

## *Economic and monetary developments and prospects<sup>1</sup>*

# Slack in the economy has increased and inflation will stay below the target in the near term despite proposed aluminium projects

*Activity and demand have been somewhat weaker in recent months than the Central Bank forecast last November. Most indicators suggest that GDP shrank slightly in 2002. Labour market conditions have continued to weaken. Weaker than expected economy and the appreciation of the króna have brought inflation below the Central Bank's target. In part the appreciation of the króna can probably be attributed to a rise in the equilibrium exchange rate on account of proposed investment projects. In the Bank's current macroeconomic forecast it is assumed that an aluminium smelter and hydropower facilities will be developed in East Iceland. In spite of these projects and higher fishing quotas, the outlook this year is for GDP growth below potential and rising unemployment. The rate of growth will increase in 2004, but given the current outlook a significant output gap will not emerge until well into next year. Assuming that the exchange rate and monetary policy remain unchanged, annual inflation in the course of the next two years will be slightly more than 2%, which is below the Central Bank's target. For as long as the conditions described above prevail, the outlook is for macroeconomic balance to be maintained and inflation stays below the Bank's target, the weak economy will be a principal task of economic policy. Thus conditions are in place for a further easing of the monetary stance.*

### I Economic developments

Inflation is at present lower than specified by the Central Bank's target, both in terms of the consumer price index (CPI) and the core indices. Concurrently, the labour market is weakening. Foreign trade has been in balance and the króna has continued to appreciate. Domestic demand is still weak, although various indicators from Q4/2002 suggest some growth from the depressed level of a year ago.

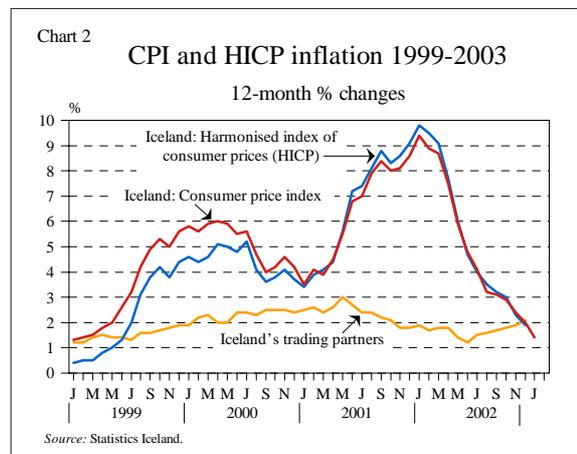
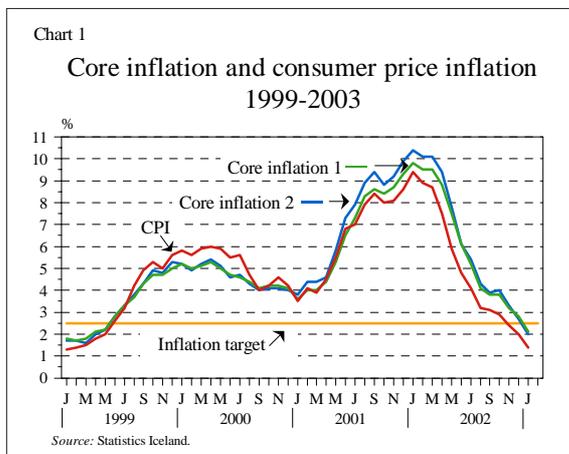
### Price developments

*Inflation is at its lowest rate for four years and underlying inflation is also below target*

In January, the twelve-month CPI inflation rate was 1.4%, the lowest rate since February 1999. Furthermore in January, core inflation also fell below the Central Bank's inflation target. Core Index 1, which excludes changes in the price of vegetables, fruit, domestic agricultural products and petrol, had risen by 2.1% over the preceding twelve months and Core Index 2, which excludes the price of public services as well, by 2%. The three-month rise in the core indices was 1.9% and the annualised increase 0.9%. The seasonal impact of winter clearance sales amounted to roughly 0.2% between December and

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1. This article uses data available on January 31, 2003.



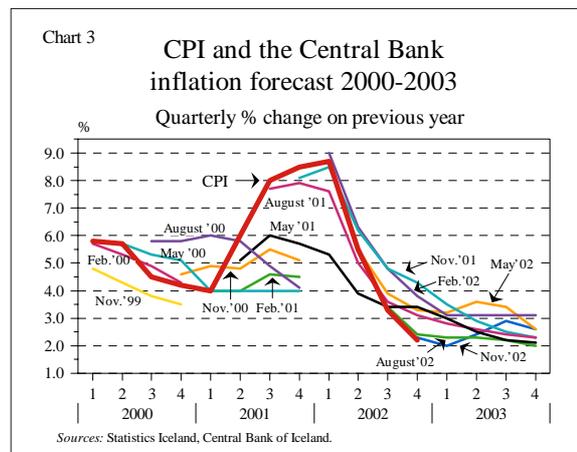
January, public services price increases, which generally occur at the beginning of each year, more than offset the impact in Core Index 1. Last year's CPI inflation was the result of rising prices of housing and services, as described in more detail below. Goods prices fell significantly in 2002, especially those of imported goods, which went down by just under 3%.

In December, inflation in Iceland was below the average in the European Economic Area, as measured by the EEA Harmonised Index of Consumer Prices (HICP). Inflation was 1.9% in Iceland, but 2.2% on average in the EEA and 2.1% among Iceland's main trading partner countries.

*Inflation in Q4/2002 was in line with the Central Bank's latest inflation forecast but was substantially below the Bank's forecast a year ago*

The rise in the CPI between Q3 and Q4 in 2002 was approximately in line with the Central Bank's forecast in November. The Bank had forecast a 2.3% rise from Q4/2001 to the same period in 2002. In fact the index rose by 2.2%. However, inflation in 2002 was considerably lower than the Bank had foreseen at the beginning of the year. In February 2002 the Bank forecast 3% inflation over the year. The deviation stems from the effect of the rise in the exchange rate of the króna during 2002. In 2002, the foreign currencies depreciated by 12% against the króna. The appreciation of the króna which occurred after the forecast in February 2002 was prepared should, all things being equal, have caused inflation to be at least 4% lower than otherwise.<sup>2</sup> The contribution of

lower prices of imported goods to CPI disinflation was 1%, which by itself explains two-thirds of the deviation in the forecast. In addition, prices of imports competing domestic goods have declined and exchange rate linked cost impulses may be channelled into prices over a longer period.<sup>3</sup> Forecasting errors are discussed in more detail in Box 1.



2. It should be borne in mind that in the beginning of the period, the impact of the appreciation of the króna in the previous year had only partly been transmitted into the price level. Thus the initial appreciation did little more than to withdraw inflationary impulses that were already present. In the long run, a permanent exchange rate appreciation of 12% ought to bring prices down by almost 5%.
3. In the first half of last year, special measures to constrain prices had some impact. In some cases these led to a delay of increases in service prices, without affecting inflation in the long run. Delays in increases in import prices, however, may have become permanent due to the appreciation of the króna.

## Box 1 Forecasting errors in Central Bank inflation forecasts

*Monetary Bulletin* 2002/1 included an evaluation of errors in inflation forecasts by the Central Bank and other forecasters of inflation in Iceland. A similar evaluation is provided below. It is vital for the Central Bank to monitor the errors in its inflation forecast, which together with other types of economic analysis has become an integral part of the Bank's activities after the change in the monetary framework almost two years ago. An updated evaluation of the Central Bank's annual and quarterly forecasts is discussed below, but comparison to forecasts from other sources will not be discussed on this occasion.

Evaluations of inflation forecasts focus on their bias and root mean square error (RMSE). The bias shows the forecasts' mean deviation from actual inflation and thus whether inflation is being systematically over- or underpredicted. The root mean square error measures how far the forecast value differs from the true value.

Table 1 presents an overview of the Central Bank's forecasting errors over the period from the fourth quarter of 1994 to the fourth quarter of 2002. It should be borne in mind that some forecasts for the first years do not extend over full four quarters, but those made from

Q4/1999 onwards cover at least four quarters. Since Q2/2001 the Bank has forecast at least eight quarters in advance, as assumed in the joint declaration of the Government of Iceland and the Central Bank from March 2001. In April this year, when figures for Q1/2003 become available, it will for the first time be possible to compare a forecast eight quarters ahead with actual inflation.

The upper part of the table shows the bias and RMSE of forecasts projecting from one to four quarters into the future. One-quarter forecasts reveal virtually no bias, but this grows as the forecast horizon is extended and on average the Bank has underpredicted inflation by 0.33% on a four-quarter projection. However, this may be misleading. Until 2000 the error of forecasts over a horizon of four quarters was only -0.01% while over the period 2000-2002 it was -0.81%. The largest deviation emerged during the first half of 2001 when the impact of the unanticipated weakening of the króna in the second half of 2000 and first part of 2001 was being transmitted into the price level. The Bank forecasts are always based on the assumption of unchanged exchange rate, since research indicates that to be normally the best forecast. As may be expected, the RMSE increases the longer the forecasting period, as uncertainty increases.

For obvious reasons, in the cases of forecasts over one calendar year, the largest bias and highest RMSE are observed for the forecast conducted at the beginning of each year, when the forecasting period is longest, then these diminish as the forecasting period wears on.

Due to the carry-over effect involved in year-on-year average inflation forecasts, i.e. from the previous to the current year, the bias and RMSE is lower.

It would also be interesting to examine the discrepancy between actual inflation and confidence limits in the Bank's forecasts. Since the Bank has only recently begun to publish forecasts which incorporate these factors, the number of available forecasts four quarters ahead that can be compared to such confidence limits is still insufficient, but soon this will be possible.

### Evaluation of forecasting errors in Central Bank inflation forecasts

<i>Forecast for next (number of quarters):</i>	<i>one quarter</i>	<i>two quarters</i>	<i>three quarters</i>	<i>four quarters</i>
Bias	0.01	-0.07	-0.12	-0.33
RMSE <sup>1</sup>	0.41	0.90	1.43	1.78
<i>Forecast for inflation within year:</i>	<i>Forecast published in</i>			
	<i>Q1</i>	<i>Q2</i>	<i>Q3</i>	<i>Q4</i>
Bias	-0.86	-0.56	-0.21	-0.14
RMSE <sup>1</sup>	2.38	1.82	1.11	0.76
<i>Forecast for year-on-year annual inflation</i>	<i>Forecast published in</i>			
	<i>Q1</i>	<i>Q2</i>	<i>Q3</i>	<i>Q4</i>
Bias	-0.27	-0.18	0.01	0.00
RMSE <sup>1</sup>	1.15	0.68	0.35	0.10

1. RMSE: Root mean square error.

### *Housing inflation still rising*

Housing cost has risen more than other components of the CPI over the past twelve months. Housing price inflation has even intensified in the latter half of the period. The imputed rent item in the housing component of the index, which reflects changes in the market price of housing, went up by 1.6% between December and January, 3.2% over the past three and 7.7% over the past twelve months. To a large extent the recent rise in the housing component can be attributed to higher prices of multiresidential accommodation units in the Greater Reykjavík Area, i.e. small apartments. It has been claimed that small apartments have been in short supply and the price trend apparently supports this view. In December, the index for price per square metre in multiresidential accommodation in the Greater Reykjavík Area had risen by 4.7% in the space of three months and 8.3% over twelve months. Turnover in the housing market was brisk in 2002, especially around mid-year, which is probably explained by increased supply of credit and greater demand.<sup>4</sup> Nonetheless, in the last quarter of 2002 the Housing Financing Fund disbursed fewer loans than at the same time in the previous year, possibly indicating some decline in housing market activity. If this is the case, housing inflation may slow down in the near future.

### *Service price inflation has not slowed much down in recent months*

The twelve-month rise in service prices has not abated significantly in recent months. The public services component of the CPI rose by 4.8% last year and private sector services prices by 4.9%. The increase in the service component of the CPI contributed to a 1.5% rise in consumer prices over the past year. Public services prices, which tend to rise in the beginning of the year, went up by 3% between

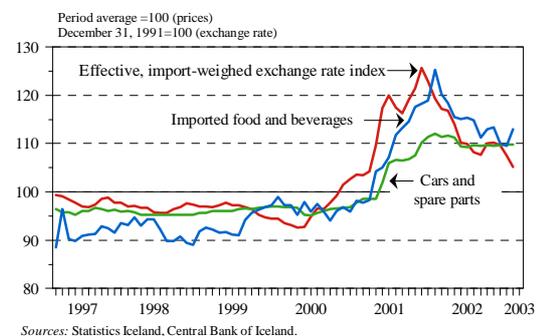
4. As discussed in *Monetary Bulletin* 2002/4, the upswing in the housing market is probably to a large extent the result of greater supply of credit for housing purchases. The ceiling on housing loans was raised in May and authorisation to increase the mortgagability limit for supplementary loans had been interpreted liberally. Furthermore, the obligation of municipal authorities to purchase social housing was abolished in mid-year, whereby owners of these properties were allowed to sell them at market prices. Enhanced economic stability, lower inflation, lower interest rates and rising real wages in the second half of last year can also be expected to have fuelled demand.

December and January. Wages are a major cost component of many types of services and the fact that services prices have been rising faster than goods prices may indicate that wage increases in excess of productivity growth in recent years are still being transmitted to the price level. Given that contractual wages rose by 3%-3.4% at the beginning of the year, it seems likely that service prices will continue to exceed overall inflation for some time. Insofar as productivity in the non-traded service sector changes more slowly than in the traded goods sector, however, the excess services price inflation could be quite persistent.

### *The appreciation of the króna caused a decline in import prices last year*

The 12% decline in the price of foreign currency last year was to a considerable extent reflected in imported goods prices. The main exceptions were petrol, alcohol and tobacco. Alcohol and tobacco prices remained virtually unchanged throughout last year, notwithstanding the appreciation of the króna, then went up by almost 7% after excise duties on tobacco and spirits were raised. World petrol prices have risen over the past half-year due to the precarious situation in the Middle East and strikes in Venezuela. Over the past twelve months, domestic petrol prices have risen by 2.2%. Excluding petrol, alcohol and tobacco, prices of imported goods dropped by more than 5% last year. The largest decline was in the price of food imports, or almost 10%.

Chart 4  
Imported goods prices and the exchange rate of króna 1997-2003



Changes in the exchange rate are transmitted most rapidly to the price level of goods with a high inventory turnover rate. Consumer durables adjust to the exchange rate more slowly, since they can be expected to have a slower inventory turnover rate and be more sensitive to the economic cycle. Prices of new cars and spare parts have only adjusted partially to exchange rate movements. They have only fallen slightly over the past three months and declined by a modest 2% over the past year. They also rose less than warranted by exchange rate movements when the króna depreciated in 2001. In the long run, however, car prices have more or less kept pace with changes in the exchange rate, like the prices of other imports, although the long lag in the adjustment process implies that they do not adjust to sharp transitory swings, as can be seen in Chart 4.<sup>5</sup>

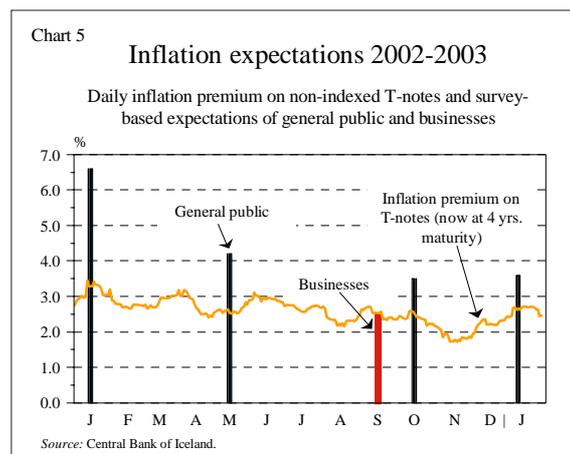
*Domestic food prices have declined over the past three months, but other domestic goods prices have risen slightly*

Prices of domestic goods are also affected by exchange rate movements through competitive and cost-push effects. Last year saw a significant fall in prices of domestic food products. Agricultural products and domestic vegetables prices went down by 4.4%. The sharpest drop was in the price of vegetables, which had been driven up by external conditions early last year. Prices of other agricultural products also fell, reflecting overproduction and growing competition from less expensive substitutes, which have gained market share from traditional domestic products. Prices of domestic food product other than agricultural products were down 2.5% in January from year ago. In many cases these products face intensive price competition from imports. The price of other domestic products, on the other hand, rose slightly.

5. It should be remembered that the composition of the exchange rate index does not always provide an appropriate measure of changes in the price of individual types of goods. This can make a considerable difference when the exchange rates of major import currencies against the króna change in different directions. Last year the US dollar fell by 22% against the króna, but the euro by only 7%. Given that car imports from Europe were around tenfold those from the USA last year, the development of the euro/USD cross rate may conceivably have contributed to the modest swing in car prices relative to changes in the effective exchange rate of the króna.

*Inflation expectations, as measured by the premium on non-indexed treasury bonds, have risen in recent months*

The inflation premium on treasury bonds with a lifetime of roughly four years rose steadily from the beginning of November, when the last *Monetary Bulletin* was published, until the second half of January. In November the premium was 1.9% on average, but in January it was up to 2.6%. This rise most likely reflects expectations about the impact of the impending hydropower and aluminium projects on inflation and the Central Bank's policy interest rate. However, the inflation premium settled back slightly towards the end of the month and stood at 2.5% on January 31. Inflation expectations among finance market analysts, according to a Central Bank survey in January, were consistent with the inflation premium. On average, they expected 2.3% inflation over the current year and 2.6% over the next 24 months. The results of this survey are discussed in Box 2.



