

## Outlook for the German economy: macroeconomic projections for 2008 and 2009

The German economy remains on a sound upturn path which is quite broadly based on the demand side, and which may be seen as relatively employment-intensive. This basic underlying trend will be maintained in the next two years, although the pace of growth is likely to be slower, at somewhat less than 2% annually in non-working-day-adjusted terms.

The price climate has deteriorated visibly during the current year. The average annual rate of HICP inflation will probably amount to 2.3% in 2008 – as in 2007, in which fiscal measures made a contribution of some 1½ percentage points. In 2009, however, the inflation rate could slow down to 1.5%, provided that crude oil prices tend to ease in line with market expectations, the increase in agricultural prices does not continue beyond the middle of 2008, and the present sharp upward pressure on prices is not used by wage policy-makers as an occasion for higher negotiated pay rates.

Owing to these assumptions, the upside risks to prices predominate towards the end of the projection period when compared with the baseline projection. By contrast, the main risks to real economic developments, which lie primarily in the international setting and a fairly large loss of purchasing power, are on the downside.

## Preliminary remarks

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The macroeconomic projections for Germany for 2008 and 2009, the main results of which are presented in this article, are an integral part of the projections for the euro area prepared by Eurosystem staff.<sup>1</sup> The results of these projections for the euro area are incorporated into the assessment of economic developments and the risks to price stability undertaken by the Governing Council of the ECB for the Eurosystem's monetary policy strategy. The ECB began publishing these projections in December 2000.<sup>2</sup> The main reasons for this were to create greater transparency and to improve communication with the general public.

In this report, the Bundesbank is publishing its contribution to the euro-area projections for the first time and thereby extending the range of information it provides. The projection was completed on 23 November 2007.

## The projection framework

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*Conditional nature of the projection*

The projection is based on a number of assumptions which are determined – insofar as they concern the global economic setting and the euro area – jointly by Eurosystem staff. These include, in particular, the assumptions about future interest rates, exchange rates, crude oil prices and world trade. These assumptions highlight the typical conditional nature of economic projections.

In addition to forecasting the most probable development (baseline projections), assessing

both qualitative and quantitative risks is a key part of the macroeconomic projections. This concerns not only the above-mentioned exogenous assumptions but also other factors of uncertainty associated with point estimates. In line with the Bundesbank's stability policy mandate, particular attention is paid to price risks.

*Baseline projection and risk analysis*

## Major assumptions

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With regard to exchange rates, the assumption specified by the Governing Council of the ECB is that the euro's exchange rate against the US dollar will remain constant during the projection period at its average level during the first half of November of US\$1.46, compared with an average exchange rate of US\$1.37 to the euro for 2007. Against the 24 most important trading partners of the euro area, an effective euro exchange rate of more than 2½% above the 2007 level is anticipated.

*Exchange rates*

For the assumptions about interest rates, the market expectations observed in the first half of November are used. This "snapshot" shows short-term interest rates, measured by the three-month EURIBOR, at 4.5% on an average of 2008 and at 4.3% in 2009. The market assessment of the long-term govern-

*Interest rates*

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<sup>1</sup> See European Central Bank, Eurosystem staff macroeconomic projections for the euro area, Monthly Bulletin, December 2007, pp 83-86.

<sup>2</sup> Since then, the staff projections have been published in the June and December editions of the ECB Monthly Bulletin. Furthermore, in its Monthly Bulletin for March and September the ECB publishes the projections for the euro area which have been prepared by its staff without the involvement of the national central banks.

ment bond yields in Germany indicates a flat profile with average annual figures of 4.1% in 2008 and 4.2% in 2009.

*Turbulence in the financial markets*

Corporate bond spreads increased perceptibly in summer – albeit from a decidedly low level – owing to the turbulence in the financial markets. The projection is based on the assumption of slightly greater spreads for bank loans throughout the forecasting horizon, which means that it costs the enterprises somewhat more to raise funds.

