveys, at around 4% for households and 3½% for businesses. On the basis of these indications, it can be assumed that the last two policy rate hikes have by and large resulted in a tightening of the monetary stance – unlike earlier rises, which fell some way short of raising real rates commensurably. Furthermore, the appreciation of the króna also implies a considerably tighter stance.

### **Inflation outlook has improved since December**

The reasons for the policy rate hikes in December and February have already been explained in depth, the former in *Monetary Bulletin* 2004/4 and the latter in the report to the Government which was published on February 18 and is included in this edition of *Monetary Bulletin*. They will therefore not be covered in detail here. In brief, the main reasons for needing to tighten the monetary stance were the higher inflation outlook, plans for stepping up investments in the aluminium and power sectors this year, and the surge in credit growth after the banks began offering more extensive mortgage loans on easier terms. By February, the inflation outlook was considered to have improved since December, although not by enough to ensure that the inflation target would be attained. Accordingly, further constraint was considered to be justified. The main reasons for the more upbeat inflation outlook were the higher policy rate and the appreciation of the króna. Since the report was published the króna has strengthened further and the inflation outlook has improved marginally since February. However, inflation has continued to increase. The main driver is the ongoing rise in housing prices, while goods prices have been on the decrease.

### **Crucial to keep the housing component in the target index reference**

Developments over the past year raise a number of questions about monetary policy implementation. For instance, does it matter that the housing component of the CPI accounts for more than half of total inflation while goods prices are rising very little and even falling in some cases? Is it a drawback to have housing cost carrying so much

weight in the CPI reference for the inflation target? As was made clear in its report to the Government, the Central Bank firmly advocates that housing costs should remain part of the reference index for the inflation target, and that by and large the best available methodology is being used to evaluate them. This is because housing costs are a major item in household consumption. Excluding changes in housing prices would ignore a large proportion of household expenditures. An added complication is that, besides accounting for a large share of private consumption, housing is also a permanent asset or investment. For homeowners, a rise in housing prices is primarily perceived as a rise in asset price. They can easily overlook the resulting higher opportunity cost of owner-occupancy, since this is not reflected in their expenditure flows. Those who are moving onto or up the property ladder, on the other hand, are hit hard by housing inflation. If the cost of financing housing purchases has gone down they do not feel the increase so intensely, of course. Nonetheless, the CPI is not intended as a measure of capital costs – which otherwise ought to affect the value of many other components of private consumption, especially consumer durables.

As pointed out in the report to the Government, housing inflation has the advantage – from the perspective of central banks on an inflation target – of being a leading indicator of general inflation later on.<sup>9</sup> Presumably this is because the housing market is independent from foreign markets. Increased housing demand cannot be channelled out of the economy, unlike various other goods and services, nor is foreign competition present to any significant extent. When demand surges, housing prices often rise sooner and by more than prices of goods and services in general. In addition, housing supply is inelastic, causing price rises to be amplified by spikes in demand.

### **Preferable to tighten the stance before a price slump becomes more likely**

Although the Central Bank firmly supports retaining the housing component in the inflation target reference index, this does not preclude a situation from arising which demands a different response to inflation that is predominantly driven by housing inflation. Housing prices are a measure of asset value and in many respects share the characteristics of other asset prices. Their price formation is affected by expectations, speculator activity can even sometimes lead to an asset bubble and the inelasticity of supply increases the probability of a substantial, temporary divergence between housing prices and construction cost, which can create oversupply in the future and depress prices. One of the challenges that monetary policy faces at any time is to assess the probability of a sudden slump in housing prices. An autonomous fall due to excess supply may occur or a deflation may be brought about by a deterioration in external conditions or by monetary policy tightening. In a worst-case scenario, a belated policy rate hike aimed at containing asset prices could

9. See Pétursson, Thórarinn G., (2002), Evaluation of core inflation and its application in the formulation of monetary policy, *Monetary Bulletin* 2002/4, pp. 54-63.

increase the probability of a price slump, with all the ramifications this would have for the financial markets.

The timing of such a turning point is extremely difficult to identify, since they often occur abruptly. Central banks are therefore reluctant to regard asset price stability as an independent policy objective, except insofar as changes in asset prices affect the inflation outlook. Given that housing inflation accounts for an exceptionally large share of total inflation, however, housing price developments and prospects unavoidably have a strong bearing on monetary policy. Housing prices in the Greater Reykjavík Area have risen faster than ever in recent months and have reached record levels. The course of developments in the housing market will prove crucial for monetary policy. If housing inflation continues at the current pace, total inflation will stay above target for the time being, even if the strong value of the króna and high interest rates constrain other components of the index. A tight monetary stance will be needed if such a scenario unfolds. However, if a turnaround were to occur soon (and assuming that the exchange rate remains stable) it could lead to deflation, which might be an argument in favour of easing the stance.

As things stand, housing inflation seems unlikely to slow down over the coming months. On the contrary, it has been gaining momentum in the past few months and economic conditions – rising incomes and employment, falling long-term interest rates and expectations of continued growth – do not indicate that a sharp reversal is in the offing, even though housing prices are extremely high in historical terms. Next year, however, when the current wave of investments in the aluminium and power sectors draws to a close, the picture is much more ambiguous. This makes it crucial to apply a timely and adequate tightening of the monetary stance, before such measures raise concerns about precipitating a collapse of housing prices with an accompanying contraction effect.

### **Exchange rate changes are an important part of the transmission mechanism of monetary policy under present conditions**

Another monetary policy challenge at present is exchange rate instability. In an open economy, the exchange rate is one of the most important relative prices. It can also be regarded as an asset price which shares the characteristics of other asset prices, including uncertainties about its long-term equilibrium, the strong impact of expectations, speculator tendencies, etc. Occasionally, these characteristics provoke price volatility. The exchange rate is one of the main aggregates determining short-term inflation developments and likewise it is one of the most important channels of transmission for monetary policy in an open economy. Also, the exchange rate is more difficult to forecast than most other variables. All these characteristics of exchange rate developments can pose major challenges for the implementation of monetary policy, especially when the real exchange rate of a currency diverges substantially from its expected long-term equilibrium.

The real exchange rate of the króna is currently close to a historical high. Unlike earlier episodes, the rise in the real exchange rate since 2001 has largely taken place through an appreciation of the



nominal exchange rate, rather than being caused by higher inflation or wage rises than among trading partner countries. The higher nominal exchange rate can be attributed to the interaction of heavy capital inflows for industrial investment, improving external conditions, a tight monetary stance and low foreign interest rates – and expectations about all these factors. Eventually, the factors which have contributed to the current strength of the króna are likely to be reversed. It must be safe to say that the króna will depreciate at some time in the future. The timing of the turning point, however, is uncertain, and a further appreciation cannot be ruled out in the interim.

Changes in the exchange rate are one of the most important channels for transmitting monetary policy decisions in an open economy. If a large proportion of credit is foreign-currency denominated, the exchange rate will be even more crucial in monetary policy transmission. Under present conditions, this applies more to Iceland than to any other country with a similar monetary policy framework. Icelandic companies have financed the bulk of their domestic investments through foreign borrowing, and almost half their debts are denominated in foreign currencies. Overseas expansion by Icelandic companies is also financed with foreign credit. Foreign interest rates have been at a historical low in recent years. This has provided an incentive to borrow abroad, even for businesses that have no natural hedges in the form of foreign currency revenues. Foreign credit has therefore flowed into the Icelandic economy, boosting liquidity in the credit system and counteracting the Central Bank's monetary policy stance. This is the background to the claims sometimes heard from certain quarters that, in the current climate, the Bank's monetary policy is impotent.

Such an inference is wrong, however. Strong supply of foreign credit at low rates of interest affects how monetary policy works, but not whether it works. The situation in foreign credit markets at the moment puts more strain on the exchange rate as a transmission mechanism for monetary policy than it otherwise would. The interest-rate differential with abroad widens and monetary tightening exerts a stronger impact on the exchange rate, as has clearly been seen in recent months. An appreciation of the króna directly contributes to a tighter stance in four ways. First, when the real exchange rate is approaching a historical high and the current account deficit is as wide as at present, the probability of a depreciation later on obviously increases correspondingly. Foreign funding becomes more expensive when the expected depreciation of the króna over the lifetime of the loan has been taken into account. Second, the strong value of the króna squeezes profits in the traded goods sector due to stronger price competition from abroad, which reduces businesses' investment potential and their scope for raising wages. Third, when the króna appreciates it reduces prices of imported goods, which affects inflation expectations and thereby wage demands. Fourth, demand is channelled out of the economy, narrowing the output gap and bringing down inflation in the long run.