*The public's inflation expectations and assessments of past inflation have not caught up with disinflation*

The general public appears to expect a considerably higher rate of inflation than finance market analysts or market participants, cf. the inflation premium on non-indexed treasury bonds. A survey of the public's inflation expectations was conducted in the beginning of January. It revealed that the public expects on average an inflation rate of 3.6% over the next twelve months, while a small group expected a much higher rate than most respondents. The public's inflation

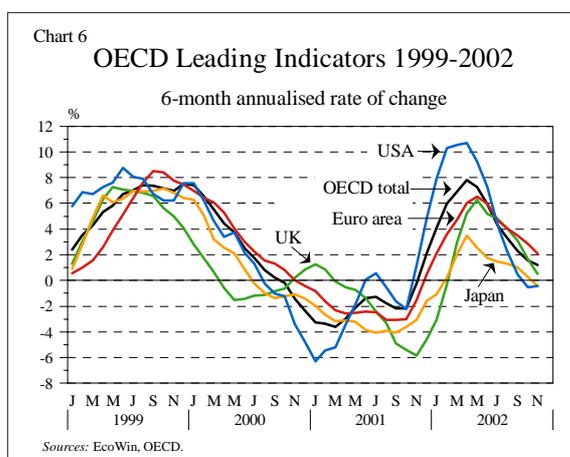
expectations have not declined since October, which is noteworthy given the decline in inflation during the period. On average, respondents considered the rate of inflation over the preceding twelve months to be 3.2%; more than double the rise in the CPI over the period.<sup>6</sup> Thus the public seems rather ill-informed about the disinflation in recent months. This may explain the persistence of inflation expectations in excess of forecasts, because experience indicates that the public's expectations of inflation twelve months ahead tend to correspond roughly to their assessment of past inflation, with some lag (see *Monetary Bulletin* 2002/3).<sup>7</sup>

### External conditions and production

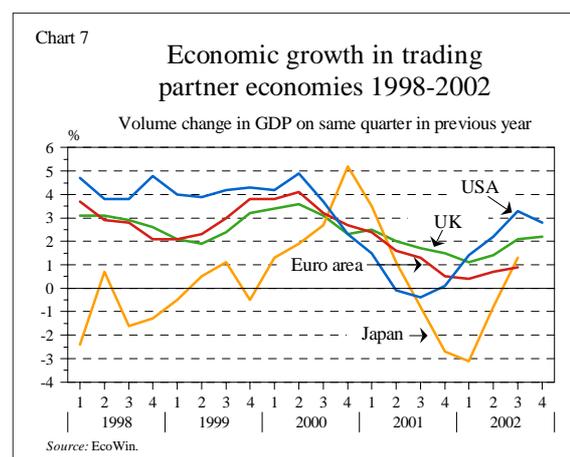
A significant improvement in the world economy is still lacking. Indices of consumer and business sentiment and other leading economic indicators point to a rather bleak outlook on economic growth, although the recession in the USA and some European countries last year was relatively mild by historical comparison. Industrial production has not recovered

either, and employment has been on a declining trend. The looming war with Iraq may delay economic recovery even further, because the state of uncertainty leads individuals and businesses to bide their time. Oil prices have also risen because of the looming war and the strikes in Venezuela. All this has hit the equity market particularly hard, which has not managed to stage a sustained rally following the biggest slump in equity prices for six decades. Judging from recent profit figures and the P/E ratios derived from them, share prices may in fact still be fairly high by historical comparison, at least in the USA.

Recent GDP data, on the other hand, does not seem to fully justify the prevailing pessimism as indicated by confidence indices, equity market developments and the slump in industrial production. The USA, for example, experienced considerable growth for most of last year (see Chart 7). The most recent US production figures, however, suggest that growth in Q4/2002 fell short of expectations. Private consumption growth, for example, was weaker than anticipated, which is a cause for concern since it has been driving growth recently. The German economy is weak and recovery not in sight. The German government recently substantially reduced its growth forecast for the year and on average *Consensus Forecast* only expects 0.9% growth in 2003, following negligible growth last year.



6. The survey was conducted before the January CPI was published. In some sense it would be more appropriate to use the December inflation rate, which was 2%, as a reference. Nonetheless a substantial difference remains even in that case.
7. Although experience shows that the public's expectations are apparently not very forward-looking, it is not inconceivable that discussion of the inflationary impact of the proposed power-intensive industrial projects has had some influence on replies to the survey, given the intensity of media coverage, the scale of the projects and possibly the fact that people imagine them as closer in time than the actual construction schedules warrant.



The weak economies of Iceland's trading partner countries is not entirely a bad thing for Iceland's indebted economy. It has caused foreign interest

rates to decline, especially on short term debt. The weakening of the US dollar over the past year has also reduced Iceland's debt service burden.

*External conditions of the economy deteriorated somewhat in the second half of last year*

Foreign currency prices of marine products peaked last summer, declined fairly rapidly until the autumn, then recovered slightly as winter progressed. The rise this winter is probably seasonal and therefore does not herald any particular turning point. In November, prices were 4% lower than a year before. Despite the decline in the summer, prices are still fairly high in foreign currency terms, but have dropped significantly in terms of domestic currency as a result of the appreciation of the króna.

The short term outlook is uncertain. Weak private consumption in trading partner countries could undermine prices, but this could be offset by correspondingly weak supply. In general, however, the European Union's fishing quota cutback is not expected to have any marked effect on fish prices, except perhaps fresh fish.<sup>8</sup> It is even uncertain whether the impact on prices, if any, would be positive or negative. Nor is aquaculture expected to have any sizeable impact on fish prices in the near future.<sup>9</sup> However, it is conceivable that a significant rise in commodity prices in the world market, e.g. agricultural products, would have positive effects on marine product prices, especially fish meal and fish oil. Aluminium prices are still low, but have risen somewhat since in the autumn. The price has recently been over US \$ 1,400 per tonne, a level only reached briefly twice last year.

The demersal fish catch was somewhat poorer in November and December 2002 than in the year ago, as generally was the case after spring, when on the other hand the catch was much greater. In the spring

of 2001 fishing was disrupted by strikes. Apart from December 2002, which was considerably better than the same month in 2001, the pelagic catch was also poorer in the second half of the year, but due to bumper harvests in the first half the catch for the year as a whole was up by 9%.

As far as other external conditions are concerned, the prospects are somewhat negative. The threat of war and conflicts have caused a sharp rise in oil prices, as mentioned before. From January 2002 to the corresponding month this year, oil and petrol went up by more than 70%. Oil and petrol prices were almost one-third higher at the end of January 2003 than on average in 2002. Forward contracts indicate that oil prices are expected to remain high in the first quarter of this year, then fall by more than one-quarter, while petrol prices will not decline significantly until Q3. Other commodity prices have also increased considerably, after being depressed for some years, which could lead to a rise in the cost of inputs. The net impact on the competitive position is however uncertain. On the whole, the external conditions of the economy deteriorated in the second half of last year. The fish catch was somewhat down, overall export prices slipped and oil prices rose sharply towards the end of the year.

After slipping in the summer, export volume reached quite a high level in September and October. This development derives from the above swings in catch volume. In the first eleven months of last year merchandise exports rose by 8% in volume terms, of which marine exports accounted for just under 6%. Exports of services in Q3/2002, on the other hand, were down by 4% from year ago, at constant exchange rates.

*Weaker exports in Q3 caused GDP to contract*

As a result of favourable external conditions in 2001 and the first half of last year, GDP continued to grow, year-on-year, despite a sharp contraction in national expenditure. In the third quarter, however, total exports rose only modestly from the year before, which caused GDP to shrink by 1½% from year ago. Concurrently, the contraction in private consumption slowed down, while the contraction in gross fixed investment deepened.

The downturn in exports in Q3 can be traced to lower fish catch and a contraction in service exports.

8. In some quarters it is thought that the quota cutbacks will have a negative effect on the market, since consumers may infer that all fish stocks are under threat of extinction.

9. Competition from aquaculture, which primarily involves salmon, is not thought to lead to lower prices of wild fish in the short term, because the substitution between farmed species and, for example, wild cod and haddock is thought to be rather low. If supply of farmed cod and other farmed demersal species increases, however, as appears likely, price competition may intensify. Annual production from cod farming is expected to be as much as 700 thousand tonnes after roughly 10-15 years.

The real effective exchange rate also rose, but hardly played a significant role. It rose from a low level and remains close to a ten year average. Based on relative unit prices, the rise in the real exchange rate from Q3/2001 to the corresponding quarter in 2002 was 9.3% and it has risen by 3½% since then.<sup>10</sup>

The higher exchange rate in real terms is beginning to make itself felt through a lower EBITDA among exporters and import competing industries. Among fisheries companies listed on Iceland Stock Exchange, EBITDA dropped from 28% to 21% between 2001 and 2002. Nonetheless, profitability remains good and according to forecasts of financial companies it will remain strong this year. Thus it should suffice to sustain strong exports if catches prove adequate.

increase in turnover, judging from VAT returns, but domestic turnover in those months was 2% the year ago level, in real terms.

#### Domestic demand

##### *Private consumption probably strengthened in Q4/2002, but investment remains depressed*

Although domestic demand has recovered from the trough it reached at the end of 2001 and beginning of 2002, it was still relatively weak in Q3/2002. This applies in particular to investment. Various private consumption indicators, e.g. turnover in groceries stores and credit and debit cards turnover, show a considerable rise in turnover from year ago, but as mentioned, the base effect caused by the slump

Table 1 Various indicators on production and demand in the fourth quarter 2002

<i>Indicator</i>	<i>Percent change on same period in previous year</i>
Merchandise exports in October-November 2002 (at constant exchange rates) .....	0.3
Merchandise imports in October-November 2002 (at constant exchange rates) .....	0.6
Turnover based on VAT-reports in September-October 2002 (at constant prices) .....	1.8
Domestic turnover based on VAT-reports in September-October 2002 (at constant prices).....	-2.1
Retail turnover based on VAT-reports in September-October 2002 (at constant prices).....	-3.9
Turnover in the construction industry based on VAT-reports in September-October 2002 (at constant prices).....	-15.2
Turnover in groceries in November-December 2002 (at constant prices, based on the price index for the groceries category in the CPI).....	1.9
Credit card and debit card turnover in October-December 2002 (at constant prices).....	1.4
Automobile registrations in October-December 2002 .....	20.0
Sales of cement in October-December.....	-1.7
Ratio of the value of contracts in public tender to estimated costs, January-December 2002 <sup>1</sup> .....	-7.0

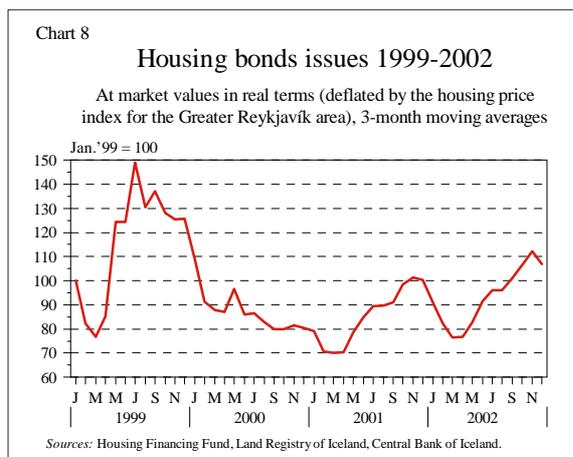
1. Value shown is the change in the ratio between years (percentage points).

Available data in the final quarter of 2002 indicates some recovery in demand. Turnover in autumn and towards the end of the year appears to have risen considerably from the year before. To a large extent the year-on-year growth reflects the sharp contraction during Q4/2001. Merchandise exports in September and October also contributed to the

towards the end of 2001 must be borne in mind as well. The same is true of car sales.

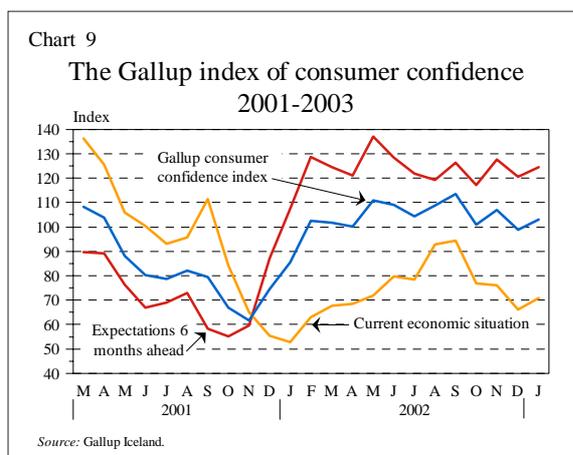
Investment-related turnover, on the other hand, is still relatively depressed, judging on the basis of indicators such as VAT returns by construction firms, cement sales, indicators of construction starts and the ratio of the value to estimated costs of contracts in public tender. An exception may be investment in residential accommodation. Despite some decline in the number of disbursed loans for new buildings and

10. The real exchange rate based on relative unit prices rose by more than 11% from Q3/2001 to Q1/2003.



home improvements, the market value of those loans rose by 6.7% in excess of housing price increases in the Greater Reykjavík Area between Q4/2001 and Q4/2002, and on average by 8.5% between the years. Recent housing price developments do not either suggest any low in the market. In real terms, residential accommodation prices in the Greater Reykjavík Area are approaching the previous peak which occurred early in 2001. High prices in real terms ought to stimulate new building.

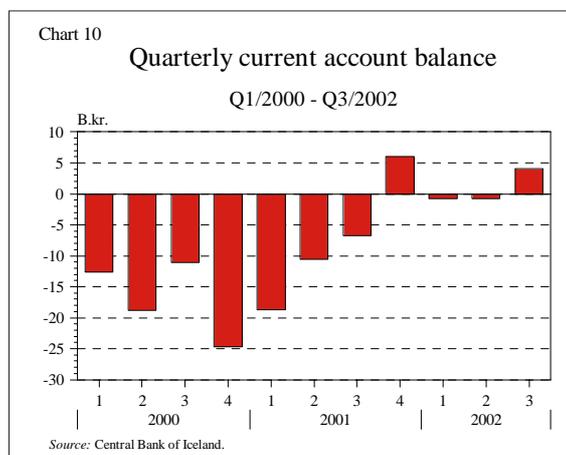
As indices of consumer and business sentiment are a relatively recent phenomena in Iceland, the message they convey about the short term demand outlook is hard to discern. The Gallup index of consumer confidence clearly reflects the exchange rate developments to a large extent. Expectations six months ahead reached a low around the time the



króna was at its lowest level, but optimism grew as it strengthened. Assessments of the current situation improved somewhat later, possibly reflecting the slowdown in the inflation rate. Last autumn the assessment of the current economic situation began worsening again. This may reflect the deteriorating employment situation, although this did not seem to be confirmed by the employment confidence component of the index.

*After one of the sharpest current account reversals among OECD countries in the space of two years, the outlook is for the external sector to remain in balance*

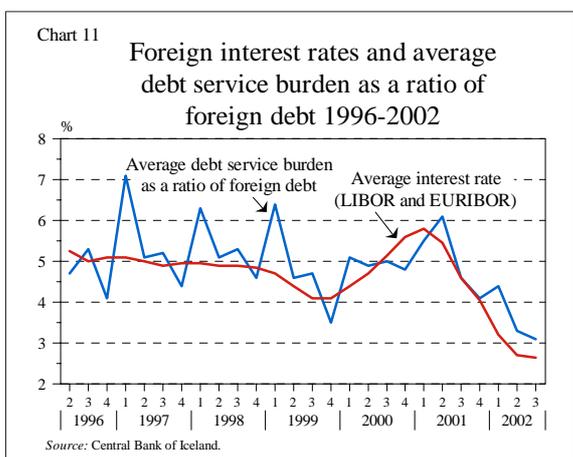
Over the period January-September the current account was in a 2.6 b.kr. surplus. In the third quarter alone, the surplus was 4.1 b.kr. In October and November the merchandise trade balance was 3.8 b.kr. in surplus. For the whole quarter, the surplus is likely to be in the tune of 5 b.kr. The final quarter of each year is generally characterised by a deficit on the service account, although this was not the case in 2001. On balance, there is strong evidence that there was a modest surplus on the current account last year.



As discussed in an article by Arnór Sighvatsson elsewhere in this *Monetary Bulletin*, the turnaround in Iceland's current account balance over the past two years was the third largest recorded among OECD countries for at least three decades. Data on foreign trade indicates that merchandise and service trade is broadly stable. At constant exchange rates and prices, merchandise imports have remained fair-

ly stable since spring 2002 and service imports in the second and third quarters were at a similar or somewhat lower level than year ago, after recovering from a sharp contraction from Q4/2001 to Q1/2002. Excluding vessels and aircraft, seasonally adjusted merchandise exports have also remained roughly stable since late in 2001, but services exports have declined somewhat.