*Oil price and other commodity prices*

Based on forward quotations, an annual average oil price of US\$88.6 per barrel of Brent crude oil was used as the basis of the Eurosystem projection for 2008. For 2009, a decline to an average of US\$83.7 was assumed. In US dollar terms, the other commodity prices (excluding energy) are assumed to go up in 2008 by just under 9% compared with the average for 2007 and to increase by a further 4½% in 2009.

*World economy and global trade*

With regard to the development of the world economy, the projection is based on the assumption that the rates of global growth will slow down from a very high level to roughly 4¾% annually during the forecasting horizon. Simultaneously, it is assumed that the calendar-adjusted volume of global trade will increase in 2008 and 2009 by 6½% and 7% respectively, compared with just over 6% in 2007.

*Public finances*

In public finances, all measures which have been adopted or which have already been specified in sufficient detail and are likely to be adopted were taken into consideration.

**Major assumptions of the projection**

| Item   | 2006  | 2007  | 2008  | 2009  |
|--|-------|-------|-------|-------|
| <b>Exchange rates for the euro</b>                 |       |       |       |       |
| US dollar/euro                                     | 1.26  | 1.37  | 1.46  | 1.46  |
| Effective <sup>1</sup>                             | 103.6 | 107.6 | 110.4 | 110.4 |
| <b>Interest rates</b>                              |       |       |       |       |
| Three-month EURIBOR                                | 3.1   | 4.3   | 4.5   | 4.3   |
| Yield on government bonds outstanding <sup>2</sup> | 3.8   | 4.2   | 4.1   | 4.2   |
| Crude oil price <sup>3</sup>                       | 65.4  | 72.6  | 88.6  | 83.7  |
| Other commodity prices <sup>4, 5</sup>             | 24.9  | 18.1  | 8.9   | 4.5   |
| German exporters' sales markets <sup>5, 6</sup>    | 8.3   | 5.7   | 5.8   | 6.3   |

<sup>1</sup> Compared with the EER-24 group of currencies. — <sup>2</sup> Yield on government bonds outstanding with a residual maturity over nine and up to ten years. — <sup>3</sup> US dollars per barrel of Brent North Sea oil. — <sup>4</sup> In US dollars. — <sup>5</sup> Percentage year-on-year change. — <sup>6</sup> Working-day adjusted.

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This applies, in particular, to the business tax reform in 2008, the reduction in the contribution rate to the Federal Employment Agency to 3.3% and the extension of the period of entitlement to unemployment benefit I for older workers at the beginning of 2008.

**Cyclical outlook**

The cyclical upturn of the German economy continued at a brisk pace in the third quarter of 2007. Compared with the second quarter, overall economic output increased by 0.7% after seasonal and working-day adjustment and was 2.5% up on the year in calendar-adjusted terms. There had been a noticeable slowdown in the pace of growth in the first half of 2007, which was due mainly to the

*Upturn in Germany...*

contractionary fiscal impulse generated by the increase in value-added tax as of 1 January 2007, which affected private consumption in particular. On a half-year comparison, annualised economic growth was 2.3% compared with 3.8% in the second half of 2006, during which it had benefited from anticipatory effects in connection with the increase in VAT.

*... continues at  
a slower pace*

Conditions for a continuation of the upswing remain positive, even though the pace of growth will become slower during the forecasting horizon. Given the recent turbulence in the financial markets, a certain weakening of global economic momentum may be expected in the coming year. This will affect Germany at a time when the domestic economy – supported, not least, by an improvement in major growth fundamentals – is in quite robust shape. This is confirmed by business sentiment indicators. Much points to the domestic forces of growth gaining in importance. Investment in machinery and equipment is likely to continue its upward trend, although it will fail to match the strong growth of 2007. The ongoing high level of capacity utilisation in the economy could particularly benefit commercial construction investment, much of which is for capacity extensions. Only minor recovery potential is identifiable in housing construction, however. Given a continuation of the favourable development in the labour market, private consumption is likely to gain momentum once the dampening fiscal effects have receded. Overall, the most probable scenario is that of the classical upswing, in which the initial spark is provided by exports, investment is stepped up in the

second stage, and, finally, private consumption picks up, too.