### **Strong value of the króna has varying sectoral impacts**

These factors do not have an equal effect throughout the economy. For as long as rises in the policy rate do not move long-term mort-

gage interest rates, they have little effect on the financial conditions of households. Higher short-term interest rates will have some effect, but at the same time give households an added incentive to refinance their debt. Lower prices of imported goods are likely to cause a shift in the composition of public consumption, spurring demand for imported consumer durables. Nor can it be ruled out that an appreciation of the króna will deliver a temporary impulse to private consumption before the contraction effect begins to operate. Expectations that a currency appreciation will eventually unwind reinforce such behaviour. The debt service burden of businesses with high levels of foreign debt is eased when the króna strengthens, offsetting the effect of lower profits in the traded goods sector. Operating conditions in the non-traded goods sector may even improve. However, this does not alter the fact that it is less economical to fund investments with foreign credit when the króna is strongly valued, which is an important consideration when monetary policy aims to curb the growth of domestic demand.

#### **An easier monetary stance does not necessarily bring down the real exchange rate in the long run**

Although the strong value of the króna has a varying impact on different sectors, its ultimate effect is to subdue the economy. The impact on certain sectors may be very harsh and actually undesirable. However, this is not an unavoidable consequence of a tight monetary policy, but of the economic conditions that call for it. An easing of the monetary stance may cause a depreciation of the króna in the short run, but will not necessarily result in a lower real exchange rate. Lower interest rates would eventually lead to more inflation and wage rises, which in the final analysis would probably move the real exchange rate to broadly the same level as under tight monetary policy. The chief difference would be that the rate of inflation would be much higher when the moment of exchange rate adjustment arrived. To keep the lid on inflation in such a situation would require an even higher policy rate than is needed to contain it now. If the economy were in such a position next year, when aluminium-related investments draw to a close and capital inflows are likely to wane, the Central Bank would face a serious predicament, because of the risk that tightening the monetary stance then could amplify the contraction at the end of the investment period, prompting a slide in asset prices and financial instability. This is reminiscent of the economic policies of past decades, in Iceland and elsewhere, which have been abandoned as ineffective.

For these reasons, the Central Bank considers it highly preferable – and in fact unavoidable – to tackle the inevitable side-effects of monetary policy now rather than later. Admittedly the real exchange rate is at its highest level for a long while. Further rises cannot be ruled out. However, swings in the real exchange rate of the króna are not larger than those in other currency areas (see Appendix 5 on p. 68). Iceland is nonetheless more exposed to exchange rate fluctuations than the larger economies where businesses have access to a large home market and the bulk of their debts are denominated in the domestic currency.

**High real exchange rate and growing external imbalances fuel uncertainties about the inflation outlook**

The current high real exchange rate of the króna fuels uncertainties about the inflation outlook and monetary policy transmission in the medium term. A risk assessment of an inflation forecast which is based on the assumption of a constant exchange rate must take into account that the króna will probably depreciate again over time, temporarily leading to higher inflation than was forecast. The speed and timing of this inevitable adjustment may be crucial. The preferred adjustment cycle would be in gradual steps over a long period, and concentrated as far as possible after investments in power plants and aluminium smelters have ended and their macroeconomic pressures have subdued. On the other hand, the wide and growing current account deficit poses the risk that events will not unfold so favourably. As stated in Chapter VII above, net capital inflows last year amounted to roughly 70% of GDP. These inflows are of course offset by large foreign asset formation, and the exceptionally large errors and omissions item should also be borne in mind. Nonetheless, the inflow of credit has clearly financed more than this exceptionally large deficit – namely, both foreign portfolio investments by pension funds and direct external investment by corporations and financial institutions. It is reported in the same chapter that the basic balance, i.e. the current account balance plus residents' net foreign indirect and direct investment flow, was equivalent to 34% of GDP last year. This is a considerably higher ratio than in 2000, which was a year of grave imbalances preceding a sharp recession. In all probability, the current account deficit will widen still further this year and in 2006. The króna will come under pressure when capital inflows begin to wane, which could occur fairly abruptly.

**Belated tightening is more of a risk**

Because monetary policy is more flexible at present and the exchange rate is floating with no Central Bank intervention, the adjustment will probably not be as rapid as in 2000-2001. It will conceivably commence at an earlier stage than during the previous cycle and take a longer time. However, the adjustment process is unpredictable, and volatile expectations and speculator activity may amplify swings in both directions. There is always a close correlation between the exchange rate and other asset prices, which can have a strong macroeconomic impact during the adjustment process. All these factors point in the same direction. In order to constrain demand so that inflation can be kept under control in the coming years, the Central Bank needs to take sufficient action now. Changes in the policy rate can take up to two years to be transmitted in full. Thus the Central Bank cannot expect to have much impact next year, over and above the effects of the policy rate hikes that have already been made, unless it takes action promptly. Belated measures to tighten the monetary stance entail a far greater risk for the financial system, businesses and households.

## Appendix 1

# Forward interest rates and their application in Central Bank analysis

The Central Bank of Iceland's main macroeconomic and inflation forecast is based on the technical assumption of an unchanged policy interest rate and exchange rate from the day of the forecast. The reason is that the Central Bank is interested in seeing a picture of future economic developments if the policy rate and exchange rate are unchanged. In light of the main forecast the policy rate can then be set so that the target can be attained. Such a forecast may present a misleading picture of future economic developments because it is unlikely that these important technical assumptions will hold. The assumption of an unchanged interest rate may have sweeping consequences when inflation diverges substantially from target or when a boom is expected and the need for tighter monetary policy is obvious. Expectations about tighter monetary policy affect the yield curve. In *Monetary Bulletin* 2004/4 the Central Bank introduced an alternative scenario to its main forecast where the interest rate and exchange rate were allowed to change. In that scenario, the policy interest rate was allowed to evolve according to forward interest rates.

Forward interest rates can be extracted from the term structure, i.e. they are implied in the spot interest rates at any given time. Suppose that a bond is traded on Icelandic Stock Exchange for 91.573 kr. with a face value of 100 kr. and maturity of 2 years. The yield of the bond is then  $r_2 = 4.5\%$  which is also the 2-year spot interest rate. By computing yields of more financial instruments we can form a term structure of interest rates. The term structure not only informs us about interest rates from today until the maturity date, but also implies expected interest rates in the future. Suppose that an investor can invest in the aforementioned bond for two years or another bond for 1 year which he can renew for a further year in one year's time with a known yield. To prevent arbitrage, both investment opportunities must be equal, which means that the following must hold:

$$(3) \quad \frac{100}{(1+r_2)^2} = \frac{100}{(1+r_1)(1+f)}$$

Where  $r_1$  denotes the 1-year spot rate,  $r_2$  denotes the 2-year spot rate and  $f$  denotes implied forward rates for 1 year in one year's time. If the 1-year spot rate according to the term structure is  $r_1 = 3.5\%$ , then the implied forward rate can be computed as:

$$(4) \quad f = \frac{(1+r_2)^2}{(1+r_1)} - 1 = \frac{1,045^2}{1,035} - 1 = 5.51\%$$

When interpreting the forward rate it must be borne in mind that it can contain a forward term premium due to the unpredictability of future interest rates. This has not been investigated for Iceland, but Svensson (1994) points out that, although frequently tested, the forward term premium has widely been found to be negligible.