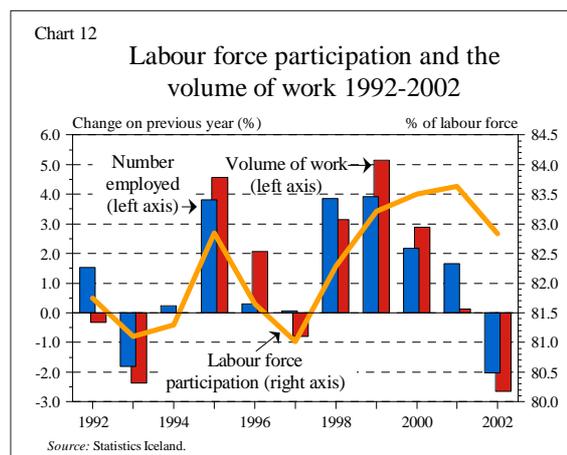
A combination of forces has caused the deficit on the balance on income to shrink significantly in the second half of last year. Firstly, the value of foreign currencies decreased against the króna by 8½% from Q3/2001 to Q3/2002. Secondly, the depreciation of the US dollar against the euro and yen reduced the debt service burden even further, since it weighs heavier in Iceland's foreign debt than in the exchange rate index. Thirdly, foreign interest rates declined, especially on short term debt. Fourthly, the average maturity of foreign debt has shortened, causing the debt service burden to decline further. The outlook is for interest rates in main trading partner countries to remain low for the rest of the year. Thus the balance on income deficit will stay modest considering the size of the debt. However, these are temporary conditions which will be reversed in the years to come, even though there are no signs of an imminent reversal.



## Labour market and income developments

### *The labour market has continued to weaken...*

There is a strong evidence of a continuing slack in the labour market. Although seasonally adjusted unemployment remained unchanged between September and December, other indicators of labour market conditions indicate that a period of growing slack in the labour market has not come to an end. Apart from uncertainty pertaining to the seasonal adjustment process, which could change the estimate as further data arrives, there is a tendency for working hours to shorten or labour market participation to fall when demand is on the decline. Unemployment therefore does not grow as rapidly as employment declines or hours worked shrink. This is confirmed by Statistics Iceland labour market surveys. They indicate that labour market participation contracted by 0.8 percentage points between 2001 and 2002.



The greatest reduction was in the age group 16-24, while participation by the remainder of the labour force increased.<sup>11</sup> This should not come as a surprise, because during the upswing labour market participation by students increased sharply. This may explain the fact that the average working week in 2002 was just under half an hour longer than in 2001. Those fully employed might still have been working shorter hours. Between 2001 and 2002 the volume of

11. The proportion of the youngest age group, 16-24, to total unemployed also increased from 21% in 2001 to 26% in 2002.

Table 2 Recent labour market indicators

	<i>Latest</i>	<i>Year ago</i>
Unemployment, registration-based, December (%) .....	3.0	1.9
– seasonally adjusted (%).....	3.0	1.7
Unemployment, survey-based, November (%).....	3.2	2.4
Average weekly hours worked survey-based, November.....	43.0	42.8
Number of employed persons survey-based, November.....	147,500	151,300
Weekly hours worked (volume of work), November (thous. hours)...	6,340	6,452
Listed job vacancies, December....	133	214
Work permits, October-December – thereof new, temporary permits	921	1,072
	73	206
Indicator of increase/decrease in the number of employees, based on the Confederation of Icelandic Employers survey (%).....	-1.6	-0.4

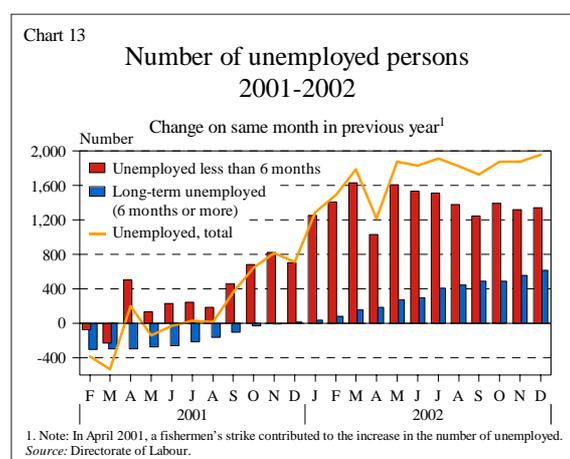
work (total working hours) declined by one-third more than employment. Employment went down by 2% at the same time as total hours worked dropped by 2.6%. Labour market surveys show a somewhat higher unemployment ratio than the registered unemployment ratio (of those seeking benefits). This is common when unemployment is on the rise. Registered unemployment in 2002 was 2.5% on average, while labour market surveys showed average joblessness of 3.2%.<sup>12</sup>

*...and prospects in the labour market are not bright*

A survey conducted by the Federation of Industry in December revealed that employers wanted to reduce their staffing levels by 1.6% during the first months of this year. At the same time a year before, they wanted to reduce staffing by 0.4%. Figures for unemployment in January appear to confirm this and suggest that seasonally adjusted unemployment will increase further in the winter months. The survey also suggests a pending change in the distribution of

12. It should be remembered that the labour market surveys adopt the much broader ILO definition of unemployment. Figures from the Labour Department only take into account days out of work registered with employment agencies.

unemployment, since unlike the survey from December 2001, employers in regional Iceland also wanted to cut back staffing levels significantly more than those in the Greater Reykjavík Area, where joblessness has been running much higher recently. If unemployment continues to mount, long-term unemployment may also be expected to grow, as has already happened to some extent. In December 2002, 20% of the unemployed had been without work for six months or longer, compared with 13% a year before.



The ongoing decline in vacancies at employment agencies points in the same direction. There were 133 vacant positions at employment agencies in December compared with 214 a year before, the lowest figure since December 1998. Also, one-third fewer new temporary work permits were issued in December than year ago.

Wage drift in the private sector slowed markedly down last year. Nonetheless, real wages have risen with falling inflation. Wages in the private sector, excluding financial institutions, rose by 4.6% between the final quarters of 2001 and 2002, according to the Statistics Iceland wage index, and their purchasing power by 2.4%. This is a major turnaround from a year before, when wages in the private sector rose by 7.3% but purchasing power shrank by 1.1%. Wages of public sector and bank employees rose by more, or 7.2%, and their purchasing power by 4.9%.

## Financial markets

### *Lending of DMBs virtually stagnant last year in nominal terms*

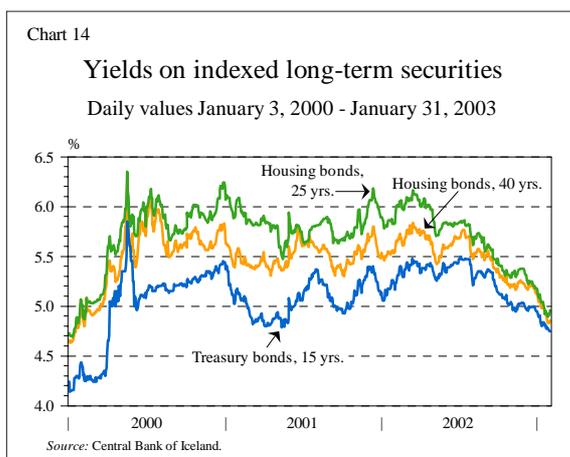
Over the past year Deposit Money Bank lending has remained virtually stagnant in nominal terms. To some extent this slow growth rate is the result of the appreciation of the króna, but even if adjusted for the impact of declining value of foreign currency linked debt, the growth rate has been consistent with price stability. In real terms, or excluding exchange rate and price indexation effects, credit has increased slightly since the spring, but the real value of the outstanding stock of debt has remained broadly stable since spring 2001. During the upswing which began in 1997 and lasted right through to the end of 2001, lending to businesses grew much faster than to households, but last year the trend was reversed, reflecting economic developments described above, i.e. relatively vigorous housing market, but business investment on the decline.

### *Real interest rates have declined since the beginning of November*

Since the beginning of November the Central Bank policy interest rate has been lowered twice, by a total of one percentage point. The impact of the lower policy rate filtered through more or less the entire interest rate spectrum, although short-term yields have come down the most. Since October, however, the spread between the yield on Treasury bonds with a maturity of four years or more and shorter instru-

ments has increased. It is common for the spread between long-term and short-term yields to widen markedly when the monetary stance is eased and the policy rate comes down by more than market participants consider sustainable in the long run. Yields on Treasury bonds with a lifetime of roughly 4 and 10½ years have gone up since mid-November, despite the cut in policy rate. Most likely these developments reflect the impact of the impending aluminium projects, i.e. rising yields reflect expectations that the projects will fuel inflation and thereby lead to higher nominal interest rates. Treasury bond yields rose further after the Ministry of Finance published its report on the macroeconomic impact of the aluminium projects. This rise has been levelled out to some extent, and on February 3 the yield on non-indexed Treasury bonds with a lifetime of 4 and 10½ years was broadly at the same level as before the policy rate cut in the beginning of November. The yield curve for money market bonds has recently been virtually flat, while in early November it showed some downward trend at the shorter end. The yield curve trend implies that market participants expect little or no change in interest rates in the next few months. This is consistent with the announcement by the Central Bank, when interest rates were cut in December, that it was not clear in which direction the next move on interest rate would be.

Yields on indexed treasury-guaranteed bonds have dropped sharply in recent months. In part the Central Bank policy rate cut is at work there, but so is greater demand for domestic indexed bonds, from pension funds among others.



## II Output and inflation forecast

In the output and inflation forecast presented in this section it is assumed that construction work in connection with the Alcoa aluminium smelter in East Iceland will proceed as planned. The most important changes concerning other assumptions reflect recent data, which indicates somewhat weaker demand than previously assumed, the appreciation of the króna since late October 2002 and increased fishing quotas this year. As usual, the monetary policy stance and exchange rate are assumed to remain unchanged throughout the forecast period. A small contraction in GDP is projected last year, but growth is expected to

recover as early as this year. Nonetheless it will fall short of potential output growth. Hence the slack in the economy will increase this year, but decrease again in 2004. Overall, the economy is expected to be reasonably balanced for most of the forecasting period, with a slight initial slack that will disappear next year. The combination of stronger króna recently and weaker economy will contribute to a low inflation, or 2% over the next two years. This is slightly below the Central Bank's 2½% inflation target, but well above its lower tolerance limit. Forecast uncertainty is estimated to be symmetrical one year hence, but two years ahead inflation is deemed more likely to exceed the Bank's forecast than be below it.

## Demand and output

### *Minor contraction in GDP last year*

The projected GDP growth rate in 2002 is based on national accounts statistics for the first three quarters and a number of indicators for the fourth quarter. National expenditure is estimated to have contracted in 2002 by slightly more than the previous year, or 3¼%. Gross fixed investment shrank by 14½% and private consumption by 1½%. Public consumption increased by 3%, which is close to its average growth rate over the past decade.

Projected growth for 2002 has not changed much from the Bank's November forecast. The most significant change is in foreign trade. Exports of goods and services are now estimated to have risen by just over 4% during the year, compared to 5½% in November. Recent data suggests that exports of goods and services for the first nine months of 2002 expanded more slowly than previously expected, especially services exports. However, the outlook is also for sharper contraction in imports than forecast in November, or roughly 4%. As a result of these changes GDP is at present projected to have declined by ¼% in 2002, but in November it was forecast to remain unchanged. Some surplus is estimated to have been shown on the current account last year, while in the previous forecast it was almost in balance.

### *The forecast is based on the assumption that an aluminium smelter will be built in East Iceland*

The most important change in assumptions from the

last forecast is that construction work in connection with the aluminium smelter in Reydarfjörður and the Kárahnjúkar hydropower project is expected to begin in 2003 and 2004. These projects will boost GDP growth this year by more than ½% and a similar amount in 2004.<sup>13</sup> The impact may be surprisingly small, but construction activity will not be in full swing until 2005 and 2006, when the bulk of work on the smelter itself is under way, as discussed more fully in the Appendix on the aluminium and hydropower projects. Work this year will largely be confined to the hydropower facility. It will step up next year when work commences harbour-building and, on a small scale, on the smelter. This year gross fixed investment will increase by 10 b.kr., due to these projects, representing an increase of 6½%, and in 2004 around 19 b.kr.

The exchange rate of the króna has appreciated considerably recently. In the forecast it is assumed that the exchange rate index will remain at 124 over the forecasting period,<sup>14</sup> which implies that the króna will be 5% above what was assumed in the November forecast. The króna was on average 2½% higher in 2002 than 2001 and will rise by 4½% between 2002 and 2003 if it remains unchanged for the rest of the year.

Other significant changes in assumptions are that the economy is thought to have been weaker in recent months than previously estimated, and a recent decision to increase fishing quotas has been taken into account. Marine export production is expected to increase by 3% this year instead of 1% before. Counterbalancing this is lower than previously assumed growth in other export production. Growth in the non-marine export sector has been slowing down recently and the sluggish recovery of the global economy and stronger króna could lead to an even slower rate of growth. Aluminium exports are expected to increase by 1½% this year and aluminium prices to decline by almost 11%, as was also assumed in the November forecast. The balance on

13. The discrepancy between the assessment here and in the Appendix is due to different exchange rate assumptions. The Appendix assumes a lower rate of exchange in the baseline scenario which excludes any exchange rate adjustment. The recent strengthening of the króna is probably partly caused by the expected construction projects.

14. Based on the exchange rate index on January 22.

income is heading for a smaller deficit than was projected in November. Aluminium exports are expected to be unchanged in 2004, but marine exports to grow by 2%. In foreign currency terms, export prices are expected to decline in 2003 but increase by 2% in 2004.

*The growth outlook for this year and next year has not changed much...*

Table 3 presents the Bank's forecast for 2002-2004. Overall, the outlook for growth this year and next year has not changed much since November. GDP growth will be slightly higher this year, but the same rate of growth is forecast in 2004. The reason for that forecast growth this year will not increase more in spite of the beginning of the hydropower project and increased fishing quotas is the weaker than previously assumed economy in recent months, and the stronger exchange rate.

with the November forecast, apart from a minor increase in housing investment that was expected then.

As a result of the hydropower project, business investment is expected to rise over the next two years. Marine exports are also expected to grow somewhat. On the other hand, other exports are forecast to grow at somewhat slower pace, in particular exports of services. Imports, on the other hand, will be considerably higher than previously expected, mostly as a result of the hydropower project. The contribution of additional investment to growth is almost counterbalanced by smaller merchandise and service accounts surplus, keeping the total effect on GDP minimal. Consequently, a growth rate of 1¾% GDP is forecast this year and 3% next year, compared to 1½% and 3% in the November forecast.

In 2002, a current account surplus of roughly ½%

Table 3 The Central Bank macroeconomic forecast

	<i>Billion krónur at current prices</i>			<i>Volume change on previous year (%)<sup>1</sup></i>			<i>Change since previous forecast (%)<sup>1</sup></i>		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
Private consumption.....	421.1	432.2	440.9	-1½	¼	1½	0	-¼	¼
Public consumption.....	189.8	197.8	206.8	3	2¼	2½	¼	¼	¼
Gross fixed capital formation.....	149.3	164.0	181.1	-14½	10½	9	-½	9½	2¾
Industries.....	81.9	96.2	112.5	-21	18¼	14½	-¼	16¾	4
Residential housing.....	33.9	33.6	33.4	2	-1½	-1¾	-1	-2½	-¾
Public investment.....	33.6	34.3	35.2	-6½	1½	1½	½	2	0
National expenditure.....	760.0	794.0	828.8	-3¼	2¾	3¾	0	1¾	¾
Exports of goods and services.....	311.0	304.8	319.8	4¼	3	2¾	-1¼	1	-1½
Imports of goods and services.....	289.1	299.2	316.7	-4	6	4	-¾	3½	¾
Gross domestic product.....	782.0	799.6	831.9	-¼	1¾	3	-¼	¼	0
Current account balance, % of GDP.....	.	.	.	½	-1½	-2½	½	-½	-1½
Unemployment, % of labour force.....	.	.	.	2½	3½	3	0	¼	0
Output gap, % of GDP.....	.	.	.	¾	0	½	¼	¼	½

1. Volume changes are calculated at constant 1990-prices.

According to the forecast, private consumption will remain unchanged or increase marginally this year. Housing investment is expected to contract by 1½%. Next year, however, private consumption is expected to pick up slightly, but housing investment to continue declining. This scenario is broadly in line

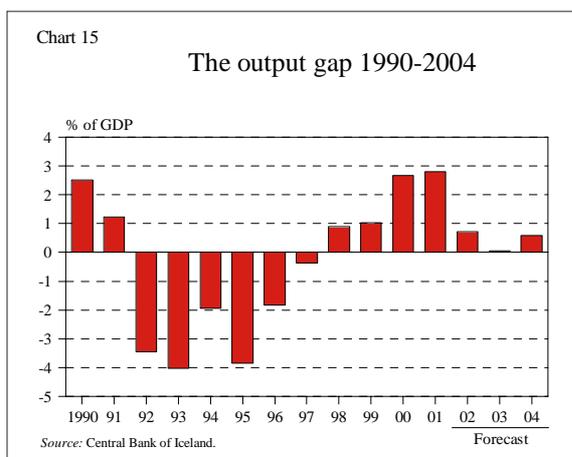
of GDP is projected and the outlook is for a moderate deficit this and the following year, 1½% and 2½% respectively. In November the Central Bank forecast a current account deficit of 1% of GDP each year. The larger deficit is primarily explained by imports connected to the hydropower projects, but this

is counterbalanced by a smaller deficit on the balance on income as a result of the stronger króna.

*... nor has the assessment of the tightness in goods and labour markets*

Since the November forecast, signs of increasing slack in the labour market that emerged in the autumn have become increasingly visible. Apparently there are no compelling arguments for a significant change in the unemployment forecast for the next couple of years, notwithstanding that the hydropower project will increase the demand for labour as the forecast period wears on. Compared to the November forecast, only slightly higher unemployment is forecast this year and the forecast for 2004 is unchanged.