Based on the indicators available up to November, we assume a rather moderate expansion in overall economic activity for the final quarter of 2007. In particular, the decline in purchasing power due to recent developments in consumer prices might have a dampening impact on private consumption. The external sector will probably make a rather minor positive contribution to growth. Overall, the German economy is therefore likely to start the new year only with moderate momentum.

In the first half of 2008, the economy will remain on a growth path, initially at a reduced pace. Above all, corporate investment is likely to weaken temporarily owing to the anticipatory effects in connection with the temporary easing of depreciation requirements. By contrast, private consumer demand is likely to become increasingly buoyant in view of the continuing improvement in the labour market situation. From the second half of 2008, there is then the prospect of quarterly real gross domestic product (GDP) growth returning to figures in the vicinity of ½%. On an annual average in calendar-adjusted terms, we expect a rise of 1.6% for 2008 and of 2.0% for 2009. This means that, in the coming year, the German economy will probably grow roughly in line with potential output. Total output is likely to expand noticeably more strongly again in 2009. Owing to the differing number of working days, real GDP will increase by 1.9% in non-working-day-adjusted terms in each of the two years.

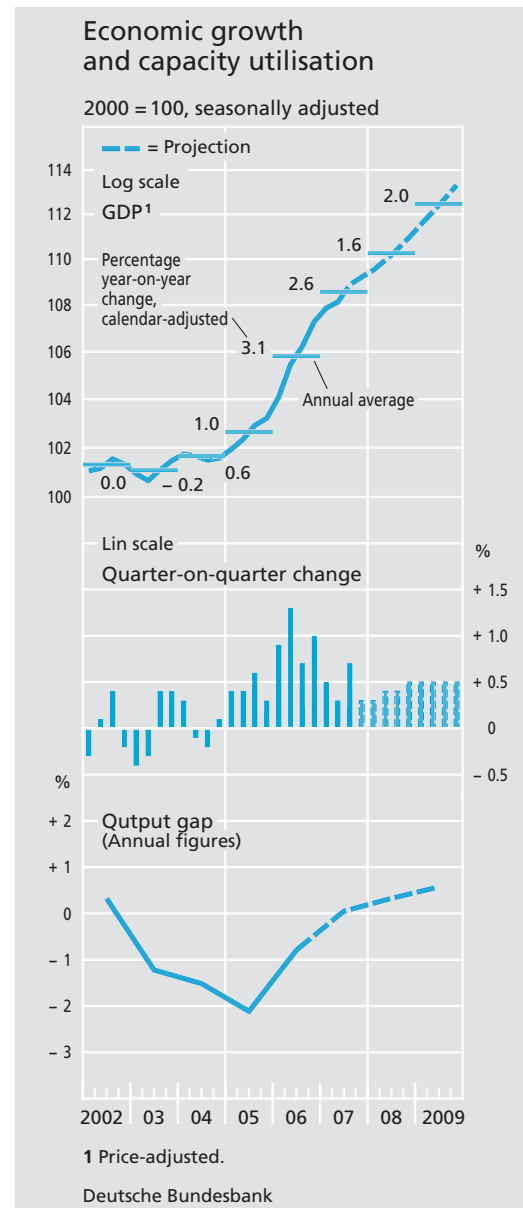
*Economic  
growth at or  
above potential  
rate*

*Stimuli still  
coming from  
abroad*

Exports will remain a major provider of stimulus to the German economy throughout the forecasting horizon. Owing to their overall favourable price competitiveness and the wide range of products offered, German exporters expanded their market share once again in 2007. The appreciation of the euro means that their market position will probably show only minor improvement in 2008, however. In non-working-day-adjusted terms, we expect an increase in real exports of goods and services of 6¾% in 2008 and of 6¼% in 2009. Given a projected rise in real aggregate demand of some 3½% for each of those years, real imports are likely to go up by 7% in 2008 and 6¾% in 2009. This means that net exports will make a positive mathematical contribution to growth, although, at ¼ percentage point per year, it will be noticeably smaller than in 2007.