Continuous term structure is not visible on the market, but we can view the discrete connection between individual financial instruments and time. This information provides the building blocks for a continuous function which describes the term structure. There is more than one known procedure to estimate the continuous term structure. Initially McCulloch (1971, 1975) used cubic spline procedures to bridge the discount function. The discount function can be transformed to present a spot rate curve and then the implied forward rate curve can be computed in the same way as above. The cubic spline procedure has the disadvantage (especially at the longest maturity) that estimates of forward rates can be rather unstable. Consequently, other procedures have become more popular, such as the Nelson and Siegel (1987) procedure along with Svensson's (1994) extensions. Their procedure is to estimate the following equation for the forward rate:

$$(5) \quad f(m; \beta) = \beta_0 + \beta_1 \exp\left(-\frac{m}{\tau_1}\right) + \beta_2 \frac{m}{\tau_1} \exp\left(-\frac{m}{\tau_1}\right) + \beta_3 \frac{m}{\tau_2} \exp\left(-\frac{m}{\tau_2}\right)$$

where  $f$  denotes the forward rate as a function of time to settlement  $m$  and the parameters  $\beta_0, \beta_1, \beta_2, \beta_3, \tau_1$  and  $\tau_2$ .<sup>1</sup> The equation consists of four components (Nelson and Siegel had only three components but Svensson added the last part). The first part is a constant  $\beta_0$ . The second part is a monotonically decreasing (or increasing) part  $\beta_1 \exp(-m/\tau_1)$  which works as an asymptote to ensure that the longest maturity of the forward term structure approaches  $\beta_0 + \beta_1$  (which has to be positive to ensure a positive interest rate). The last two parts of the equation make it possible to have a hump-shaped yield curve. The Nelson Siegel approach enables one hump but the Svensson extension makes it possible to add another.

To make the equation functional, the parameters have to be estimated. The spot interest rate curve can be derived by integrating the function and then the discount function is easily derived as well. The parameters of the equation are estimated by either minimising price errors or yield errors. Minimising price errors involves minimising the squared difference between estimated prices from the discount function and observed prices of the financial instruments. Since the yield often has a limited effect on price at short maturity, minimising price errors can result in inaccurate estimation of the yield in that part of the yield curve. The Central Bank therefore minimises yields, which involves minimising the squared difference between estimated yields

1. The implied forward rate is continuously compounded. It is easier to use the continuously compounded rate when estimating the function, but it can be converted afterwards to, for example, weekly compounded rates by using  $r_d = d(\exp(r_c/d) - 1)$  where  $r_d$  denotes weekly compounded rates,  $r_c$  denotes continuously compounded rates and  $d$  denotes number of days.



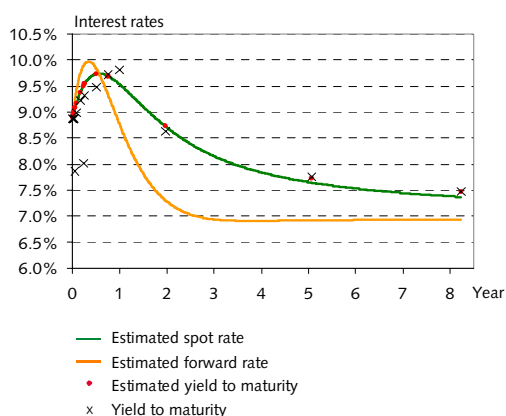
and observed yields. When the parameters have been estimated we have a continuous function which describes the term structure at a given time.

Before we estimate the term structure we have to decide what information we use as building blocks for it. For a central bank on an inflation target it is particularly interesting to obtain information from financial markets on expectations about the future policy interest rate over a horizon of roughly two years. The policy interest rate applies to repurchase agreements, which makes it interesting to investigate the one-week implied forward rate. Treasury bills and Government bonds are usually used as a basis for the (non-indexed) term structure. These bonds are selected since they are more actively traded than others. They also have a minimum default risk and therefore a minimum risk premium, unlike corporate bonds, for which the market in Iceland is too inactive to be useful in term structure estimation. When estimating the term structure the Central Bank has also used money market interest rates.<sup>2</sup> Money market interest rates have a disadvantage, since they are not the same financial instruments as bonds and can differ from the interest rates on Treasury bills and Government bonds even though their maturity is similar.<sup>3</sup> The advantage, however, is that they provide much more information on the term structure. Lately there has been an inconsistency between interest rates on Treasury bills and in the money market which can be traced to a discrepancy between supply and demand for Treasury bills.

Chart 1 shows the estimation for 1-week yield curves on February 23, 2005. The estimated spot rate rises faster than money market interest rates imply – to more than 9.7% in little more than half a year compared with just under 9.5% in the money market for the same maturity. Treasury bill interest rates differ with a yield to maturity of around 8% even though they mature after a fairly short time. Basing term structure only on Treasury bills and Government bonds would have given a quite different picture because interest rates on Treasury bills have been quite low recently. However, since there are only two Treasury bills they do not have much effect on the estimation. Estimated yield to maturity is the same as estimated spot rates for all instruments except those carrying coupons, namely Government bonds maturing in approximately 5 and 8 years. Estimated forward rates rise faster than estimated spot rates and peak at just under 10% in 3 months. After that they fall rapidly to 7% in 3 years' time.

Information regarding the evolution of interest rates is important for the Central Bank. Interest rate changes affect domestic

Chart 1  
Estimated term structure of interest rates  
on February 23, 2005



Source: Central Bank of Iceland.

2. In *Monetary Bulletin* 2004/4 the implied forward rate was based on Treasury bills and Government bonds. Since then the methodology has been revised and interest rates in the money market are now also included in term structure estimations. The methodology is still being revised.

3. Money market interest rates are simple (flat) and have to be adjusted to an effective rate in order to be comparable with Treasury notes and Government bonds. Day count rules also differ. In the money market the actual/360 rule applies but the 30/360 rule applies for Treasury notes and Government bills.

demand and thereby inflation. Due to the lag in the pass-through, it is important for the Central Bank to be forward-looking in its monetary decisions. By monitoring the market the Central Bank can extract information about the future economic situation and the monetary stance. Disregarding the forward term premium, the implied forward rate can be interpreted as the market's forecast for the 1-week interest rate in the future, comparable to the policy interest rate. This enables the Central Bank to monitor market expectations of future monetary policy measures. The implied forward rate is also used for the macroeconomic forecast in which interest rates and exchange rates are allowed to change, as was done in *Monetary Bulletin* 2004/4.

If the term structure for indexed debt instruments is computed as well, the Bank can assess market inflation expectations, which is the difference between the real and nominal forward rate. Market inflation expectations are an indicator of the Central Bank's credibility in its decisions. If expectations are not close to the policy rate, this indicates that the monetary stance lacks credibility.

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## Appendix 2

### Calculating the output gap

The output gap is an important concept in the preparation of inflation forecasts and assessments of the economic outlook. However, the output gap is difficult to measure and subject to great uncertainty in practice. The techniques used by the Central Bank of Iceland and elsewhere to calculate the output gap, which have previously been described in *Monetary Bulletin* (2000/4 pp. 14-15), will be recapitulated here taking particular account of investments in the aluminium and power sectors, since these have a substantial impact on both the level of production and output potential in the economy, not only during the construction phase but also when the investments have been completed.

#### Definition of the output gap

The output gap is defined as the difference between actual and potential GDP as a per cent of potential GDP, i.e.:

$$(1) \quad GAP_t = \frac{Y_t - Y_t^P}{Y_t^P}$$

where  $GAP_t$  is the output gap,  $Y_t$  is GDP in real terms and  $Y_t^P$  is the potential output of the economy, all during the year  $t$ . Potential output is defined as the level of GDP that is consistent with full utilisation of all factors of production under conditions of stable inflation. Thus potential output is determined on the supply side of the economy, i.e. by capital stock, labour use and available technology.

Potential output in the long term is determined by how efficiently the available factors of production can be utilised for a given level of productivity. In the short run, however, aggregate demand can drive the level of production beyond long-term potential output. This creates macroeconomic pressures which take the form of excess demand in the goods and labour markets, eventually causing inflation to rise. If production is lower than long-term potential output, on the other hand, slack is formed which, other things being equal, lowers the rate of inflation.

Estimates of potential output are necessary in assessments of the economic situation and outlook for policy-making or other purposes. Growth resulting from an increase in potential output does not cause an increase in the rate of inflation, for example when productivity is boosted by new technology. On the other hand, if output growth is driven by an increase in demand in excess of potential output, a positive output gap may develop which will cause the rate of inflation to speed up. GDP growth in excess of long-term output potential does not always have an inflationary effect, however. If there is prior slack in the economy, businesses can meet increased demand by utilising the factors of production more efficiently. Hence estimated utilisation of the factors of production is a key assumption behind assessments of medium-term price developments.

### Measuring potential output in the economy

Potential output cannot be observed directly from available data. Since it has to be estimated using statistical methods, it is subject to a high degree of uncertainty.