The hydropower and aluminium projects will probably not begin to markedly affect the economy until 2005, leaving forecast growth and estimates of the output gap for the next couple of years broadly unchanged. However, the output gap is not expected to become negative this year, as was previously assumed. The output gap for recent years, on the other hand, has been revised slightly downwards, in line with recent data. It should be kept in mind that output gap estimates are subject to considerable uncertainty, and the difference between the forecasts is hardly statistically significant. In any case, the estimated output gap for the next couple of years indicates that domestic demand will basically be consistent with full utilisation of the factors of production.



## Inflation prospects

*Main assumptions behind the inflation forecast broadly unchanged*

As mentioned before, the inflation forecast is based on the assumption that the hydropower and aluminium smelter projects will be launched as planned. Since the bulk of activity will not occur until 2005-6 they have limited impact on the basic assumptions of the forecast, which only extends to the first quarter of 2005.

As usual, the inflation forecast is based on an assumption of unchanged monetary policy over the forecasting horizon, i.e. the Bank's policy interest rate remains unchanged. Likewise, the exchange rate of the króna is assumed to remain unchanged from the day of the forecast, i.e. when the exchange rate index stood at 124 points. This implies that the króna is assumed to strengthen by ¾% over the current year, in addition to the 12% rise in 2002, and remain 5% higher than assumed in the November forecast to the end of forecasting period.

Table 4 Main assumptions of the inflation forecast

	Previous forecast			Current forecast		
	2002	2003	2004	2002	2003	2004
Labour cost based on contractual wages <sup>1</sup> .....	4¼	3¼	3	4¼	4¼	3
Wage drift <sup>1</sup> .....	½	0	½	¾	0	1
Domestic productivity <sup>2</sup> ...	½	1	1½	½	1	1½
Exchange rate of króna, (imports-based weights) <sup>1</sup>	-8	0	0	-12	-¾	0
Import prices in foreign currency terms <sup>2</sup> .....	-1	1	1½	-1	1	1½

1. Percentage changes within year.

2. Percentage changes between annual averages.

In addition to the Bank's macroeconomic forecast outlined above, the inflation forecast is based on various assumptions concerning the development of key cost and price variables such as wage cost and import prices. These assumptions have changed only modestly since November. Wage cost in 2003 has been revised upwards, because of higher national insurance contribution, larger than expected impact on labour cost of a provision for special pension fund

savings, and larger wage rises in 2003 under an agreement made in the autumn between the Federation of Icelandic Industry and labour unions in and around the Greater Reykjavík Area. Wage drift is also assumed to be higher in 2002 and 2004 than assumed in the November forecast. In 2002 this reflects the latest wage data, and in 2004 increasing wage drift as a result of the large construction projects. Hence, unit labour cost has been revised upwards since the November forecast. Early in the forecasting period wage cost will rise somewhat faster than is consistent with the Bank's 2½% inflation target, but in 2004 wage increases are expected to be in line with the target. Assumptions on other cost factors are unchanged from the November forecast.

#### *Inflation over the next two years below the Central Bank's target*

The outlook is for a somewhat lower inflation this year than the Central Bank had forecast in November. This is largely due to the unexpected rise in the exchange rate of the króna, but weaker than expected economy is also a contributing factor. The factors contributing to a rise in inflation around mid-year 2003, assumed in the last forecast, are therefore no longer in place. One year ahead, inflation is forecast at 2.2%, compared with just under 3% in the November forecast (or 2.6% to 2003:4). According to the current forecast, inflation will remain stable throughout the forecasting period, in the range 2-2¼%. Two years hence, the inflation rate is expected to be 2%, unchanged from the previous forecast. Thus inflation in 2003 and 2004 will be just over 2%, slightly below the Central Bank's target but still well above its lower tolerance limit. The Central Bank's forecast for 2003 is broadly in line with those of market analysts, as discussed in Box 2, but the two year forecast is somewhat lower.

There are several reasons for the relatively low inflation throughout the forecasting period. The exchange rate of the króna will remain strong and unemployment for most of the period is expected to be somewhat higher than required to maintain low and stable inflation. The output gap will be negligible and the economy appears to be in fine balance, especially in 2004, while conditions in the labour market and some other factors suggest some slack

Table 5 Central Bank inflation forecast

	<i>Quarterly changes</i>		
	<i>Percentage change on previous quarter (%)</i>	<i>Annualised quarterly change (%)</i>	<i>Change on same quarter of previous year (%)</i>
2001/Q1	0.9	3.4	4.0
2001/Q2	3.5	14.5	6.0
2001/Q3	2.3	9.7	8.0
2001/Q4	1.6	6.6	8.5
2002/Q1	1.0	4.2	8.7
2002/Q2	0.4	1.6	5.5
2002/Q3	0.2	0.7	3.3
2002/Q4	0.6	2.3	2.2
2003/Q1	0.5	2.0	1.7
2003/Q2	0.8	3.3	2.1
2003/Q3	0.5	1.9	2.4
2003/Q4	0.4	1.6	2.2
2004/Q1	0.5	1.8	2.2
2004/Q2	0.6	2.6	2.0
2004/Q3	0.6	2.4	2.1
2004/Q4	0.3	1.3	2.0
2005/Q1	0.6	2.4	2.2

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

<i>Year</i>	<i>Annual changes (%)</i>	
	<i>Year-on-year</i>	<i>Within year</i>
2000	5.0	3.5
2001	6.7	9.4
2002	4.8	1.4
2003	2.1	2.1
2004	2.1	2.1

Shaded area indicates forecast.

this year. From a medium term perspective, however, there are some causes for concern. Inflation could accelerate relatively quickly if monetary policy does not respond to the impulses from the large investment projects once they intensify. The impact of these projects and possible responses to them are discussed in more detail in the Appendix.

*Considerable uncertainty remains concerning exchange rate developments...*

Prospects on exchange rate developments are among the biggest uncertainties concerning the inflation outlook. The króna has appreciated considerably recently and some would argue that it is excessively strong given the present external conditions. In part this appreciation probably stems from expectations on the market concerning the impact of the aluminium and hydropower projects on the exchange rate in the next few years. It is, however, possible that market participants are overestimating this impact, for example by failing to recognize that the bulk of construction activity and currency inflows will not occur until 2005 and 2006. Conceivably, they may also be underestimating the underlying weakness in the economy that has emerged in recent months. If expectations on this matter change, the exchange rate could weaken again. As the construction phase approaches, however, further appreciation of the króna is more likely. Counteracting this is the fact that the appreciation will probably be regarded as short-lived, which in a forward-looking market ought to limit its scope.

*... and the global economic outlook*

The global economic outlook is also fraught with uncertainty. Recovery has been slower than anticipated and looming military conflict in Iraq exacerbates the uncertainty. Oil prices have risen recently because of the growing risk of war, but the announced actions of OPEC to step up oil production in the case of a surge in prices could keep these increases in check.

*Domestic demand may turn out to be weaker than estimated for the next few months, but stronger in the long term*

Since the Central Bank's November inflation forecast was published, indications of slack in the domestic labour market have become increasingly visible and the outlook for the current year has deteriorated. This has contributed to a lower forecast rate of inflation compared to November. Conceivably, the economy may even be weaker than envisaged in the main forecast. Should the labour market turn out to be weaker than forecast, it will affect domestic demand, e.g. for housing. An easing of demand for

housing could bring down real estate prices and have a secondary effect on the net wealth of households. Notwithstanding those arguments for weaker than forecast domestic demand, the risk of this scenario is not deemed sufficient to significantly affect the balance of risk in the forecast. The fact that housing prices have been rising fast recently, for example, does not suggest an imminent turnaround in the housing market.

A more compelling case can be made for a bias towards higher than forecast inflation in the latter half of the period. Domestic demand could be stronger than assumed in the baseline forecast, for instance due to unexpectedly strong public sector construction activity, as general election will be held this year. Household and corporate expectations could also respond more forcefully to the large investment projects than assumed in the forecast. Uncertainty also surrounds wage settlements next year. Wage agreements for the largest group in the private sector will expire late this year or in the beginning of 2004.

*The risk spectrum is assumed symmetrical in the short term but a positive bias is more likely over the medium term*

On balance, the probability of a lower than forecast rate of inflation one year ahead seems roughly equal to that of a higher inflation. Exchange rate and global economic developments are highly uncertain, but whether the effect on inflation will be positive or negative is ambiguous. Although the weakness in domestic demand may be underestimated in the short term, the case for downward risk does not seem compelling enough for the time being. However, inflation two years hence seems to be more likely to be above the baseline forecast than fall short of it, in view of the potential for larger than forecast effect of the large scale investment projects on expectations and aggregate demand.

As pointed out before, historical forecasting 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 16 presents the Bank's main forecast for the next two years together with an assessment of its confidence range. Thus the entire coloured area

## Box 2 Survey of finance market analysts' assessments of the economic outlook

In the last survey of finance market analysts' assessments the questions were conditional such that the proposed, but then somewhat uncertain, aluminium projects should not be taken into account. The findings were published in *Monetary Bulletin* 2002/4. For the present survey, on the other hand, respondents were free to choose their forecast assumptions for themselves. They all expected construction work in connection with the Alcoa smelter would go ahead, and some also expected the Nordurál expansion to take place during the period, since the survey was taken before the announcement of the recent ruling by the acting Minister for the Environment on a hydropower project to supply electricity to it.

Firstly, the table shows the analysts' evaluation of inflation prospects for this and the following year. Their inflation forecasts for this year are close to the Central Bank's forecast and below its inflation target. However, the analysts forecast a rather higher inflation than the Bank in 2004, both over the year and between annual averages.

Analysts were also asked about the outlook for other key economic aggregates. Interestingly, they are more optimistic than the Central Bank. On average they forecast 2½% GDP growth this year – some way

above their forecasts in October – and 3½% next year. The Central Bank's current forecast is for 1¾% for 2003 and 3% for 2004, which is a small change from its previous forecast.

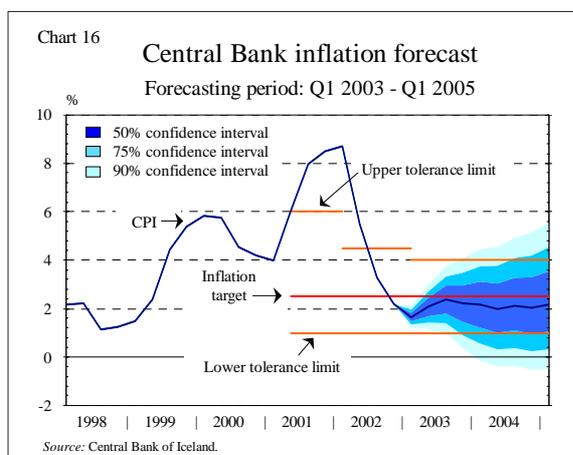
Five out of six of the analysts expect the exchange rate of the króna to strengthen slightly over the next twelve months, but over a two-year horizon there are conflicting views. In general they expect the króna to appreciate more over the medium term than in their last forecasts. The table shows that market analysts now foresee an end to the lowering of Central Bank interest rates, which can be understood in light of the investment projects. They expect the policy rate to be up to 6% after one year and close to 7% after two years.

Finally, the survey findings suggest that analysts foresee brighter prospects in the equity market than in their last forecast. They expect the ICEX-15 index to rise on both a one-year and two-year horizon. However, their views differ widely. Opinions are also divided about real estate prices. Forecasts over the next twelve months range from a 2% decrease to a 5% increase, but they all expect higher prices two years hence.

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

	2003			2004		
	Average	Highest	Lowest	Average	Highest	Lowest
Inflation (within year) .....	2.3	3.2	1.5	2.9	3.8	2.0
Inflation (year-on-year) .....	2.1	2.8	1.5	2.6	3.7	2.0
Economic growth .....	2.5	3.0	2.0	3.6	4.0	3.1
	One year forward			Two years forward		
The effective exchange rate index of foreign currencies vis-à-vis króna (Dec. 31, 1991=100)...	121.3	125.0	120.0	125.0	130.0	115.0
Central Bank policy interest rate .....	6.0	6.3	5.8	6.9	7.5	6.3
Nominal long-term interest rate <sup>2</sup> .....	7.2	8.0	6.7	8.1	9.5	7.3
Real long-term interest rate <sup>3</sup> .....	4.6	5.1	4.0	5.0	5.4	4.8
ICEX-15 share price index (12-month change) ...	8.4	12.0	3.7	13.6	26.0	5.0
Housing prices (12-month change) .....	3.1	5.0	-2.0	5.2	10.0	1.0

1. The table shows percentage changes, except for interest rates (percentages) and the exchange rate index for foreign currencies (index points). Participants in the survey were the research departments of Búnaðarbanki, Economic Consulting and Forecasting, Íslandsbanki, Kaupthing, Landsbanki and SPRON (Reykjavik and Environment's Savings Bank). 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 housing bonds (IBH 41 0315). Source: Central Bank of Iceland.



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 the longer the horizon of the forecast, as reflected in the widening of the confidence intervals.<sup>15</sup>

Table 6 Probability ranges for inflation over the next two years

Quarter	Inflation				
	under 1%	in the range 1% - 2½%	in the range 2½% - 4%	under 2½%	above 4%
2003:1	1	99	< 1	> 99	< 1
2003:4	14	46	34	61	5
2004:3	23	33	28	56	16

The table shows the Bank's assessments of the probability of inflation being in the column's interval in percentages.

According to this assessment the probability that inflation one year ahead will be below the Central Bank's inflation target has increased since the last forecast. However, the probability of deviations from the target two years hence remains unchanged. The probability of inflation remaining within the tolerance limits of the target over the entire period has

15. The range for which the Bank has not previously forecast is based on a simple projection. Just as forecasts for individual values are subject to uncertainty, so is the method of estimating the uncertainty of forecasts. The estimated forecast uncertainty should therefore be interpreted with caution. The aim is to highlight the inherent uncertainty of forecasting rather than to provide a precise assessment of the probability distribution of forecast inflation.

increased slightly since the last forecast, and the probability of deflation has decreased. The probability of deflation during the forecasting period is less than 10%, given the quarterly values on which the inflation forecast is based.

### III Financial conditions and monetary policy

The Central Bank's policy interest rate has declined in real terms after being lowered twice in November and December. Other financial conditions have generally eased apart from the exchange rate of the króna. The stronger exchange rate in recent weeks is partly explained by higher fishing quotas and expectations in connection with aluminium and hydropower projects. However, conceivably, as pointed out elsewhere, market participants may overestimate the short-term impact of the projects on currency inflows and underestimate the emerging weakness of the economy. The Bank's macroeconomic and inflation forecasts, which take the projects into account, indicate that a further lowering of the policy rate is warranted, which would probably bring the interest rate below its long-term equilibrium level, stimulating growth even further.

#### Monetary stance and financial conditions

##### *The monetary stance has continued to ease ...*

The Central Bank policy rate has been lowered twice since the *Monetary Bulletin* was published in November, by a total of one percentage point, from 6.8% to 5.8%. This includes a reduction of half a percentage point on the day the Bulletin was published in November. Central Bank interest rates have not been as low since 1994. That year and the following year there was a major slack in the economy and inflation measured only 1½%.

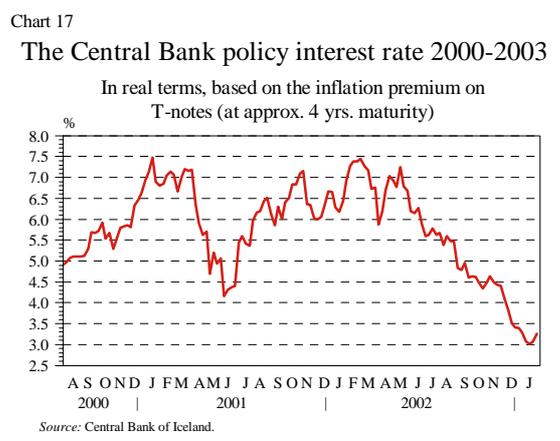
In the beginning of November 2002 the inflation premium on Treasury bonds with a lifetime of four years was less than 2%, and on shorter bonds it was even lower. The corresponding inflation premium at the end of January was just over 2½%, and 2% on two-year bonds. On this criterion, the Central Bank's policy rate has declined in real terms from 4½-5% to just over 3%. Calculated on the basis of the inflation premium on Treasury bonds the policy rate has not

been lower in real terms since January 1997. The T-bond inflation premium was probably abnormally low in the beginning of November, exaggerating the estimated real policy rate. If calculated on the basis of the Central Bank's inflation forecast, the real rate has also declined unequivocally. Based on the Bank's forecast one year ahead, the real rate was just under 4% at the beginning of November, but recently the real rate has been close to 3½%, based on the current forecast.