Various methodologies have been suggested for estimating potential output. All of them assume that GDP growth may be divided into two components: trend growth and cyclical growth. Pure statistical methods, i.e. those which are not directly derived from a theory-based approach, divide the level of production whereby:

$$(2) \quad y_t = \tau_t + c_t$$

where  $y$  is the logarithm of GDP,  $\tau$  is its trend component and  $c$  is its cyclical component. The trend reflects a broad long-term growth curve around which output fluctuates. It is often regarded as a measure of potential output, although this view is not unanimously held (see e.g. Canova, 1998). Estimates of trend GDP are subject to the same complications as estimates of potential output, namely the path cannot be evaluated directly. A number of statistical approaches are possible for dividing measured time series in this way.<sup>1</sup> The problem is that they yield different outcomes, often with marked divergences depending on the methodology adopted.

Other methods are based on estimating the production function and using this to estimate potential output. Production is commonly described using the Cobb-Douglas specification of the production function:

$$(3) \quad Y_t = A_t N_t^\alpha K_t^{1-\alpha}$$

where  $Y_t$  is the output level of the economy at constant prices,  $A_t$  is total factor productivity (i.e. productivity of the combined factors of production (labour, capital and other factors)),  $N_t$  is labour input and  $K_t$  the capital stock, while  $\alpha$  is the share of wages in the total value added in the economy and is assumed to be constant over time.

### Central Bank of Iceland's methods for estimating potential output

For a number years, the Central Bank has estimated the output gap in the economy. The output gap is calculated from an estimation of potential output based on the mean yielded by five different methods. One involves estimating trend GDP using the Hodrick-Prescott filter (1997) (HP).<sup>2</sup> The other four are variants of the Cobb-Douglas production function. All these methods use the current capital stock, as it changes slowly. Changes in the stock of capital are thus fully reflected in potential output. Total factor productivity is also

1. Such as polynomial trend extrapolation, Hodrick-Prescott filters, Beveridge-Nelson filters, state of space models, etc.

2. The Hodrick-Prescott filter is applied to the level of production  $y$  to estimate  $\tau$  in equation (2).

found using the same method in all cases and is estimated by solving for  $A_t$  from equation (3). The HP filter is then applied to  $A_t$  to establish the trend path for total factor production. These four methodologies thus differ only in the way that they find the trend path for labour.

The simplest method is to use the HP filter to find the trend path for labour input. The other three begin by dividing labour use into its components:

$$(4) \quad N_t = H_t L_t (1 - u_t)$$

where  $H_t$  is the participation ratio,  $L_t$  is the number of individuals of working age and  $u_t$  is the unemployment rate. An attempt is then made to measure the natural rate of unemployment, i.e. the level of unemployment measured at full utilisation of the factors of production. Three of the five methods used by the Central Bank to calculate potential output are based on different estimates of the natural rate of unemployment. One applies the HP filter to the unemployment rate, whereas the other two use an assumed rate of natural employment. These set the unemployment rate at full utilisation of the factors of production in Iceland at 2.5% and 3.0%, respectively. Each of these five approaches yields a specific estimation of potential output, which is then used together with estimated output to calculate the output gap (using equation (1)).

#### **The impact of investments in the aluminium and power sectors**

Investments currently being made in aluminium smelters and power stations have a sizeable impact on GDP. It is important to distinguish between their impact on potential output and the output gap. The investment projects affect not only production but also potential output of the economy, both during the construction phase and afterwards. For this reason, special allowance needs to be made for their impact on capital stock, labour input, total factor productivity and the natural rate of unemployment when potential output is estimated using the production function (3).

To incorporate these factors, a number of the aggregates on which potential output is based need to be revalued with respect to the impact of the investments upon them. The investment cycle is assumed to be fully known. The Central Bank's macroeconomic model is then used to estimate what output, capital stock, labour input and the size of the labour force would have been, had the investments not been made. This is done by forecasting these aggregates over the construction phase without the construction projects, to produce an alternative scenario excluding the investments.

The total factor productivity trend is allowed to develop as in the alternative scenario with the addition of a productivity shock during the investment phase. This is based on calculations by the National Economic Institute that, other things being equal, GDP will increase by 1% when the smelters reach full production. This addition will be reflected in total factor productivity over several years.

The capital stock corresponding to full utilisation of the factors

of production is allowed to develop as in the model excluding the aluminium and power sector investments. New smelters and power stations are added to the production function when they start up. At the end of the construction phase the capital stock then grows annually by the same proportion as in the scenario excluding the investments.

When using the HP filter to find the trend path for labour use, the labour input from the alternative scenario, i.e. excluding the aluminium and power sector investments, is filtered, and the imported labour for the projects is added to the filtered series. When the labour input trend is estimated using equation (4) and the natural rate of unemployment is found using an HP filter, the filter is applied to estimated unemployment excluding the investments, then the difference between the number of unemployed excluding and including the investments (calculated as a proportion of labour supply) is added to it. Labour supply is found by adding imported labour to labour supply excluding aluminium and power sector investments. This method of calculation is also used when a natural rate of unemployment of 2.5% or 3.0% is assumed.

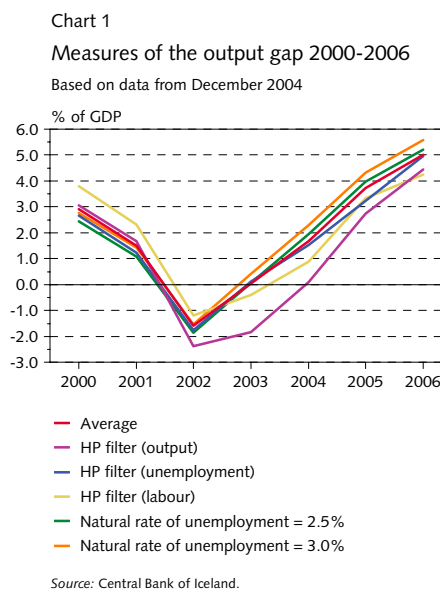
Such an approach aims to prevent the output potential of the economy from appearing to have increased before it actually does in practice. Without this adjustment, the HP filter would increase output potential long before production begins, because it levels out fluctuations by spreading the effects of shocks in both directions. If labour supply increases, e.g. on account of imported labour for specific projects, straightforward HP filtering would cause the extra labour supply to begin exerting an impact several years before it is actually added, and even before the investment is decided.

After it became clear that the investments in the aluminium and hydropower sectors would go ahead, the simplest available method – HP filtering of the level of output itself – was discarded, because it spreads the additional future output potential back into the past as well, thereby underestimating the actual output gap. The mean of the estimated potential based on the four different versions of production function (3) is therefore used instead.

Chart 1, which uses data from December 2004, shows six estimates of the output gap. Four are based on output potential using the production function methods described above, and one shows the mean value for output potential derived from them. The output gap measured by HP filtering of GDP is also shown. The chart reveals how this method yields a smaller output gap measurement, because the HP filter spreads output potential backwards in time over many years.

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## Appendix 3

# Uncertainty in the Central Bank's inflation forecast

Since the Central Bank of Iceland moved on to an inflation target at the beginning of 2001 it has published inflation forecasts with a two-year horizon. These forecasts play a key role in monetary policy decisions. The inflation forecast is always based on the technical assumption that the policy interest rate remains unchanged over the horizon. The forecast is used to gauge whether the current policy rate is sufficient to maintain a rate of inflation as close as possible to the Central Bank's target of 2½%. A substantial deviation in the outlook generally calls for a change in the policy rate. However, there is no mechanical connection between the forecast and monetary policy decisions.

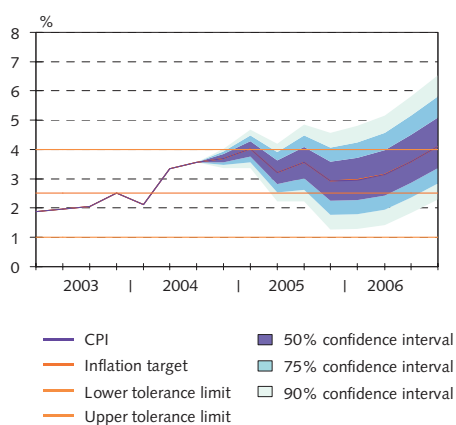
Inflation forecasts are subject to uncertainty which increases over the horizon. In making interest rate decisions, the Central Bank takes into account not only the main inflation forecast, but also its probability distribution. To underline this and also to inform the public and markets about the risk profile, the Central Bank publishes confidence intervals for each forecast, i.e. the ranges within which inflation will end up with a 50%, 75% and 90% probability. The probability distribution is represented in the form of a fan chart with increasingly dark lines as the interval narrows.<sup>1</sup> An assessment of the main asymmetric uncertainties also accompanies the forecast. This approach contributes to a more focused analysis of various factors that may impact the forecast and underlines their importance in forecast preparations. An example of the fan chart is Chart 1, which shows the Central Bank's forecast for Q4/2004. It also shows that there was an upside risk to the inflation forecast at end-2006.

The following is a closer examination of methods for estimating the probability distribution for the forecast and the balance of risks.

### Probability distribution in the inflation forecast

Uncertainty in the Central Bank's inflation forecasts is estimated on the basis of historical data on its forecasting errors one and two years ahead.<sup>2</sup> However, since the degree of uncertainty may vary, historical data do not necessarily give a clear indication of future uncertainty. For each forecast, therefore, an assessment is made of whether the degree of uncertainty calculated from historical data should be scaled up or down. Likewise, the forecasting risk can be to the upside or the downside, i.e. when inflation one or two years ahead is considered

Chart 1  
Bank of Iceland inflation forecast 2004/4  
In *Monetary Bulletin* 2004/4



1. This implies a 10% probability that inflation will end up outside the shaded area of the chart.  
2. Since the Central Bank began publishing quarterly inflation forecasts two years ahead in *Monetary Bulletin* 2001/2, the standard deviation of the forecasting error over that horizon has been 1.1%. The standard deviation of the forecasting error one year ahead has been slightly higher at 1.2%. The assessment is still based on a relatively few observations but a more reliable measure of the standard deviation of the forecasting error should be obtained over time. A study of the forecasting errors in the Bank's inflation forecasts is published every year in *Monetary Bulletin*, most recently in *Monetary Bulletin* 2004/2.

more likely to be greater than the main forecast (which is regarded as the most probable value) or lower.

The risk profile for the inflation forecast is based on methods developed by the Bank of England and Sveriges Riksbank (Britton et al., 1998, and Blix and Sellin, 1998), which also allow an estimation of skewed distributions.

A two-piece normal distribution is used, see Johnson et al. (1994):

$$(1) \quad f(x) = \left( \frac{2}{\sqrt{1-\gamma} + \sqrt{1+\gamma}} \right) \frac{1}{\sqrt{2\pi\sigma^2}} \exp \left\{ -\frac{(x-\mu)^2}{2\sigma^2} \left[ 1 + \gamma \left( \frac{x-\mu}{|x-\mu|} \right) \right] \right\}$$

where  $f(x)$  is the density function,  $\mu$  is the mode of the probability distribution (i.e. the value that maximises the density function) and  $\sigma$  is the standard deviation of the composite density function.

The parameter  $\gamma$  measures the skewness of the probability distribution and lies in the range -1 to +1. The asymmetric uncertainty can then be calculated from  $\gamma$ , measured as the deviation of the mean from the mode of the distribution, which is expressed with  $\varphi$ :

$$(2) \quad \varphi = (m - \mu) = \sqrt{2/\pi} \left( \frac{\sigma}{\sqrt{1-\gamma}} - \frac{\sigma}{\sqrt{1+\gamma}} \right) = \sqrt{2/\pi} (\sigma_2 - \sigma_1)$$

where  $m$  is the mean of the distribution and  $\sigma_1$  and  $\sigma_2$  are the standard deviation of the two parts of the composite probability distribution. Standard deviation  $\sigma_1$  therefore measures the standard deviation of the distribution to the left of  $\mu$  and  $\sigma_2$  to the right of  $\mu$ .<sup>3</sup> If  $\gamma > 0$  the distribution is skewed upwards ( $m > \mu$ ) to leave a larger part of it to the right of the mode, i.e.  $\sigma_2 > \sigma_1$ . Conversely, if  $\gamma < 0$  the distribution is skewed downwards ( $m < \mu$ ) to leave a larger part to the left of the mode, i.e.  $\sigma_1 > \sigma_2$ . For a conventional symmetric normal distribution,  $\gamma = 0$  with  $\sigma_1 = \sigma_2$  and  $m = \mu$ . The density function in equation (1) simplifies to:

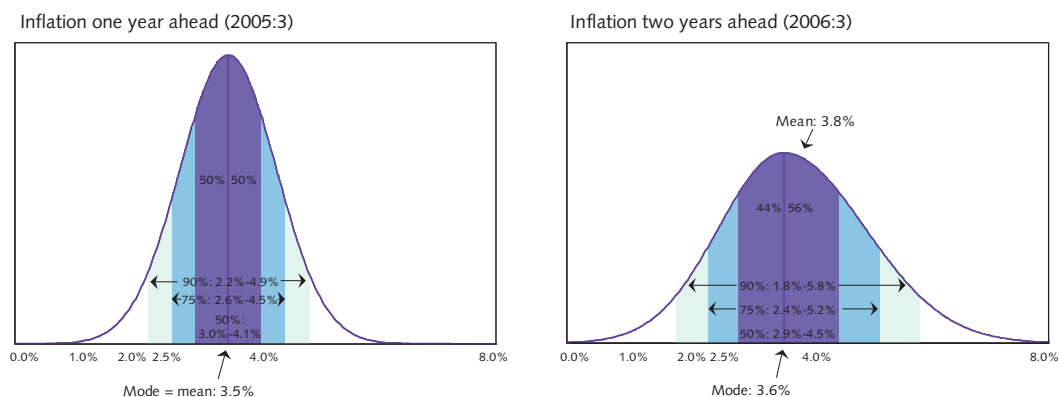
$$(3) \quad g(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp \left( -\frac{(x-\mu)^2}{2\sigma^2} \right)$$

Chart 2 shows the probability distribution one and two years ahead for the inflation forecast that was published in *Monetary Bulletin* 2004/4 (i.e. forecast inflation in Q3/2005 and Q3/2006). The best way to understand the presentation of the Central Bank's inflation forecast is to examine Charts 1 and 2 together. In effect, the probability distribution for inflation is calculated separately for each of the nine quarters that the Bank forecasts, as shown in Chart 2. Chart 1 then presents a simple bird's-eye view of these nine probability distributions.

The width of the probability distribution reflects the risks in the forecast: the wider they are, the greater the uncertainty about how developments will unfold. This is shown, for example, by the fact that the probability distribution two years ahead is much wider than the

3. These are in effect two conventional normal distributions measured with their respective standard deviations rescaled to be continuous in the mode with the integral below the area equal to 1.

Chart 2  
Probability distribution one and two years ahead for the Central Bank of Iceland inflation forecast 2004/4



distribution one year ahead, because the uncertainty increases over the forecast horizon. Since the area below the curve must always equal 1, increased uncertainty is also reflected in a lower and flatter curve. The risk profile is ultimately reflected in the shape of the distribution: symmetric uncertainty is reflected in symmetric probability distribution, but the distribution will be skewed if the estimated risk is greater in either direction.

In the Central Bank's forecast in December 2004, the risk was considered symmetric one year ahead but on the upside two years ahead.<sup>4</sup> Inflation was forecast at 3.5% one year ahead which, since the balance of risks was symmetric, also corresponds to the mean of the forecast. Two years ahead, however, the most probable rate of inflation was considered to be 3.6%. Since that distribution is skewed to the upside, however, the mean of the forecast was 3.8%. Accordingly, 56% of the probability distribution lies above the mode and only 44% below it. It was considered fairly unlikely that the inflation target would be attained over the forecast horizon based on the policy interest rate at that time. One manifestation is that the probability of inflation in the range 2-3% one and two years ahead was only 20%.

### Uncertainty assessment

An assessment of uncertainties in the inflation forecast attempts to give a forward-looking view of the risks to the forecast, not a mechanical extrapolation of past forecasting errors. It examines the underlying factors in the development of inflation and assesses whether the uncertainty is greater or less than is implied by historical forecasting errors or fluctuations in these values. Whether the risk is to the upside or downside is also estimated. Factors at work include exogenous economic developments (e.g. exports, oil prices and the general level of import prices), domestic demand (e.g. private consumption, investment, the public sector, imports, wage developments and the output gap) and financial market developments (e.g. the exchange rate and equity prices).