It is interesting to compare the Central Bank policy rate, after the latest cuts, with those of other central banks. Table 7 shows interest rates and inflation in selected countries. The upper section of the table shows central bank interest rates and inflation in countries which apply inflation targeting, and the lower section shows other major industrial countries. At the end of January the Central Bank of Iceland's policy rate was slightly higher than the average among countries with an inflation target excluding Brazil and South Africa, which have unstable economies and very high policy rates. It is interesting to note that Icelandic interest rates are at a similar level as in New Zealand and lower than in Norway. Real interest rates calculated on the basis of inflation over the past twelve months are abnormally high in Iceland since inflation probably reached a trough in January, while inflation expectations are higher. Relative to the inflation target, real interest rates in Iceland are similar to those in Norway and Poland but lower than in New Zealand. This shows that compared to interest rates in comparable countries

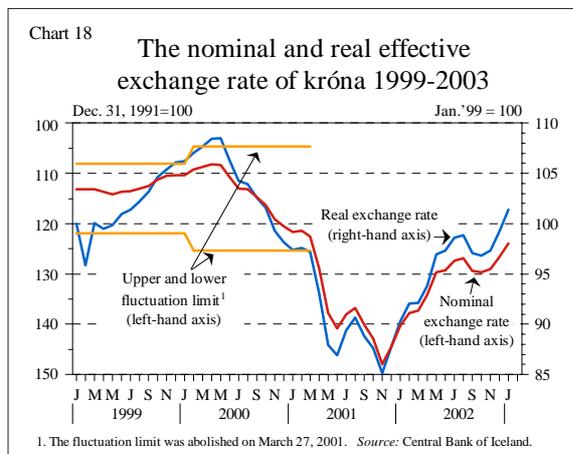
Central Bank policy rate in Iceland is by no means an outlier. However, this is not a particularly meaningful statement, since under inflation targeting and floating exchange rate regime the policy rate must be determined by the economic conditions in the respective country.

While the króna has appreciated, interest rates in financial markets have declined slightly. After being somewhat on the rise until the end of January, interest rates on non-indexed long-term bonds are at roughly the same level as in November. The recent rise was probably spurred by expectations of higher inflation and a higher policy rate over the medium term due to the mentioned projects. The interest rate in indexed bonds, on the other hand, has dropped significantly, as the result of lower policy rate and increasing demand for domestic indexed bonds. Moreover these rates had probably been abnormally high due to special conditions in the housing market, as described before. Towards the end of January, the yield on housing bonds had generally come down to below 5%, compared to the beginning of November. The yield on 25-year housing bonds was down by 0.4 percentage points and 0.3 percentage points on 40-year housing bonds. Although interest rates on indexed bank loans have dropped somewhat since the beginning of November, they have not kept pace with the declining yields on comparable government and housing bonds, as discussed in more depth in the article on financial markets and Central Bank measures. The rise in equity prices by more than 4½% from the beginning of November to the end of January also represents an easing of financial conditions.



*...but stronger króna constrains the traded goods sectors*

Despite lower Central Bank policy rate and continuing foreign exchange purchases, the króna has appreciated considerably over the past three months. At the end of January the exchange rate was more than 7% higher than at the end of October last year, on top of a continuous rise from a low in November 2001. In January the real effective exchange rate was just above 10 year average, whether calculated on the basis of relative unit labour cost or consumer prices, but based on the exchange rate at the end of the month it was 5½% over the ten-year average.



There is a strong presumption that market players' assessment of the Reydarfjörður aluminium smelter project and associated hydropower facilities contributed a great deal to the appreciation of the króna in recent weeks. Other factors that could have contributed to a stronger króna were more or less known in the last months of 2002, such as the favourable current account balance. Changes in short-term interest rate differentials with abroad are unlikely to have had substantial effect. The interest rate differential on T-bills was, in fact, narrower at the end of January than in November, but in the inter-bank market it was marginally wider. Although inflation declined, inflation expectations have gone up, so the change in real interest differential is ambiguous. Recent increase in fishing quotas may also have contributed to a stronger króna, by fuelling expectations about currency inflows.

The Central Bank has previously expressed its view that large scale investment projects could lead to a higher exchange rate before and during the construction phase. As explained in more detail in the appendix, the reasons are the net capital inflow accompanying the projects and expectations of a rise in the policy interest rate. Higher interest rate expectations ought to spur an immediate rise in yields on long-term bonds and increase the spread between bonds of longer and shorter maturity, as in fact has happened in recent weeks. This could encourage foreign currency inflows and lead to an appreciation of the króna. In a forward-looking market the exchange rate has a tendency to respond immediately to news on development that may affect its future course.

Accordingly, the króna may rise even though the currency inflow directly associated with the construction phase has not begun. The higher exchange rate tightens the competitive position of traded goods sector and narrows a positive output gap or increases a negative one. This helps the economy to adjust to large-scale projects at an early stage. One should note, however, that gross profits (EBITDA) in the traded goods sector have been very good over the past two years. Even though profits may decline in 2003, e.g. due to the stronger króna, the outcome is still expected to be reasonably good. Forecasts by finance companies, for example, suggest that the gross profits in the fisheries sector in 2003 could be higher than it has been over the past decade with the exception of the latest two years.

There may be normal and benign reasons for the recent appreciation of the króna. However, it intensifies the present weakness in the economy and may have reached an undesirably high level at the present stage, even after taking the investment projects into account. Conceivably, the market has been overestimating the impact of the projects and not fully appreciated the lag until they reach a full swing. The slack that would have formed this year, in the absence of increased fishing quotas and the investment project, may also have been underestimated. A negative output gap and weak economy do, however, not necessarily result in a weaker domestic currency as long as the trade balance remains strong and tranquillity on the currency markets lasts. In some cases weak domestic demand has been associated with a current account surplus and appreciating domestic currency. Expectations about currency inflows, higher inflation and higher interest rates appear to be the main reasons for the recent strength of the króna. A strong króna, however, may be unwelcome when the economy is weak and inflation below target. According to the macroeconomic and inflation forecasts, there will be a slight slack at the beginning of the forecast period which will disappear next year, assuming that the exchange rate and monetary stance remain unchanged. Thus the present challenge of monetary policy is a weak economy at the same time as inflation is below target.

Several years ago monetary conditions indices (MCIs), i.e. average of short-term interest rates and the exchange rate, weighted according to the esti-

Table 7 Inflation and interest rates in selected countries

<i>Inflation targeting countries</i>	<i>In- flation</i>	<i>Period</i>	<i>Inflation target</i>	<i>Central Bank policy rate</i>	<i>Latest change in the policy rate</i>		<i>Policy rate in real terms, based on:</i>	
					<i>change (%)</i>	<i>date of change</i>	<i>past inflation</i>	<i>inflation target</i>
Australia .....	3.0	Q4 '02	2 - 3	4.75	0.25	June 5 '02	1.7	2.2
Brazil .....	9.9	Q4 '02	3½ (±2½)	25.50	0.50	Jan. 23 '03	14.2	21.3
Canada .....	3.9	Dec. '02	1 - 3	2.75	0.25	July 16 '02	-1.1	0.7
Chile .....	2.8	Dec. '02	2 - 4	2.75	-0.25	Jan. 9 '03	0.0	-0.2
Iceland .....	1.4	Jan. '03	2½ (±1½%)	5.80	-0.50	Dec 17 '02	4.3	3.2
Israel .....	6.5	Dec. '02	2 - 3	8.90	-0.20	Dec 23 '02	2.3	6.2
New Zealand.....	2.7	Dec. '02	0 - 3	5.75	0.25	July 3 '02	3.0	4.2
Norway .....	2.8	Dec. '02	2½ (±1)	6.00	-0.50	Jan. 23 '03	3.1	3.4
Poland.....	0.1	Dec. '02	5 (±1)	8.50	-0.50	June 26 '02	8.4	3.3
South Africa.....	14.5	Nov. '02	3 - 6	13.50	1.00	Sept. 13 '02	-0.9	8.6
Sweden .....	0.6	Dec. '02	3 - 5	2.50	-0.25	Jan. 30 '03	1.9	-1.4
Switzerland.....	0.9	Dec. '02	0 - 2	0.25-1.25	-0.50	July 26 '02	-0.1	-0.2
Thailand.....	0.3	Dec. '02	0 - 3	1.75	-0.25	Nov. 19 '02	1.4	0.2
UK .....	2.7	Dec. '02	2½	4.00	-0.50	Nov. 8 '01	1.3	1.5
<i>Average .....</i>	3.6	.	.	6.46	-0.10	.	2.7	3.6
<i>- excl. Brazil and South Africa</i>	2.3	.	.	4.46	-0.23	.	2.1	1.9
<i>Other industrialised countries</i>								
Denmark .....	2.5	Dec. '02	-	2.75	-0.50	Dec. 6 '02	0.2	-
Euro area.....	2.3	Dec. '02	0 - 2	2.75	-0.50	Dec. 6 '02	0.4	1.7
Japan.....	-0.4	Nov. '02	-	0.10	-0.15	Sept. 18 '01	0.5	-
USA .....	2.4	Dec. '02	-	1.25	-0.50	Nov. 6 '02	-1.1	-
<i>Average of all countries above</i>	3.2	.	.	6.64	-0.21	.	1.7	.
<i>- excl. Brazil and South Africa</i>	2.2	.	.	3.81	-0.3	.	1.6	1.9

Inflation is calculated on the basis of the twelve-month change in the index on which the respective country's monetary policy is based, or in the CPI, as appropriate. The most recent available measurements are stated. Policy rates in real terms are calculated from past inflation. Until August 9, 2001 the Central Bank of Chile targeted real interest rates. Changes in policy rates in real terms before then are calculated on the basis of the inflation rate. For Switzerland, the mean value of the policy rate spread is used. The table shows inflation targets for 2002 or long-term targets in countries where these have already taken effect. Iceland's long-term target is 2½% (±1½%), to be attained in 2003. The long-term target for Poland is an inflation rate of less than 4%, to be attained in 2003. The inflation target for the Czech Republic decreases linearly and should end up at 2%-4% in 2005. Mexico is not included in the table despite having an inflation target, since its central bank does not have a proper policy rate target, but bases its monetary policy instead on a target of liquidity in circulation.

mated effect on demand, were frequently applied worldwide as a measure of the monetary stance. Experience indicates that this is a rather poor measure in countries such as Iceland where variable external conditions are likely to cause wide swings in the equilibrium real exchange rate.<sup>16</sup> When the exchange rate adjusts to a change in the equilibrium exchange rate, this does not necessarily entail a change in the monetary stance. It is therefore misleading to focus

on such an index under these conditions. An alternative MCI which consists of the weighted average of short-term real interest rates, calculated on the basis of real inflation expectations and the exchange rate's deviation from an estimated equilibrium value would provide a better estimate of the tightness of the stance. The problem, however, is that neither inflation expectations nor the equilibrium exchange rate can be observed. The stronger exchange rate in recent weeks can probably to a large extent be attributed to a rise in the equilibrium exchange rate in response to pending investment projects and increased fishing quotas. So it cannot be concluded that the changes in the value of the króna reflect a

16. The use of monetary condition indices, for example, led monetary policy implementation astray in New Zealand for part of the 1990s. See Lars Svensson's "Independent review of the operation of monetary policy in New Zealand: Report to the Minister of Finance", February 2001, [www.princeton.edu/~svensson](http://www.princeton.edu/~svensson).

tighter monetary stance; other indicators point in the opposite direction.

## Monetary policy

### *Conditions are ripe for further cuts in the Central Bank policy rate*

In the macroeconomic and inflation forecasts, presented above, it is assumed that the investment projects will go ahead as planned. In the absence of any change in the monetary policy stance and provided that the exchange rate remains at its end of January level (foreign exchange index value 124), the outlook is for a growth rate of actual GDP below that of potential output. Hence, the output gap should turn more negative with unemployment rising from 2002. The rate of unemployment is forecast at 3½% in 2003, which is probably more than is compatible with stable growth and low, steady inflation over the medium term. Over the year as a whole, the output gap is expected to be roughly neutral, but in view of employment statistics and considering the uncertainty surrounding the measure of the output gap, a negative output gap appears likely in the first half of the current year. Next year the growth rate of GDP is expected to be very close to that of potential output, while unemployment will still be around 3%. However, it seems likely that unemployment will be on the decline during the year. Inflation is forecast to remain near 2% until the first quarter of 2005, or just below target.

According to the forecast, further lowering of the Central Bank policy rate appears to be warranted. The scale and timing will, however, depend as always on unfolding developments. The Central Bank's policy interest rate at the end of January was just over 3% in real terms, as stated above. A further cut in the policy rate would leave the real rate below what appears to be a probable long-term equilibrium level, injecting a considerable stimulus into the economy. The short-term impact will depend on how other interest rates respond, especially the banks' lending rates, which are more important for indebted households and businesses than the Central Bank's rates.

The degree of further monetary easing will depend on conflicting and continuously changing forces of uncertain strength. There is a great deal of

uncertainty concerning the degree of the slack in the economy at present, the responsiveness of the economy to further easing of the monetary stance, especially when the Central Bank rate has fallen below its long-term equilibrium level and when and to what extent a wave of optimism that might accompany the investment projects and upswing in the global economy will bring domestic demand to the stage of overheating.

Recently, it has been argued that a substantial and immediate easing of the monetary stance is required to reverse the appreciation of the króna and to prevent deflation. If Iceland faced a serious threat of deflation there would be a good case for easing the monetary policy stance quickly. However, as may be inferred from the inflation forecast presented above, and as discussed in more detail in Box 3, the probability of this happening is minimal. Inflation forecasts and expectations are generally around or over 2%, which is some way from imminent deflation. Wage growth is continuing at a significant rate and the same applies to the growth of broad money (M3). Moreover, on the horizon are some of the largest-scale construction projects in Icelandic history.

It should be underlined that exchange rate stability is no longer an objective of monetary policy. By law, the Central Bank is obliged to promote price stability, as specified in the joint declaration by the government and the Central Bank from March 2001. Central Bank interest rates are decided on the basis of the inflationary outlook over a two-year horizon, but the basic principle is that the exchange rate is determined on the foreign exchange market.<sup>17</sup> The Central Bank can intervene in the foreign exchange market if it considers this necessary to attain the inflation target or if exchange volatility is seen as posing a threat to financial stability. Nothing like this

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17. In the same way as the exchange rate in principle has to be determined on the market, e.g. given the interest rates set by the Central Bank with a view of the inflation outlook, the interest rate differential with abroad is determined by market conditions. The notion of a positive lower limit to the interest rate differential with abroad does neither have a sound theoretical nor empirical basis. For example, if appreciation of the domestic currency is expected, domestic interest rates are low - in the context of a weak domestic economy - and foreign interest rates high - reflecting a different cyclical position - the interest rate differential could easily turn negative without contradicting the inflation target. Sweden's interest rate differential vis-à-vis Germany, for example, has been negative since the Swedish krona was floated.

is on the cards at the moment. Since the beginning of September the Central Bank has regularly purchased small amounts of foreign currency in order to replenish its foreign currency reserve, which was much depleted as a result of repeated interventions to support the króna in 2000 and 2001. Although the aim behind these regular purchases is not to influence the exchange rate, it may lead to a somewhat lower exchange rate than otherwise. If the intention were to cut interest rates with the sole aim of inducing a

depreciation of the króna, the recent appreciation of which recent appreciation may partly be caused by a rise in the equilibrium rate, this would probably require considerably lower interest rates than is compatible with the inflation target. That would pose a risk of kindling a new episode of overheating and instability. Hence, the Central Bank will continue to base its monetary policy decisions on the inflation target, as it is obliged to do.

### Box 3 Deflation

The risk of deflation has come up for some discussion in Iceland. In part this is an echo of international discussion on this issue, but it has also been inspired by the recent low rate of inflation. The CPI rose by only 1½% last year, and excluding its housing and service components the increase was a mere 0.3%. So what is deflation? What is the likelihood of it occurring in the industrialised countries? How can deflation be avoided and what is the most effective response if it occurs? The following is a brief attempt to answer these questions.

The most natural way to define deflation is in the same way as inflation, only in reverse. *Inflation* is defined as *a persistent rise in the general level of prices*. Thus a rise in the price of individual goods or a short-term rise in the price level is not considered to be inflation. Similarly, *deflation* is defined as a persistent decrease in the general level of prices. A decrease in the price level for a couple of months is not considered to be deflation, nor does a general reduction in the price of goods constitute deflation if the rise in the price of services is greater, whereby the price level does not rise on average.

In fact it is not uncommon for a rise in the price of services to counterbalance a rise in the price of goods. In September 2002, consumer prices in the USA had risen by 1.5% from the year before. At the same time the price of services went up by 3.2% while the goods in the CPI went down by 0.9%. As a rule, productivity has increased more slowly in service industries than in

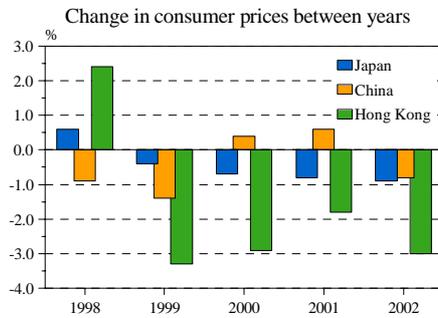
manufacturing. However, if wages in different sectors rise in tandem due to intersectoral labour mobility, the price of services will inevitably increase by more than that of goods.<sup>1</sup>

In the same way that inflation occurs because of excess demand in the economy, deflation is the result of excess supply. Excess supply may form because of a supply shock, but serious deflation is most probable when a sharp contraction in demand creates a slack which causes prices and wages to fall. Such a scenario tends to go hand in hand with stagnation or recession and rising unemployment. Deflation may therefore be either *benign* or *malignant*.