4. The assessment of forecast uncertainty thus allows the probability of inflation falling within a given range over the next two years to be calculated, cf. Charts 1 and 2 which show, for example, a 50% probability that inflation two years ahead would be in the range just below 3-4.5%, and Table 7 in *Monetary Bulletin 2004/4* which shows a 57% probability that it would be in the range 1-4%, i.e. within the tolerance limits.

A calculation of uncertainties in the inflation forecast therefore simply examines fluctuations in these factors and the standard deviation of the forecast is their weighted mean, where  $N$  is the number of subfactors:

$$(4) \quad \sigma = \left( \frac{\sum_{i=1}^N \beta_i h_i \sigma_i}{\sum_{i=1}^N \beta_i \sigma_i} \right) \omega$$

where  $\omega$  is the historical standard deviation in the Central Bank's inflation forecasting errors,  $\sigma_i$  is the forecasting error in the respective factor and  $\beta_i$  measures the impact of each subfactor on inflation one and two years ahead. The parameter  $h_i$  is the scaling factor for that value and is greater than 1 if the uncertainty about the factor is considered greater than historical forecasting errors would imply (and thus  $\sigma > \omega$ ) but lower than 1 if the uncertainty is considered less (and thus  $\sigma < \omega$ ). To give an example, the Central Bank has considered the uncertainty in its recent inflation forecasts to be generally lower than historical forecasting errors would imply, due to the impact of forecasting errors in 2001 when the exchange rate framework was changed and a substantial depreciation of the króna went hand in hand with a temporary rise in the inflation rate.<sup>5</sup>

For each new forecast, an estimation is made of the main asymmetric uncertainties, i.e. those which will result in either higher or lower inflation if they materialise. This yields an estimate of the asymmetry of each subfactor,  $\gamma_i$ , and thus of the asymmetry of the probability distribution for the inflation forecast as a whole as:<sup>6</sup>

$$(5) \quad \varphi = \sum_{i=1}^N \beta_i (m_i - \mu_i) = \sum_{i=1}^N \beta_i \varphi_i = \sqrt{2/\pi} \sum_{i=1}^N \beta_i h_i \sigma_i \left( \frac{1}{\sqrt{1-\gamma_i}} - \frac{1}{\sqrt{1+\gamma_i}} \right)$$

For example, in the most recent forecast, the risk connected with exchange rate and wage developments, the wealth and credit effect on private consumption, and doubts about an adequately tight fiscal stance was considered to be on the upside (i.e.  $\gamma_i$  for those factors exceeded 0), while asset prices were more likely to weaken further ahead (i.e.  $\gamma_i$  for this factor was less than 0). All told, therefore, the risk was symmetric one year ahead but to the upside two years ahead.

### References

- Blix, M. and P. Sellin (1998), Uncertainty bands for inflation forecasting, *Sveriges Riksbank Working Paper*, no. 65.
- Britton, E., P. Fisher and J. Whitley (1998), The Inflation Report projections: Understanding the Fan Chart, *Bank of England Quarterly Bulletin*, February 1998.
- Johnson, N. L., S. Kotz and N. Balakrishna (1994), *Continuous Univariate Distributions*, vol. 1, New York: Wiley.

5. The exchange rate will probably remain one of the main uncertainties in inflation developments and large-scale changes in it cannot be ruled out in the future. However, the pass-through of exchange rate fluctuations to inflation may have decreased after the exit from the fixed exchange rate regime.

6. Strictly speaking, equations (4) and (5) describe the uncertainty in the forecast one year ahead. Uncertainty two years ahead will also be affected by the risks one year ahead.

## Appendix 4

# What mortgage options are currently available to homebuyers?

Until last year, the Housing Financing Fund (HFF) held a virtual monopoly in the mortgage market. Other financial institutions did not offer mortgages at competitive rates of interest, and then only as second mortgages to supplement loans that households took with the HFF and, to some extent, the pension funds. After financial companies began providing mortgages at competitive rates of interest, households were given substantially more scope for financing their housing purchases. Growth of credit supply has probably been a major driver of soaring housing prices, which showed a twelve-month rise of 19.9% in February. Financial institutions providing mortgage loans are the HFF, Íslandsbanki, KB banki, Landsbanki Íslands, Netbankinn (nb.is), Frjálsi fjárfestingarbankinn, the savings banks and most pension funds.

KB banki made the first move with CPI-indexed mortgage loans carrying 4.4% interest. These were annuity loans with a maximum loan-to-value ratio of 80%. The other commercial banks followed suit, along with the savings banks and HFF. The banks bid each other down and now all offer 4.15% interest with CPI indexation. Besides lower interest rates, the loan-to-value ratios were raised. Loan ceilings are now set at 80%-100% of market value. Maturities are also more flexible than on HFF mortgage loans, at 5-40 years. A first priority pledge is still always a condition for a 100% mortgage, and interest rates are either fixed or reviewed at five-year intervals. In most cases the borrower has to be a customer of the respective institution but this requirement is not made by Frjálsi fjárfestingarbankinn.<sup>1</sup>

Apart from mortgageability of the property and the customer's debt service capacity, banks generally do not set ceilings for mortgage amounts.<sup>2</sup> However, an exception is made when the loan-to-value ratio exceeds 80%. The maximum mortgage for a loan-to-value ratio from 80% to 100% is 25 m.kr. and such loans are only provided for housing purchases (i.e. not for refinancing).

The banks also offer loans that are foreign currency-linked, indexed to a currency basket or denominated in a combination of foreign and domestic currency. Several currencies are used, mostly the US dollar, euro, Swiss franc and yen. Since these loans carry variable interest rates set at a spread above 3-month LIBOR, borrowers face both interest rate and currency risks.

1. To qualify for customer status, the borrower needs to use either all or three of the following services: salary account, direct debit, payment card, supplementary pension savings scheme and/or various types of personal insurance.

2. In all cases, the lender insists on an evaluation of the customer's debt service capacity.

In December, the HFF and savings banks launched a joint mortgage scheme, enabling them to offer much higher loan amounts. The HFF lends according to its lending rules and the savings banks top up the loan with the balance required.

Pension funds have also begun to offer mortgage loans, exclusively for their members. Maturity is generally the same as on loans offered by the banks but the loan-to-value ratio is only 60-65%. The lower ratio, combined with a ceiling of 85-100% of fire insurance value, means that pension funds offer much lower loan amounts than commercial banks. Their interest rates are also slightly higher, at 4.15-4.33%. The three largest pension funds are included in the examples in the table.

All mortgage loans are subject to 1.5% stamp duty and a registration fee of 1,200-1,350 kr., both of which accrue in full to the Treasury.

The accompanying table clearly illustrates the wide variety of loan options currently on offer.

## Household mortgage loan options

<i>Loan options</i>	<i>Mortgage loan 1</i>	<i>Mortgage loan 2</i>	<i>Mortgage loan 3</i>	<i>Mortgage loan 4</i>	<i>Mortgage loan 5</i>	<i>Mortgage loan 6</i>	<i>Mortgage loan 7</i>
Loan-to-(market) value ratio	100%	100%	100%	100%	90%	90%	90% of market value or construction cost
Maximum	25 m.kr	130% of combined fire insurance and land value	None	None	25 m.kr	25 m.kr	14.9 m.kr. (Less than 100% of fire insurance value)
Pledge	1st priority	1st priority	1st priority not a condition	1st priority not a condition	1st priority	1st priority	1st priority
Interest rate	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	Variable depending on pledge	Variable, currency-linked against króna and foreign currencies	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed
Format	Equal instalments	Optional	Optional	Optional	Annuity	Annuity	Annuity
Maturity	5-40 yrs.	5-40 yrs.	Up to 40 yrs.	Up to 40 yrs.	25 or 40 yrs.	25 or 40 yrs.	20, 30 or 40 yrs.
Review clause	Y (interest rate reviewed every 5 years)	Y	Y (premium reviewed every 5 years)	Y (premium reviewed every 5 years)	N	Y (interest rate reviewed every 5 years)	N
Refinancing	N	N	Y (also suitable for home improvements and debt conversion)	Y (also suitable for home improvements and debt conversion)	N	N	Y (suitable for home improvements and new housing)
Prepayment charge	2%	2%	N	2%	2%	2%	N
Borrowing charge	1%	1%	1%	1%	1%	1%	1%