*Benign* deflation may be caused by growth in output and productivity or improved terms of trade. Examples are found in Britain and other countries during various periods of the nineteenth century, and even

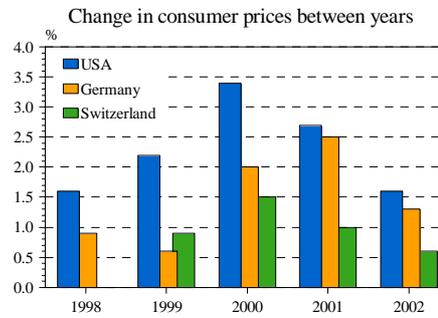
1. Such a situation is not far-fetched. Let us take the example of an economy that comprises two sectors of equal size, goods manufacturing and services. Let us also assume that productivity increases by 3% per year in goods manufacturing but remains unchanged in services. Average productivity would therefore increase by 1½% per year. Furthermore, let us say that real wages keep pace with the average productivity trend plus 1%, which is reflected in a 1% rise in consumer prices. Nominal wages will therefore go up by 2½%. Because productivity in services remains unchanged, their price will increase by the same amount as wages. Goods prices, however, will decrease by ½% per year. This state is not deemed to be deflation. For simplification's sake, this example ignores imported inputs and use of capital. The findings do not essentially change if these are included, but the figures would be different then and more complex to calculate.

Annual deflation in Japan, China and Hong Kong 1998-2002



Sources: EcoWin, Central Bank of Iceland.

Annual inflation in USA, Germany and Switzerland 1998-2002



in China in recent years.<sup>2</sup> Nonetheless, benign deflation is not entirely riskfree, because if external shocks occur under such conditions and call either for a temporary reduction in real wages or negative GDP growth, reluctance to reduce nominal wages and the fact that nominal interest rates can hardly drop below zero could cause unemployment to rise.

*Malignant* deflation goes hand in hand with stagnation or contraction and underutilised production capacity. This type of deflation may enter into a spiral with inadequate demand. In particular, this occurs if deflation expectations take root and the level of household and corporate debt is high. In that case, real interest rates could become high even if nominal interest rates go down to zero, causing an increase in the debt service burden in real terms because liabilities carry fixed nominal rates of interest. Deflation therefore causes the real debt service burden to rise without any corresponding real appreciation of assets. This may have serious consequences for debtors, as shown in many instances, especially if asset prices fall. One example is the Great Depression of the 1930s when particularly malignant deflation occurred in many parts of the world and was amplified by a financial crisis, economic policy mistakes and protectionism. Other more recent examples of malignant deflation are Japan in the past few years and Argentina from 1999 to 2001.

2. Pain and Weale (2002) cite the example of Britain between 1880 and 1890, when GDP grew on average by 2.2% annually at the same time as prices went down by 0.6% per year.

Because of its negative consequences, it is important to prevent deflation. A monetary policy that aims for price stability or a low rate of inflation can therefore perform this function, by responding to negative demand shocks by monetary easing. There are at least three reasons to aim for a low rate of inflation rather than zero inflation. Firstly, changes in quality and composition of the CPI introduce a positive bias in the index. This bias is generally regarded to lie in the range ¼-1%.<sup>3</sup> Observed inflation within this range therefore effectively corresponds to price stability. Another reason is that relative prices and real wages become less elastic at a very low rate of inflation, potentially causing an unnecessary loss of output and unemployment. The third reason is that modest inflation reduces the risk of the economy accidentally slipping into a deflationary spiral. However, moderation is called for in this respect, because inflation is also costly for the economy. This is why it is commonly argued that central banks with inflation targets should target inflation not lower than 1% and not higher than 3%.

What action can be taken if deflation becomes entrenched? Generally speaking the answer is to stimulate demand sufficiently to absorb any slack in the economy. In most cases this should be achievable through monetary policy. However, it may prove difficult if central bank interest rates are already down to

3. Studies and discussions within the OECD have indicated a higher bias in the USA than in most European countries. CPI bias in Iceland has not been evaluated but it is considered to lie closer to the lower limit, e.g. because the index base is updated relatively frequently.

zero, as is the case in Japan. But the situation is complicated if monetary policy transmission is impaired by problems in the banking system, whereby an increase in base money is not transmitted to broad money aggregates, since banks will not or cannot increase their lending. This may apply in Japan's case.<sup>4</sup> In theory, a central bank ought to be able to induce inflation, but may need to use unconventional methods for doing so, for example by buying long-term bonds or equities or directly funding treasury spending<sup>5</sup>.

At the moment deflation is largely confined to Japan, Hong Kong and China.<sup>6</sup> Deflation has not become entrenched in any developed country apart from Japan, nor do forecasts indicate such developments over the medium term. Consumer prices rose by 1.6% between the years in the USA last year and according to *Consensus Forecasts*, inflation will be 2.2% this year.<sup>7</sup> In Germany, which has been mentioned as a possible deflation risk country, the CPI rose by 1.3% last year and the average forecast for 2003 is 1.2%, but the lowest forecast 0.5%.<sup>8</sup>

What is the situation in Iceland? To begin with, deflation has never occurred before and is extremely unlikely, for example because of the openness of the economy. In the absence of global deflation, it is rather unlikely that persistent deflation will take root in Iceland.

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4. In 2002 base money in Japan rose by no less than 19.5%. Lending shrank by 4.7%, however, and broad money (M3) increased by only 2.2%.

5. Bernanke (2002) discusses central banks' options for avoiding and escaping deflation.

6. Consumer prices also declined in Singapore last year, but it is too early to deem whether deflation is a fact there.

7. *Consensus Forecasts*, January 2003.

8. *ibid.*

The CPI rose by 1.4% last year and this looks set to be the lowest inflation for the time being. Inflation expectations for the next years are 2% or more, which is in line with the current Central Bank forecast. Wage rises in excess of short-term productivity growth substantially diminish the probability of deflation. Growth in base money is still running in double-digit figures. If the risk of deflation grows, considerable scope still remains for responding to it by easing the monetary stance, since the Central Bank's policy rate stood at 5.8% at the end of January. Later on, the Alcoa project will lift demand significantly. Thus deflation is not a probable task of economic policy in Iceland given the present outlook. It can also be argued that the potential damage that deflation may have on the asset position of debtors is smaller in Iceland than in countries where most liabilities carry fixed nominal interest rates. Price indexation and the widespread use of variable nominal interest rates imply that deflation would not cause the debt service burden on domestic loans to increase as much in real terms. The real debt service burden on indexed loans would remain unchanged, since they imply a fixed real rate of interest, and the same would apply to loans with variable nominal interest rates, to the extent that nominal interest rates decline in tandem with deflation.

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*Consensus Forecasts*, January 2003, Consensus Economics Inc.

Pain, Nigel and Martin Weale, (2002), "Commentary", *National Institute Economic Review* No. 182, October 2002.

## Appendix: Evaluation of the macroeconomic impact of the planned aluminium and power plant investments and possible economic policy responses to them

This Appendix discusses the economic impact of the planned large scale industrial projects, i.e. the construction of the Alcoa Inc. aluminium smelter in Reydarfjörður, East Iceland, and a hydropower facility built by Landsvirkjun (the National Power Company) in East Iceland to supply electricity for it. The conceivable expansion of the Nordurál aluminium smelter is not included in this report, since its timing and scope are unclear. The evaluation of the power-intensive investment programme in East Iceland suffices to portray the impact of large-scale investment projects of this kind and the economic policy responses that they call for.

### 1. Main conclusions

The main conclusions of the report that follows are:

1. The proposed power-intensive projects are very large relative to the size of the Icelandic economy. In volume terms the investment is probably the largest in the history of Iceland, while in terms of GDP it is similar to the construction of the Búrfell station and Straumsvík aluminium smelter in the 1960s.
2. Construction work will peak in 2005 and 2006, when some two-thirds of the investment will be made. When the investment reaches its peak in 2006 it will be equivalent to 9% of GDP. Labour use will also peak at the same time at just under 2,500 man-years, or the equivalent of 1¼% of the estimated labour force in Iceland.
3. A distinction must be made between the *temporary* impact caused by the construction of the hydropower facility and aluminium smelter and the *long-term* impact of their operation. The former impact will entail a temporary surge in demand while the latter will strengthen the *supply side* of the economy and strengthen Iceland's export base.
4. The impact during the construction period involves an increase in demand which is financed with foreign equity and credit. It will be accompanied by a short-lived deficit on the current account, which is not a problem, as well as demand pressure and inflationary pressure. Since the construction programme is largely foreseen, the exchange rate of the króna, interest rates and asset prices may be expected to be affected as soon as it is clear that the project will go ahead. The recent strengthening of the króna is at least partly explained by this. Underlying this strengthening is not only the expected currency inflow, but also expectations of a higher Central Bank policy rate than would otherwise be the case in the near term. Thus the rise in the exchange rate cannot be divorced from the tighter monetary stance inevitably associated with a shock on the scale involved here.
5. Calculations made using the Central Bank's models of the economy and its individual components suggest that, in the absence of any exchange rate adjustment and economic policy action, the positive output gap will be considerably wider than when the economy overheated in 2000 and 2001. The reason is that GDP growth will be considerably greater than the equilibrium growth level, or 4-4½ percentage points at peak, which could mean a growth figure of roughly 7%. In consequence, inflation would be around or in excess of 4 percentage points higher than in the absence of these large scale investments in 2005 and 2006, and thereby deviate substantially from the Central Bank's inflation target.
6. In order to prevent this from occurring, economic policy action will be needed. If the exchange rate remains unchanged from what it would have been without these large scale projects and no fiscal action is taken, the Central Bank's policy rate will need to rise in the course of this year, and in 2004 and 2005 it will be significantly higher than

otherwise. Calculations are based on a conventional forward-looking rule for central bank interest rate decisions which takes into account the contemporary output gap but the rate of inflation in the following year. The Central Bank policy rate would then be in excess of 4½ percentage points higher than without the power-intensive projects, which could mean an actual interest rate of as high as 10%. Even this would not suffice to keep inflation within the tolerance limit of the inflation target in 2005 and 2006, so the monetary stance would need to be tighter still if it is not aided by fiscal policy or exchange rate developments.

7. If the exchange rate appreciated in response to this large scale project and/or fiscal action is assumed, a much smaller interest rate hike would be required in order to keep inflation close to the target. In the scenario with exchange rate adjustment which is presented here, the policy rate would only need to rise by just over 2 percentage points in excess of the baseline scenario when it peaks in 2004 and 2005. This could entail a policy rate of just over 7%. Another consequence of an adjustable exchange rate would be that interest rates would rise later than otherwise.
8. Fiscal measures involving a 20% contraction in public sector investment in 2005 and 2006 and a corresponding increase in 2007 and 2008 would require interest rates to rise by only 2½ percentage points from the baseline scenario, assuming a forward-looking monetary policy and unchanged exchange rate. Interaction between the exchange rate adjustment and fiscal measures could reduce the need for higher interest rates even further.
9. Thus the main finding of this report is that, despite the fact that the construction projects will be some of the largest in Icelandic history, it will be possible to maintain economic stability and keep inflation close to the Central Bank's target through the interplay of internal economic adjustment and monetary and fiscal policy measures.

Important reservations need to be made about the conclusions presented here, as explained in more detail in individual sections below. The calculations are based on diverse assumptions which

could fail to hold, such as on household and business sector expectations and a relatively smooth response by financial markets. Exchange rate developments are also highly uncertain. Furthermore, it should be borne in mind that the calculations are based on models reflecting historical relationships which are not certain to apply to such a large shock as this. Models are also inherently imperfect. Thus there are many indications that the impact of interest rates on demand and of demand on inflation are underestimated in the model, jointly developed by the Central Bank, National Economic Institute and Ministry of Finance, partly used in the evaluation. The impact of monetary policy could therefore be underestimated.

As mentioned above, this study does not take into account any investments in connection with Nordurál. It is obvious that this would greatly complicate economic policy implementation if it were to coincide to some extent with the peak of work on the East Iceland smelter. Thus it would be appropriate to find a different time for scheduling that project.

It is of great help that this large scale investment did not begin until the economy had fully cooled down after overheating in 2000 and 2001, and the inflationary hike that accompanied it had subsided. Otherwise it would be more difficult to maintain stability and keep inflation in check. There is some slack in the economy at present and construction activity will not peak until 2005 and 2006. Forecasts which did not take the power-intensive projects into account suggested that the economy would be in good balance in 2004. For this reason among others, the baseline scenario excluding the projects assumes that the economy will be in equilibrium from 2005.

Finally, it should be underlined that monetary policy at any time is formulated on the basis of a comprehensive assessment of the economic situation and outlook. Various other factors besides aluminium projects could have a considerable impact on monetary policy when the time comes around.

## 2. Power-intensive development projects in East Iceland

This section describes the construction projects and puts them in a macroeconomic context. Alcoa plans to build an aluminium smelter in Reydarfjörður with

Table 1 Timeframe for cost of hydropower facility and smelter 2003-2008

At constant 2002-prices and as ratios of gross fixed investment and gross domestic product

	2003	2004	2005	2006	2007	2008	Total
Aluminium smelter and harbour (m.kr.)	85	1,440	22,700	49,400	17,800	0	91,425
Hydropower station (m.kr.).....	9,122	16,004	22,690	28,324	10,909	3,725	95,167
Total (m.kr.).....	9,207	17,444	45,390	77,724	28,709	3,725	186,592
Ratio of gross fixed investment (%) <sup>1</sup> .....	5	9	19	27	12	2	.
Ratio of GDP (%) <sup>1</sup> .....	1	2	6	9	3	0	.

1. The estimated values for gross fixed investment and gross domestic product are based on Central Bank projections.

an annual capacity of up to 322 t.p.y. Harbour facilities will also be built beside the Alcoa site.

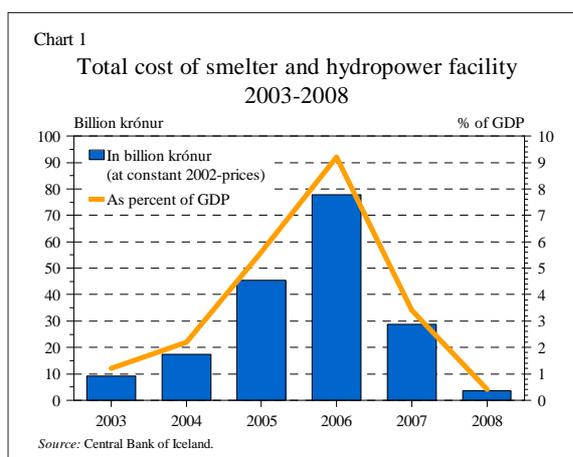
In January this year the agreement between Landsvirkjun and Fjardarál ehf. (Alcoa) was approved by both parties' Boards of Directors. The agreement involves supplying 4,700 GWh of electricity per year, or a total of 537 MW. Hydropower development work is expected to begin in full swing in spring 2003, while various preparatory work has been done beforehand. It is assumed that the electricity will primarily be produced by the Kárahnjúkar hydropower project, including the Fljótsdalur diversion.

The investment made by Alcoa and Landsvirkjun will rank with the largest ever made in the history of Iceland, but relative to GDP it is similar to the construction of the Búrfell hydropower station and the aluminium smelter in Straumsvík in the 1960s. The

total scope of the investment in aluminium and hydropower facilities is 186½ b.kr., with the smelter and harbour in Reydarfjörður estimated at 91½ b.kr. and the hydropower station, diversion and power transmission infrastructure at 95 b.kr. Construction activity will be packed into a tight timeframe. It will be most intense for both the hydro facility and the smelter in 2006, at more than 40% of total project cost. In 2005 and 2006 some two-thirds of construction will take place. Activity is spread differently over the years for the hydropower facility and smelter. The smelter project is on a much tighter schedule, with 80% occurring over 2005 and 2006. Work on the hydropower facility also peaks during these two years, with 54% of total cost incurring in these two years.

Construction of the smelter and hydropower facility will constitute a very high proportion of gross fixed investment in Iceland for the years when these projects are in progress. For the first two years of the construction phase, 2003 and 2004, work on hydropower and smelter development will not make a substantial impression on gross fixed investment: 6% in the first year and 9% in the second year. In the following three years when the bulk of work on hydropower facilities and the smelter takes place, the ratio of the projects to gross fixed investment will rise sharply, to 19% in 2005 and a peak of 27% in 2006.<sup>1</sup>

To evaluate the scale of these projects they can be seen in the context of estimated GDP over the con-



1. Investment cost for the hydropower facility and smelter are represented here as a proportion of annual gross fixed investment.

Table 2 Labour demand 2002-2008

<i>Man-years</i>	2002	2003	2004	2005	2006	2007	2008	Total
Aluminium smelter and harbour.....	0	22	123	460	1,307	362	0	2,274
Hydropower station.....	67	377	662	928	1,162	501	147	3,844
Total .....	67	399	785	1,388	2,469	863	147	6,118
Ratio of total labour demand (%) <sup>1</sup> ...	0.0	0.2	0.4	0.7	1.2	0.4	0.1	.

1. Based on Central Bank projections.

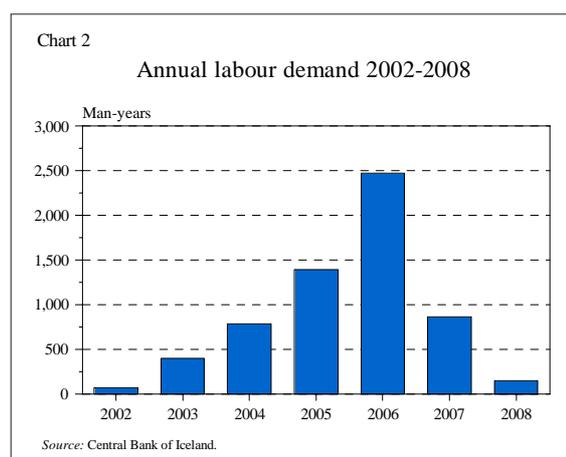
struction period. For comparison, it should be pointed out that construction of the Búrfell hydropower station and Straumsvík smelter at the end of the 1960s peaked in 1968 when it measured 8% of GDP. The scope of the proposed development programme is very similar, or 9% of GDP at its peak in 2006, and an average of 4¼% of GDP for each year over the construction period 2003-2007.

It is estimated that construction cost will be divided 40/60 between domestic and foreign cost. It will, however, will not be spread in even proportions over the construction period. Domestic cost will weigh heavier at the start of the projects, primarily involving earthmoving, construction of tunnels and dams, and concreting. The foreign component will increasingly gain momentum as the projects progress when various imported inputs, materials, equipment and machinery will weigh heavily. Towards the end, sizeable domestic cost can be expected again, when various completion work is done along with installation of piping and wiring, at both the smelter and power station.

An estimated labour requirement of almost 2,300 man-years is needed to build the Alcoa smelter in Reydarfjörður and harbour structures. More than 3,800 man-years are required for work on the hydropower facility, diversions and switchgear. The total is just over 6,100 man-years.

Labour use will be greatest in 2006, at 40% of the total for the entire construction phase. The labour requirement will be around its highest point in 2005 and 2006 when it will amount to almost two-thirds of the total figure. Late in 2007 the labour requirement will rapidly diminish and come to a complete end in late spring 2008. Some 70% of construction workers on the smelter are expected to be Icelandic and 30%

from abroad. Similarly, an estimated 80% of workers on hydropower construction will be Icelandic and 20% from abroad. In total, the labour force will be just over ¾ domestic and just under ¼ foreign. When the domestic labour requirement peaks in 2006 it will amount to 1¼% of Iceland's total labour force. The requirement will probably peak in the first half of that year.



The Alcoa smelter in Reydarfjörður is planned to start operating in late spring or early summer 2007. Some 420 full-time employees are expected to be hired to work in the smelter. Appointment of smelter staff will begin early on in the construction phase and gradually be intensified throughout the period so that all posts will have been filled by the beginning of 2007. It is estimated that it will take the smelter half a year to reach full production capacity, towards the end of 2007.

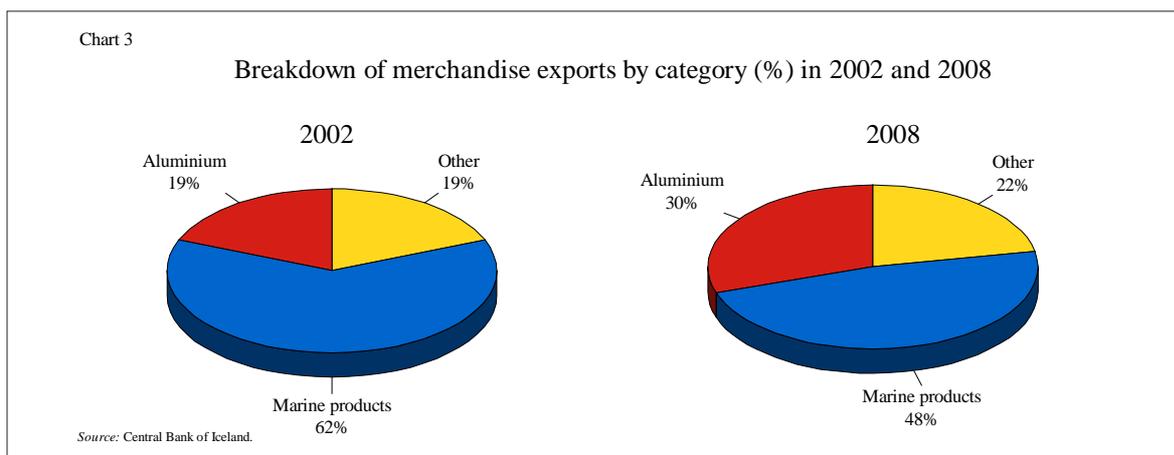
Estimated capacity of the new smelter is 322 thousand t.p.y. which will mean that Iceland's alu-

minium production will increase by more than 120% from 2002.

Aluminium will become a markedly more important export product from Iceland. In 2002 aluminium exports accounted for 19% of Iceland's merchandise exports and marine products 62%. Aluminium prices were relatively low last year and are forecast to rise somewhat as the decade wears on. When the Alcoa smelter reaches full production capacity at the end of 2007, assuming no change in prices from 2002, as a proportion of total merchandise exports aluminium will account for 30% and marine products less than 50%. Assuming that aluminium prices rise in line with forecasts, the proportion of aluminium to total exports will be somewhat higher than that figure at the end of this decade. In recent years aluminium exports have been equivalent to just over 5% of GDP. This ratio will increase substantially when the Reydarfjörður smelter enters full operation and head beyond an estimated 10%.

When the effect of power-intensive industrial projects of this kind is assessed it is important to distinguish between the *short-term* impact of construction of hydropower facilities and smelters and the *long-term* impact of their operation. The impact during the construction phase involves a large-scale investment financed with foreign capital. A considerable part of the investment comprises imports of various types of machinery and equipment, but there will also be a net currency inflow which will be used to finance the use of domestic factors of production. Demand in the domestic goods and labour markets will therefore grow sharply. This impact is temporary, however. It can therefore be termed a *temporary demand shock*. Monetary policy constantly needs to tackle temporary demand shocks. What makes this one unusual is that it is relatively very *large* and also *foreseen*.

In order to understand better the nature of the impact during the construction phase, it can be point-



### 3. Economic impact of power-intensive development projects

This section contains a general discussion of the economic impact that construction of the aluminium smelter and associated hydropower development will have, based on general economic analysis and international experience. Subsequent sections will attempt to make a quantified evaluation of this impact using the Central Bank's models of the Icelandic economy or some components of it.

ed out that the short-term effect of large-scale foreign borrowing for almost any construction project, even if it represented no addition to the production capacity of the economy, is essentially the same. What distinguishes them is the long-term impact. When the smelter starts operating, new production capacity comes into use and export production increases. This strengthens the *supply side* of the economy and gives the economy a boost. Admittedly this is conditional upon a sufficiently large part of the export revenues accruing to domestic parties through power sales to

the smelter, wages, taxes and its purchases of domestic services, to offset the cost of procuring them. Exports increase permanently, or at least for many decades. There has always been a strong long-term relation in Iceland between export revenues and national income. Its level should therefore increase in pace with greater exports. This long-term impact can also be understood in terms of the production of aluminium, and the power that needs to be procured, having a higher productivity than the business activity that may be crowded out in order to create room for them in the economy. Here the success of economic policy and preservation of economic stability during the construction phase may be an important factor. The more success achieved in this respect, the more positive the long-term impact will be, since productive export and import competing industries will suffer less disruption.

In this Appendix, no quantified evaluation of the long-term benefit of these projects will be made. To do so constructively would call for, among other things, a specific study of the profitability of the hydropower project. The reason is that foreign ownership of the smelter but domestic ownership of the hydropower facilities implies that the long-term benefit for the nation depends in part upon how the profitability is shared between them. An assessment is also needed of the extent to which productivity and real wages rise due to the new industries being more productive than those that have been crowded out. Other factors exerting an effect include taxation arrangements for these activities. At this stage the Central Bank does not have the information to make an independent assessment of these factors. Furthermore, it is more consistent with the Bank's role to give priority to evaluating the impact during the construction phase, since monetary policy responds to that impact and not the other. Studies which have been made, such as on the profitability of the hydropower station, suggest that the long-term impact on national income will be positive. The Ministry of Finance, for example, has evaluated the long-term impact on national income using a simple general equilibrium model. Although this does not provide as precise an evaluation as that discussed above, it offers some indication. In the Ministry's opinion, these projects will boost national income in the long-term by three-quarters of a percentage point.

The demand shock which is delivered by the investment is largely foreseen and is described above. Broadly speaking, total investment and labour use are known values, and there are fairly clear ideas about their distribution over time. Specific assumptions are made in the following calculations regarding the division of investment and labour use into domestic and foreign factors. Rather more uncertainty surrounds this point, however, especially regarding labour.

In very rough terms the impact of this kind of demand shock can be predicted on the basis of economic theory. The scope and timing of the impact, however, are highly uncertain. A "correct" statistically estimated economic model that could be used to assess this impact is not at hand and never will be, although constant efforts are made to improve the existing ones. The scale of the shock causes even further complications. Historical experience and data are insufficient to determine with a reasonable degree of accuracy how the economy will react to the demand shock. It is possible that historical relationships of variables may not hold. Furthermore, expectations in the economy could conceivably be exaggerated in the short term. Private consumption could thus grow faster for a while than is justified by the increase in permanent income yielded by the projects. The same could apply to the exchange rate of the króna and other asset prices. Uncertainty also surrounds the effectiveness of economic policy instruments, in terms of both scope and timing. These qualifications must be borne in mind when assessing the results of the calculations presented below.

Like all demand shocks, the projects lift demand above the level where it would otherwise have been. A current account deficit is formed due to heavy imports of investment goods which are used for the projects or form a direct part of the new industrial and power facilities (machinery and equipment). The current account deficit will have no impact on the exchange rate nor create domestic economic pressure since it will be fully funded with foreign equity or borrowed capital. However, a net currency inflow will also take place since foreign capital will be used to finance the use of domestic labour and other factors of production required for the project. The inflow will increase pressure in the domestic goods

and labour markets, contribute to a higher exchange rate and widen the current account deficit. The current account deficit will also grow through increased private consumption and investment in other industries which may accompany the greater optimism that the projects inspire.

Mounting pressure in goods and labour markets is eventually transmitted in the form of greater wage rises and inflationary pressure. The risk is that inflation will get out of control, partly due to increased inflationary expectations. It is this development and the instability that could accompany it that economic policy needs to try to prevent. Not only economic policy operates in this direction, but also certain market forces and adjustment mechanisms that are built into the economy. The exchange rate of the króna and long-term interest rates form part of this process, both of which may be expected to rise during the construction phase and the build-up to it. Another, related adjustment mechanism is the tendency of greater demand to leak out of the economy in the form of a wider current account deficit, thereby easing pressure in domestic markets. It should be added that the excess demand created in domestic goods and labour markets depends to some extent on the proportion of foreign labour and imported capital in construction of the facilities. The higher this share, the less pressure is put on domestic markets. The rise in domestic income will however be smaller.

Fiscal and monetary policy measures can be used in an attempt to reduce excess demand at the very peak of construction and also to soften the contraction that may ensue when it is completed. Monetary policy will strive to keep inflation close to the Central Bank's target and in order to do so will need to maintain higher interest rates than otherwise. The demand shock will be so large that it is uncertain whether this will succeed completely, but as outlined below there is a considerable probability that inflation within the tolerance limits of the inflation target can be achieved. The pressure on monetary policy would be less if accompanied by fiscal countermeasures such as cutbacks in public sector investment at the peak of activity in East Iceland, but increased afterwards and even beforehand. Doing so would be appropriate since monetary measures could have proportionally more effect on export industries than other areas of the economy, by raising the exchange

rate. However, it is not possible that fiscal policy could bear the brunt of the economic policy response. The scale of activity on the project will simply be too great in proportion to, for example, public sector investment.

One important feature of this demand shock is that it is foreseen, as mentioned earlier. This has important consequences for the way in which the economy responds. A good example is exchange rate developments. It is known that the projects will cause a large net currency inflow in the fairly near term. Forward-looking financial markets take immediate account of such information and in effect it is irrelevant that the inflow will not become substantial until after one or two years. All other things being equal, this will cause the króna to appreciate immediately. The exchange rate may also appreciate because the project creates expectations of a rise in the Central Bank's policy rate as the time approaches. This immediately pushes up long-term interest rates, since broadly speaking they reflect expected future short-term interest rates. The interest differential with abroad will widen at the long end of the market, drawing in foreign capital and thereby forcing the exchange rate up.

Thus a rise in the exchange rate during the build-up to the project is only natural, as the Central Bank, and in fact other analysts, have predicted. The higher exchange rate is part of the economy's adjustment to the project. At the same time they help to create room for the project in the economy. The rise in exchange rate reduces inflation and creates slack before construction work enters full swing, thereby causing less pressure in the economy. In fact the same applies to long-term interest rates.

However, a higher exchange rate cannot be a substitute to interest rate rises by the Central Bank, since in part it is based on expectations about them. Although it is convenient to separate the effects of exchange rate and interest rate developments, it must be remembered that under conditions of unrestricted capital movements, these are closely related processes. It can only be expected that one of the largest construction projects in Icelandic history and one of the largest demand shocks that have ever occurred will call for a higher Central Bank policy rate than otherwise, and conceivably a considerably higher one. The following section is an attempt at a quantified

evaluation of what these responses might be. However, it should be reiterated that the following evaluation is only intended to give a rough idea of how monetary policy could respond to the impact of this project, and that there is considerable uncertainty regarding the details of its implementation and ultimate result. The final outcome of this process will not emerge until the construction period wears on. The Central Bank will therefore decide its response when that point is reached.

#### 4. Evaluation of macroeconomic impact without economic policy response

The Central Bank's macroeconomic model was used to evaluate the conceivable impact of the proposed aluminium and power projects on GDP growth, unemployment and inflation. A baseline scenario was set up which did not include the projects. This baseline is consistent with the Bank's economic forecast for 2003 and 2004, except that the forecast incorporates work on the hydropower facilities and aluminium smelter in East Iceland. After 2004 the baseline moves towards equilibrium. The impact of the projects on output growth, unemployment and inflation was assessed as deviations from the baseline scenario for the period 2003 to 2008.

##### 4.1. Assumptions behind the calculations

All the assumptions in the scenarios with and without the power-intensive project were the same as in the forecast presented above. It is assumed that 65% of the investment in the smelter and half of the investment in the hydropower facility are imported, along with one-quarter of the labour force engaged on the projects. Assumptions for labour use and investment are based on information given by the developers and have been used in comparable studies previously made by the National Economic Institute and Ministry of Finance. Furthermore, an unchanged monetary policy was assumed, i.e. the policy rate was kept unchanged for the duration of the period.

Two alternative versions to the baseline were calculated. One assumed that the exchange rate of the króna was unchanged from the baseline scenario. The other assumed that the project would have an impact on the exchange rate. In the latter case, the exchange rate was assumed to strengthen in the first

half of the period, i.e. from 2003 to 2005, because of the capital inflow and expectations of a higher policy rate, then assumed to weaken again towards a new equilibrium. This entails that part of the appreciation that has taken place in recent weeks is the result of the proposed smelter and hydropower projects. For this reason the baseline scenario excluding the projects also assumed that the exchange rate in 2003 would have been somewhat lower than it is at present. In another scenario the exchange rate was assumed to continue to depreciate next year and then rise again towards equilibrium. The scenario incorporating the projects, however, assumes that the exchange rate rises for the first part and then lowers again towards the equilibrium rate. Furthermore, the equilibrium exchange rate is also assumed to be somewhat higher after the smelter enters operation than it would have been without it.

Even though the above exchange rate adjustment is not so improbable, it is clear that precise timing of it is almost impossible to assess, especially because of the impact on investor expectations about future exchange rate developments. As mentioned earlier, it can be argued that at least part of the likely strengthening of the exchange rate has already taken place. Also, expectations about a weakening of the exchange rate at the end of the currency inflow could begin to affect investor expectations as that period comes closer on. Thus it is impossible to give a precise assessment of exchange rate developments over this period. An evaluation of developments had the aluminium projects not arisen is equally difficult to make.

##### 4.2. Main conclusions

As Chart 4 shows, GDP growth in 2003 and 2004 is 1 percentage point higher than if the project had not been launched. Output growth will be 3-4 percentage points greater than otherwise when activity peaks in 2005 and 2006. This assumes no impact of the projects on the exchange rate.<sup>2</sup> A sizeable degree of overheating is therefore involved here, whereby the output gap could measure 6% at most in 2006. By

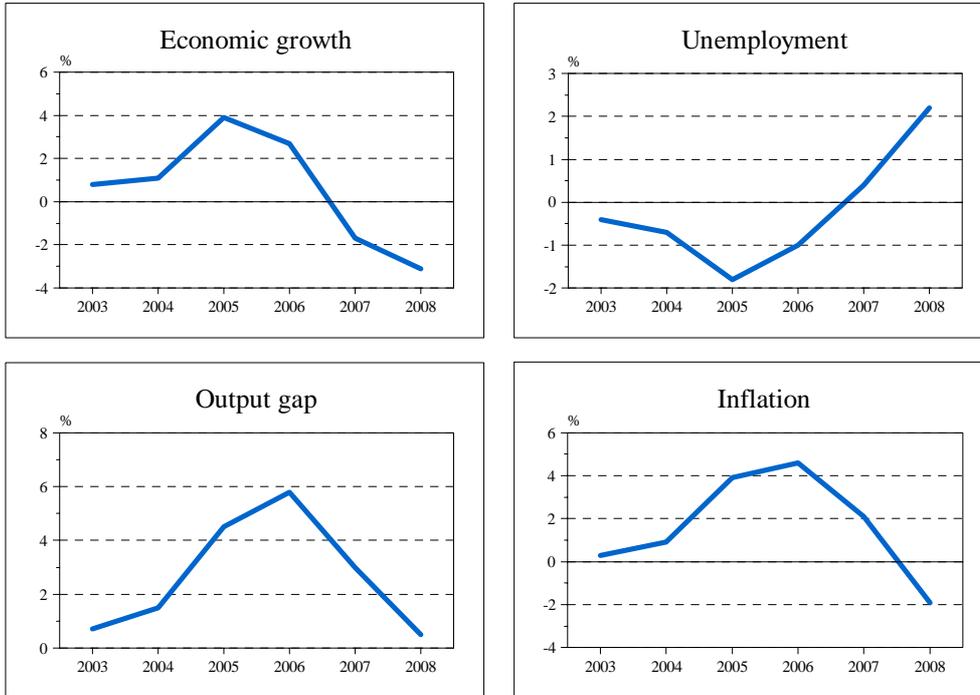
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2. The article on *Economic and Monetary Developments and Prospects* earlier in this edition considers that the project will boost growth by half a percentage point in 2003 and 2004. The discrepancy is the result of different exchange rate assumptions.