<i>Loan options</i>	<i>Mortgage loan 8</i>	<i>Mortgage loan 9</i>	<i>Mortgage loan 10</i>	<i>Mortgage loan 11</i>	<i>Mortgage loan 12</i>	<i>Mortgage loan 13</i>	<i>Mortgage loan 14</i>
Loan-to-(market) value ratio	90%	80%	80%	80%	80%	80%	80%
Maximum	25 m.kr	None	None	None	25 m.kr if 20% second mortgage taken	25 m.kr if second mortgage taken	None
Pledge	1st priority	1st priority not a condition	1st priority not a condition	1st priority not a condition	1st priority	1st priority	1st priority
Interest rate	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	Non-indexed, variable	5-6% variable, depending on loan-to-value ratio	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed
Format	Annuity	Annuity	Equal instalments	Annuity	Annuity	Annuity	Annuity
Maturity	20-40 yrs.	5-40 yrs.	5-40 yrs.	5-40 yrs.	Up to 40 yrs.	25 or 40 yrs.	5-40 yrs.
Review clause	N	Y (interest rate reviewed every 5 years)	Y (premium reviewed every 5 years)	Y	N	N	N
Refinancing	Y	Y	Y	Y	N	Y	Y
Prepayment charge	N	2%	2%	N	2%	2%	2%
Borrowing charge	1%	1%	1%	1-2% depending on loan-to-value ratio	1%	1%	1%

<i>Loan options</i>	<i>Mortgage loan 15</i>	<i>Mortgage loan 16</i>	<i>Mortgage loan 17</i>	<i>Mortgage loan 18</i>	<i>Mortgage loan 19</i>	<i>Mortgage loan 20</i>	<i>Mortgage loan 21</i>
Loan-to-(market) value ratio	80%	80%	80%	80%	80%	80%	80%
Maximum	None	10.1 m.kr (less than 100% of fire insurance value)	None	None	None	None	None
Pledge	1st priority	1st priority	1st priority	1st priority	1st priority	1st priority not a condition	1st priority
Interest rate	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	Variable depending on loan-to-value ratio. 50% krónur and 50% foreign	Variable depending on loan-to-value ratio, from 2.67%. Currency basket	4.15% fixed, CPI-indexed	Non-indexed, 50% krónur and 50% foreign	Fixed 4.7-6.7%
Format	Optional	Annuity	Equal instalments	Equal instalments	Annuity	Equal instalments	Equal instalments
Maturity	5-40 yrs.	25 or 40 yrs.	Up to 40 yrs.	Up to 40 yrs.	5-40 yrs.	5-40 yrs.	Up to 40 yrs.
Review clause	Y	N	Y (premium reviewed every 5 years)	Y (premium reviewed every 5 years)	Y	Y (premium reviewed every 5 years)	N
Refinancing	Y	Y	Y	Y	Y	Y	Y
Prepayment charge	2% (waived if interest rate changes)	N	N	N	2%	N	0.2% per year to maturity
Borrowing charge	1%	1%	1-2%	1-2%	1%	1%	1-2%

<i>Loan options</i>	<i>Mortgage loan 22</i>	<i>Mortgage loan 23</i>	<i>Mortgage loan 24</i>	<i>Mortgage loan 25</i>	<i>Mortgage loan 26</i>	<i>Mortgage loan 27</i>	<i>Mortgage loan 28</i>
Loan-to-(market) value ratio	80%	70%	65%	65%	65%	65%	65% of Land Registry or market value (up to 85% of fire insurance value)
Maximum	None	None (up to 100% value)	Not specified	None (Up to 100% of fire insurance value)	None (Up to 100% of fire insurance value)	None specified	None
Pledge	1st priority	1st priority	1st priority	1st priority	1st priority	1st priority	1st priority
Interest rate	4.15% fixed, CPI-indexed	Variable, foreign currency-linked, (depends on loan-to-value ratio) USD 30% EUR 40% CHF 20% JPY 10%	4.33% variable, CPI-indexed	4.15% fixed, CPI-indexed	4.26% variable, CPI-indexed	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed
Format	Annuity	Not specified	Optional	Optional	Optional	Optional	Optional
Maturity	5-40 yrs.	Up to 40 yrs.	5-40 yrs.	5-40 yrs.	5-40 yrs.	5-40 yrs.	5-40 yrs.
Review clause	Y	Y (premium changed every 3 months)	Y	N	Y	N	N
Refinancing	Y	Y	N	N	N	N	N
Prepayment charge	2%	2%	N	N	N	N	N
Borrowing charge	1%	1%	1%	1%	1%	1%	1%

<i>Loan options</i>	<i>Mortgage loan 29</i>	<i>Mortgage loan 30</i>	<i>Mortgage loan 31</i>	<i>Mortgage loan 32</i>
Loan-to-(market) value ratio	65% of land Registry of market value (up to 85% of fire insurance value)	20%	20%	20%
Maximum	None	None	25 m.kr. for 80% loan	25 m.kr
Pledge	1st priority	2nd priority	2nd priority	2nd priority
Interest rate	4.15% variable, CPI-indexed	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed	4.15% fixed, CPI-indexed
Format	Optional	Annuity	Annuity	Optional
Maturity	5-40 yrs.	10 yrs.	Up to 15 yrs.	Up to 15 yrs.
Review clause	Y	N	N	Y
Refinancing	N	Y	N	N
Prepayment charge	N	N	N	N
Borrowing charge	1%	1%	1%	1%

## Appendix 5

# The real exchange rate of the króna in a historical and international context

The impact of the exchange rate of the króna permeates the whole Icelandic economy. It directly affects the prices of imported and exported goods and services, the combined value of which has amounted to 75-80% of GDP in recent years. The real exchange rate may be defined as the change in domestic price level or unit labour costs relative to trading partner countries, from a given base year and measured in the same currency.<sup>1</sup> Generally the real exchange rate is shown as an index. An appreciation of the real exchange rate of the króna implies that the domestic price level or unit labour costs have risen more than in trading partner countries, after adjustment for exchange rate changes, i.e. it represents deterioration in the competitive position of domestic businesses. Businesses in the traded goods sector need either to raise the prices of their products or accept lower profit margins. In the former case the result is a loss of market share to foreign competitors, and in the latter case lower profits relative to foreign producers which weakens Iceland's competitive position in the long run.

Real exchange rates are closely linked to the hypothesis of purchasing power parity (PPP), which in effect is the law of one price – one of the key laws of economics – in the context of international trade. According to the hypothesis, real exchange rate volatility should only be small and short-lived, because in an environment of free trade and competition, it is not sustainable for the same good to be sold at different prices in different countries. In the long run price differences between countries, measured in the same currency, ought to be levelled out, since otherwise unlimited arbitrage would be possible. In practice, transport costs, trade restrictions and other business costs make it unrealistic to expect perfect PPP to be established. A more realistic approach is to adopt a relativist version of the hypothesis which states that there is a direct connection between price changes in different countries after allowing for exchange rate changes, transport costs, business costs, trade barriers, differences in taxation of goods and services between countries and other factors that explain “normal” international price differences. However, even this weaker hypothesis is at odds with empirical evidence. The real exchange rate of most countries has been highly volatile. In some cases the trend even appears to be persistent, which contradicts the PPP hypothesis but can be explained with the so-called Balassa-Samuelsson effect (see below).

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1. The real exchange rate is sometimes also explained as relative prices of non-traded and traded goods.

Most economists nonetheless believe that the PPP hypothesis is valid in the long run, as shown by a long-term mean reversion tendency, even though the deviation from the equilibrium real exchange rate (long-term equilibrium) is both large and persistent.

The Icelandic króna has appreciated sharply in real terms from its historical low towards the end of 2001. So far this year, relative consumer prices are roughly 20% higher than in Q4/2001 and relative unit labour costs (RULC) 28% higher. This increase has driven the real exchange rate 18% above the ten-year average and close to the peak reached in the 1980s. A number of reasons underlie the stronger real exchange rate in recent years. Unlike earlier episodes, it is primarily driven by an appreciation of the nominal exchange rate of the króna. Investments in the aluminium and energy sectors and the rise in the Central Bank's policy interest rate have played a substantial part, while in recent months buoyant external demand, which is reflected in higher export prices, may also be expected to have contributed. Besides a higher nominal exchange rate, inflation and wage increases in Iceland have also exceeded those in main trading partner countries. If forecasts hold, consumer prices will have risen by 14% in Iceland since 2001, compared with 6.5% in trading partner countries. However, increases in productivity have countered the impact that higher wage costs have had on the real exchange rate based on RULC. Productivity increased by 12% in Iceland over the period in question, but by 6% in trading partner countries. Measured in these terms, the real exchange rate has not strengthened as much, even though wage rises have outstripped those in trading partner countries by 13.5 percentage points.