Chart 4

Economic impact of the planned power-intensive projects  
without economic policy response and exchange rate adjustment

Deviation from baseline scenario without power-intensive projects (percentage points)



Source: Central Bank of Iceland.

comparison, the output gap was just under 3% in the recent upswing and 3½% in 1987. There would also be a considerable impact on unemployment. Unemployment could be 1½-2 percentage points lower in 2005 than if the project had not taken place, and 1 percentage point lower in 2006, but by then greater labour supply would also be beginning to be felt, taking two forms here: increased labour market participation and increased importation of labour, especially in direct connection with the projects. Overheating of the economy will put pressure on prices and in 2004 inflation could be 1 percentage point higher than otherwise, peaking at 4½ percentage points higher in 2006, which could mean an inflation rate of 6-7%, i.e. considerably above the Central Bank target's upper tolerance limit.

A sharp contraction in investment will take place at the end of the construction phase. When the

smelter starts operating in 2007 and 2008, GDP growth will be considerably slower than otherwise. Unemployment will also be higher, or half a percentage point more in 2007. Part of this increase is the result of more labour market participation because of the projects; the labour market invariably adjusts to the business cycle with some lag. Inflation will also come down in these years and in 2007 it will be only 2 percentage points higher than in the scenario which excludes the project, and in 2008 roughly 1 percentage point lower.

Clearly the sharp swings described here are not only caused by the pending investment. In part their scale is a consequence of the assumptions that were made. Two factors probably weigh heaviest: the assumption that no economic policy responses will be made, and the assumption of no exchange rate adjustment. Conceivable economic policy responses

and their effect on the development of the economy will be addressed below, but an assessment will first be made of the impact of the projects on GDP growth, unemployment and inflation, on the assumption that the exchange rate does not adjust.

If the exchange rate takes part in the economy's adjustment process, the impact on growth will hardly be measurable in 2003 and 2004, based on the exchange rate adjustment described above. Growth will be 1 percentage point higher in 2005 in the scenario that includes the projects and up to 2 percentage points higher in 2006. In 2007 and 2008 it will be marginally higher than without the projects, but the difference will be less than 1 percentage point each year. This is a notably softer impact than when the exchange rate was kept unchanged from the baseline. The same applies to the unemployment rate. Another result is that inflation will be 2 percentage points lower for both years in 2003 and 2004 with the projects included, and just over half a percentage point less in 2005. However, when activity has peaked, and the exchange rate begins to weaken again (but would have been strengthening at the same time in the scenario without the projects), inflation will be higher than otherwise.

Thus the exchange rate adjustment plays an important role in how the economy will absorb this demand shock and clearly has a substantial effect on the outcome. It serves to diminish the effect on the economy compared with assuming an unchanged exchange rate from the scenario that excludes the projects. The impact on inflation also emerges later. However, it should be borne in mind that at least part of such an exchange rate adjustment stems from investor expectations about monetary policy responses. It is therefore difficult to interpret such a development without also taking into account the possible monetary policy responses.

## 5. Assessment of possible economic policy responses and their impact

The calculations presented above are not intended to give an accurate description of economic developments in the next few years and the impact of the aluminium and power projects on the economy, but only to give a rough impression of its scope in relation to the size of the economy and to highlight the need for

taking appropriate economic policy actions in order to create room for this activity in the economy without upsetting its balance.

Assessment of possible economic policy responses to the impact of these investments is based on the Taylor rule which is a simple description of how central bank interest rates respond to the inflation and the output gap (see discussion in Box and Appendix in *Monetary Bulletin*, 2002/2). According to this simple rule, the Central Bank raises its interest rates above a certain equilibrium level if inflation exceeds its target and if there is an output gap in the economy which later imposes a risk of accelerating inflation. This rule is thought to give a good description of the interest rate determination process at the world's main central banks during periods of successful monetary policy, and it is commonly used to estimate the monetary policy response to demand shocks. Different forms of the Taylor rule are applied, depending upon whether the Bank is assumed to smooth its policy rate and the extent to which the rule is forward-looking, i.e. based on an inflation forecast rather than contemporary inflation.<sup>3</sup>

### 5.1. Economic policy actions without exchange rate adjustment

On the basis of the Taylor rule, the Central Bank's policy rate will be somewhat higher than without the aluminium projects. If monetary policy is to some extent forward-looking, the interest rate level can be expected to quickly reach a higher level than otherwise. Calculations suggest that the Bank's policy rate could end up 1½ percentage points higher this year than in the absence of the projects, and up to 5 percentage points higher in 2004-2005 based on an unchanged exchange rate from the scenario which excludes the projects. In 2006, however, it will be only 1½ percentage points higher than in the baseline scenario, and well below the level in the baseline in 2007 on account of the slack generated in the economy at that time.

If the monetary policy is less forward-looking, the policy rate will rise later. This year it would be

3. A macroeconomic model and VAR analysis are used (see article by Thórarinn G. Pétursson, "The transmission mechanism of monetary policy", *Monetary Bulletin* 2001/4, 62-77) to evaluate the monetary policy response and its impact on the economy.

only half a percentage point higher than otherwise, and next year 1½ percentage points higher. In 2005-2006 it would need to be 4½-5½ percentage points higher than otherwise because the Bank had in effect raised the rate too late, i.e. waited too long in order to be able to counter the overheating that the projects generated. On average over the period 2003-2007, the interest rate will be considerably higher than in the scenario based on a forward-looking monetary policy. The Bank will be more successful in constraining inflation and domestic demand, the more forward-looking it is in policy rate decisions. In the following discussion a forward-looking monetary policy is assumed.<sup>4</sup>

As may be expected, the overheating that establishes itself in the build-up to and peak of construction activity can be dampened to some extent. GDP growth will be a maximum of 1 percentage point higher in 2005 than in the absence of the projects, compared with just under 4 percentage points in the scenario without monetary policy response. Monetary policy also manages to smooth the unemployment rate, leaving it at 1 percentage point below the baseline level in 2005 instead of almost 2 percentage points without monetary policy response. In 2006 the unemployment rate is virtually the same in both scenarios, while in 2007 it is rather higher in the scenario with monetary policy responses, due to tighter monetary stance. Since monetary policy manages to dampen the swings caused by the projects, the output gap will also be more stable. It therefore widens much less because of the monetary policy response and is just ½-1 percentage point greater than in the scenario excluding the projects in 2003-2004 and 2 percentage points greater in 2005-2006.

Chart 5 shows that this is also reflected in the inflation rate over the period. Inflation is just under

half a percentage point higher than in the baseline scenario excluding the projects in 2003-2004 and 2 percentage points higher in 2005-2006, compared with 4-4½ percentage points in the absence of monetary policy responses. In 2007 inflation is then a mere half a percentage point higher than in the baseline.

Although monetary policy achieves a substantial reduction in the inflationary impact of the project, it does not seem to manage to keep inflation within the Central Bank's tolerance limits, assuming that it is on target in the baseline scenario. However, the deviation is smaller if a Taylor rule which attaches more importance to keeping inflation close to target or gives less priority to smoothing the policy rate is applied. If this development turns out to be correct, the Central Bank will clearly need to adopt a tighter monetary stance in order to maintain its inflation target than the one described here.

If fiscal policy is also applied to contain domestic demand, inflation is more likely to be kept close to the upper tolerance limit of the target. To give some idea of the impact of public sector restraint, a scenario was calculated which assumed that public sector investments would be postponed so that they contracted by 20% in real terms in 2005 and 2006 but would increase correspondingly in 2007 and 2008. These measures succeed in reducing overheating during the build-up to the projects and soften the contraction when they are over. Inflation remains within the tolerance limits at the peak of activity in 2006 and the Central Bank policy rate could peak at 2-2½ percentage points lower than if monetary policy alone carried the weight of economic policy responses. However, the policy rate would go down more slowly than if no fiscal response were made, since increases in public sector investment at the end of the project softens the downswing that monetary policy would otherwise need to tackle.

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4. It should be reiterated that the forward-looking Taylor rule in effect assumes that the Bank knows the future development of inflation with complete certainty. The results suggest that the Central Bank is more successful in levelling out swings in inflation and the output gap than when it responds only to contemporary developments. In reality the Bank has no such information, so it is unclear which approach proves better, and the findings in the international literature are somewhat ambiguous in this respect. International studies of monetary policy responses usually apply the Taylor rule with contemporary inflation, which is felt to provide a generally good forecast of future inflation developments.

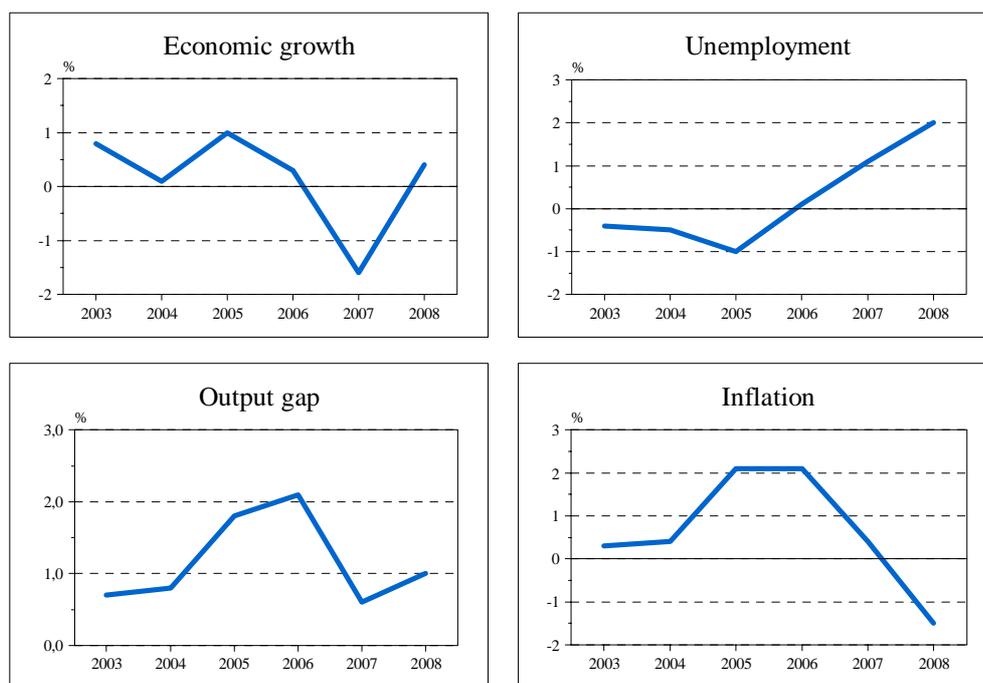
### *5.2. Economic policy responses with exchange rate adjustment*

The above calculations assume that the exchange rate of the króna plays no role in the economy's adjustment to the projects. As pointed out earlier, this is a rather unrealistic assumption, since the exchange rate can be expected to be affected by the cyclical upswing that would accompany the projects,

Chart 5

### Economic impact of the planned power-intensive projects with economic policy response but without exchange rate adjustment

Deviation from baseline scenario without power-intensive projects (percentage points)



Source: Central Bank of Iceland.

although it is difficult to make a reliable assessment of the size of the effect. Nonetheless, the króna can be expected to strengthen during the build-up to the projects and their peak in conjunction with the large currency inflow that they cause, and with expectations of a rise in the policy rate because of increased inflation.

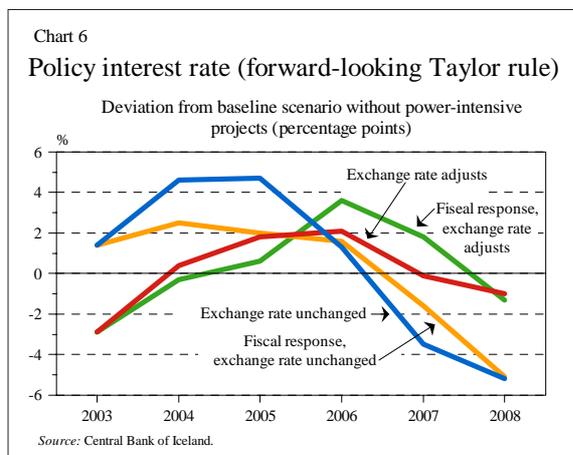
Such an adjustment of the exchange rate helps the economy to absorb the impact of the projects. Their effect on growth and unemployment will be correspondingly weaker since the strengthening of the exchange rate weakens the competitive position of export industries and helps to create room for the projects by crowding out other activities.

This different development is also reflected in the monetary policy response, as shown in Chart 6. Without the projects going ahead, inflation this year would have been considerably higher than currently

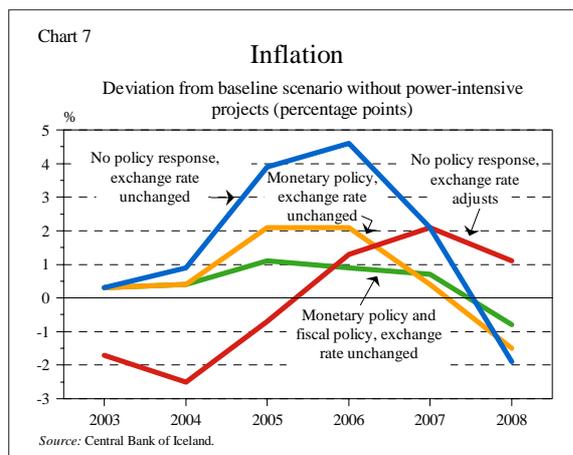
forecast, since the króna would have been significantly lower than at present. Thus the policy rate ought to be as much as 3 percentage points lower this year if the project goes ahead, without any exchange rate adjustment. Assuming a forward-looking monetary policy, however, interest rates would immediately rise next year above the baseline scenario, peaking at 2 percentage points higher in 2005-2006.

With monetary policy responses and an exchange rate adjustment, inflation will exceed the figure in the scenario which excludes the projects by just under 1 percentage point in 2006 and just over 1 percentage point the following year. Thus inflation remains within the tolerance limits of the target. However, this implies that GDP growth will be lower than in the baseline, and unemployment higher.

Thus an exchange rate adjustment clearly helps to counter overheating resulting from the projects and



makes it possible to reach the inflation target at lower interest rates than otherwise. Fiscal action in addition to an adjustment of the exchange rate would then create the opportunity for even lower interest rates. Chart 7 shows the development of inflation based on different exchange rate assumptions and economic policy responses.



### 5.3. Uncertainties and reservations

Various reservations have to be made regarding these calculations, given the great uncertainty involved in such a long-term projection, the economic policy responses and the means by which the economy absorbs them.

One of the greatest uncertainties concerns exchange rate developments. The above calculations are based on two kinds of assumptions as to exchange rate developments. Economic development

based on these exchange rate assumptions, however, are different from scenarios based on the current exchange rate level and in the absence of the projects, since the current strong exchange rate reflects at least in part expectations about their impact. Thus a scenario which incorporates an exchange rate adjustment should be compared with a scenario excluding the projects and an exchange rate which is somewhat weaker than at present and continues to weaken. Although the scenario incorporating an exchange rate adjustment is more credible than the one that leaves it unchanged, it is extremely difficult to make a reliable forecast of the exchange rate trajectory with and without the projects.

Uncertainties about the models used is also great. In comparison with the Bank's conventional inflation forecasting models, for example, the macroeconomic model used in the calculations above is likely to underestimate the impact of excess demand on inflation but overestimate the impact of exchange rate changes. If this is correct, the projects would probably not have as much impact on interest rates in 2003 under an adjustable exchange rate as the above scenarios imply.

On a related point, the effect of exchange rate fluctuations on domestic inflation could be overestimated. Experience from other countries that have moved from a fixed exchange rate regime to a flexible one, and the inflation developments after the króna depreciated in the wake of being floated could give reasons to believe that the impact of short-lived exchange rate fluctuations on domestic inflation is currently weaker than historical relationships suggest.

Related to this is uncertainty about how the economy adapts to policy rate changes. This varies somewhat depending upon the model used. The macroeconomic model is based on historical relationships over a long horizon and suggests that the policy rate needs to be raised more in order to contain inflation in the wake of the projects. The policy rate increases described above would therefore probably prove inadequate for keeping inflation close to the Bank's target. However, the above evaluation is based on a statistical estimation of a simpler model over a shorter period and indicates greater interest rate sensitivity. Since the time series used to estimate the model are relatively short, however, the model could over-

react to the interest rate, creating considerable uncertainty about this impact over and above what generally surrounds the impact of monetary policy on the economy, as discussed in the article by Thórarinn G. Pétursson (2001).<sup>5</sup>

The impact of the project on public's expectations is also highly uncertain, and could be greater than allowed for in the scenarios above. Demand

would therefore be higher than in the scenarios which include the projects, but weaker without them. The difference between economic developments with and without the projects would thus be even greater than assumed here. Hence, the impact on inflation and thereby on interest rates would be greater, and could also be felt earlier than has been assumed.

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5. Thórarinn G. Pétursson, "The transmission mechanism of monetary policy", *Monetary Bulletin* 2001/4, 62-77.