It can be argued that greater productivity in the traded goods sector is a permanent change which may cause equilibrium to be established at higher relative prices than before.<sup>2</sup> Such a real exchange rate trend, often associated with Balassa and Samuelsson, is caused by much slower productivity changes in the non-traded goods sector in the absence of foreign competition. If growing prosperity causes a relative expansion in the non-traded services sector which increases its weight in private consumption and the CPI, a marked trend may be reflected in real exchange rate time series based on them. However, such appreciation need not imply a change in the competitive position.

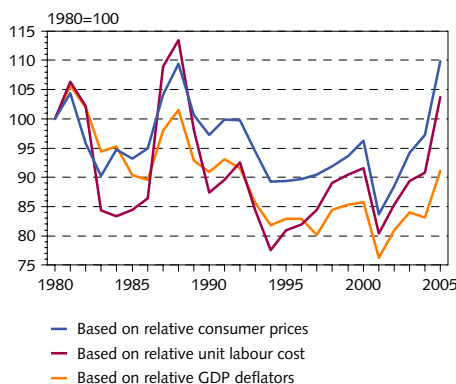
Increased productivity in the traded goods sector may have caused some increase in the equilibrium real exchange rate of the króna, but is highly unlikely to have driven it up to its present level. The wide current account deficit indicates that the real exchange rate is unlikely to be sustainable from a macroeconomic balance approach.<sup>3</sup> Hence, the króna may be expected to depreciate again in nominal and real terms when the capital inflow needed to fund such a wide current account deficit begins to dwindle. Given the

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2. The term "traded goods sector" is used here of both exports and import-competing goods and services. In other literature it is often confined to the latter.

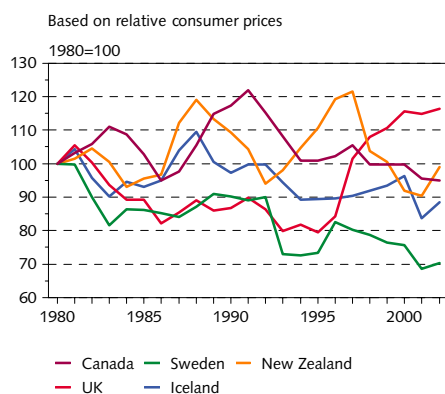
3. Another concept for examining the equilibrium real exchange rate is the macroeconomic balance approach. This defines the equilibrium real exchange rate as the simultaneous attainment of external balance (a sustainable current account balance) and internal balance (a level of employment compatible with a steady rate of inflation). Different equilibrium real exchange rate concepts are discussed in Sighvatsson (2000).

Chart 1  
Three measures of real exchange rate  
1980-2005



Source: Central Bank of Iceland.

Chart 2  
Real exchange rate fluctuations in selected  
countries 1980-2002



Source: Central Bank of Iceland.

macroeconomic shocks that Iceland will undergo over the next few years, the adjustment is much more likely to take place through a lower nominal exchange rate than with a soft landing which would involve a long episode of lower domestic inflation and labour cost increases than among trading partner countries.

Three real exchange rate indices have been regularly calculated in Iceland. While they display broadly the same long-term trend, deviations occur in certain periods. Relative consumer prices and unit labour costs have been mentioned above. The third index uses the GDP deflator instead of the CPI. Each measure has its pros and cons. GDP prices have a certain advantage in being a broader measure than the CPI. They incorporate all domestically produced and imported goods and services. However, when calculated in these terms the real exchange rate can be misleading as a gauge of the competitive position, because it fails to distinguish between relative costs or prices and the terms of trade. Since foreign trade tends to be specialised, based on relative efficiency, the components measured by GDP indices are not comparable. For example, prices of marine products weigh heavily in GDP in Iceland but not among trading partner countries. A rise in marine prices, which should imply an improvement in the terms of trade, drives up GDP prices in Iceland and thereby the real exchange rate. Thus the competitive position appears to have deteriorated although it need not have changed for fisheries sector companies at least or may even have improved. Chart 1 shows that, despite differences in methodology and this drawback, the real exchange rate deflated by GDP prices yields a similar result to relative consumer prices.

The real exchange rate relative to unit labour costs is affected by changes not only in wages and the exchange rate, but also in productivity. It differs from the other indices by not being directly linked with the PPP hypothesis. This makes it less suitable for examining the equilibrium real exchange rate in a long-term context. Changes in RULC provide an indicator of the profitability and competitive position of businesses. In 2004, the real exchange rate measured in these terms was broadly the same as the average for 1999 and 2000, but 7% higher than the ten-year average and 2% higher than the twenty-year average. Assuming that the króna remains stable for the rest of this year and wages develop in line with the Central Bank's forecast, the real exchange rate based on RULC in 2005 will be 19% above the ten-year average and almost 15% above the twenty-year average.

Chart 1 shows the development of these three real exchange rate indices for the króna over the period 1980-2006. All of them display marked volatility. The chart shows that the real exchange rate was considerably lower on all three counts in 2001 and 2002 than at any other time over the period since 1980. If the króna remains at its present strength throughout 2005, the real exchange rate will be broadly the same as the peak in 1988 relative to the CPI, but somewhat lower on the other indices.<sup>4</sup> An obvious comparison for the real exchange rate at present is the historical average over recent

4. However, so far this year the real exchange rate based relative consumer prices has been 5% lower than the peak in Q1/1988.

years and previous peaks, but it is not certain that they provide a totally accurate indication of probable adjustments towards long-term equilibrium. It can be argued that the equilibrium exchange rate dropped as a result of the widespread abolition of trade barriers in the 1990s, which dampened its volatility by causing a relative contraction in the non-traded goods sector.<sup>5,6</sup> Increased net national debt may also have driven down the equilibrium exchange rate. On the other hand, export growth prospects and high returns on foreign investments are said to have caused the equilibrium real exchange rate to rise. In practice, it is difficult to pinpoint anything definitive.

Given the scale on which the real exchange rate has risen, people have naturally wondered whether this situation is normal or whether Iceland's real exchange rate volatility is more than in other countries. Chart 2 shows real exchange rate fluctuations in several countries which, like Iceland, are on an inflation target. The real exchange rate has been fairly volatile in most of them. Table 1 shows the highest and lowest index values for the real exchange rate in selected countries over the past 25 years (1980 = 100). The European countries in the sample have witnessed wider fluctuations than Iceland over this period, while in Canada and New Zealand they have been similar.

**Table 1 Highest and lowest real exchange rates in selected countries since 1980**

Country	Highest value	Lowest value	Difference (%)	Standard deviation (%)	Exports imports as % of GDP
Austria	106	70	52	11	105
Canada	122	95	28	7	80
Iceland	109	84	31	6	80
New Zealand	121	90	34	9	60
Norway	156	100	56	14	70
Sweden	100	69	46	9	85
Switzerland	158	100	58	16	85
UK	116	80	46	12	55
USA	131	73	79	18	25

Sources: IMF (IFS), EcoWin, websites of various central banks and Central Bank of Iceland.

The widest range between highs and lows in the real exchange rate is in the US. Given the relatively low importance of foreign trade for the US economy, however (see Table 1), fluctuations in the dollar exchange rate have a far softer impact on its households and businesses, most of which produce solely for the domestic market.

#### References:

- Bravo-Ortega, C. and J. J. di Giovanni, (2005), Remoteness and Real Exchange Rate Volatility, *IMF Working Paper*, WP/05/1.
- Sighvatsson, Arnór (2000), Jafnvægisraungengi krónunnar: Er það til? [Equilibrium exchange rate of the króna – does it exist?] *Fjármálatíðindi*, vol. 47, pp. 5-22.

5. Assuming that trade barriers in Iceland were greater than among main trading partner countries.

6. Recently, two economists at the IMF published a paper where they examined the impact of trade costs on real exchange rate volatility. Their paper shows that higher trade costs result in a larger non-tradeable sector and this, in turn, leads to higher real exchange rate volatility, Bravo-Ortega and di Giovanni (2005).