*Real investment  
still mainstay of  
growth*

Gross fixed capital formation will remain a major mainstay of economic growth during the forecasting horizon. Given the high level of capacity utilisation in manufacturing, investment in capacity extension, in particular, will record a sharp increase. Even a moderate deterioration in external financing conditions will not pose an obstacle to this, especially as strong profitability means that German enterprises can tap a large pool of accumulated internal funds and have an improved base of capital and reserves.<sup>3</sup> In the case of machinery and equipment – with the temporary increase in the declining-balance depreciation rate expiring at the end of 2007 – there will be a temporary slowdown in the expansion in 2008. Commercial construction will continue to rise during the forecasting horizon. In view



of the generally comfortable financial situation in the public sector, government investment is likely to be stepped up considerably. The potential for recovery in housing construction will remain quite constrained, however. Above all, expenditure on measures to modernise the housing stock, which are, moreover, government-assisted, will support

<sup>3</sup> See also in this issue: German enterprises' profitability and financing in 2006, page 31-55.

### Key results of the macroeconomic projection

#### Percentage year-on-year change

| Item                                      | 2006 | 2007 | 2008 | 2009 |
|---|------|------|------|------|
| GDP (real)                                | 2.9  | 2.5  | 1.9  | 1.9  |
| GDP (working-day adjusted)                | 3.1  | 2.6  | 1.6  | 2.0  |
| Components of real GDP                    |      |      |      |      |
| Private consumption                       | 1.0  | -0.2 | 1.6  | 1.5  |
| Government consumption                    | 0.9  | 1.6  | 1.0  | 1.3  |
| Gross fixed capital formation             | 6.1  | 5.2  | 3.2  | 2.9  |
| Exports                                   | 12.5 | 8.1  | 6.7  | 6.3  |
| Imports                                   | 11.2 | 6.1  | 7.1  | 6.8  |
| Contributions to GDP growth <sup>1</sup>  |      |      |      |      |
| Domestic final demand                     | 1.8  | 1.1  | 1.7  | 1.6  |
| Changes in inventories                    | -0.1 | 0.1  | -0.1 | 0.1  |
| Net exports                               | 1.1  | 1.2  | 0.3  | 0.2  |
| Labour market                             |      |      |      |      |
| Total number of hours worked <sup>2</sup> | 0.5  | 1.7  | 1.0  | 0.4  |
| Persons employed <sup>2</sup>             | 0.6  | 1.7  | 0.6  | 0.5  |
| Unemployed persons <sup>3</sup>           | 4.5  | 3.8  | 3.5  | 3.3  |
| Unemployed rate <sup>4</sup>              | 10.8 | 9.0  | 8.3  | 7.8  |
| Unit labour costs <sup>5</sup>            |      |      |      |      |
| Compensation per employee                 | 1.1  | 1.1  | 2.2  | 2.8  |
| Real GDP per person employed              | 2.2  | 0.8  | 1.3  | 1.4  |
| Consumer prices <sup>6</sup>              |      |      |      |      |
| Excluding energy                          | 1.0  | 2.0  | 1.7  | 1.7  |
| Energy component                          | 8.4  | 4.1  | 6.8  | 0.5  |

Sources: Federal Statistical Office; Federal Employment Agency; from 2007 to 2009, Bundesbank projections. — <sup>1</sup> Percentage points. — <sup>2</sup> Workplace concept. — <sup>3</sup> In millions of persons (Federal Employment Agency definition). — <sup>4</sup> As a percentage of the civilian labour force. — <sup>5</sup> Ratio of domestic compensation per employee to real GDP per person employed. — <sup>6</sup> Harmonised Index of Consumer Prices (HICP).

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demand for construction. On the other hand, the higher construction and financing costs also mean that new housing construction is likely to be subdued at best.

Including other investment, which chiefly includes software which has been bought-in or produced in-house, gross fixed capital formation could increase by roughly 3% per year. The total capital stock, which is a major indicator of future growth opportunities, was growing – if housing is excluded – at no more than 1¼% latterly. During the forecasting horizon, its rate of growth will match that of the second half of the 1990s (roughly 1¾%).

As expected, private consumption declined perceptibly in real terms at the beginning of 2007. This was due not only to the direct dampening effect of the increase in the standard rate of VAT but also to anticipatory spending in 2006, which was “lacking” thereafter. This was also reflected in household saving. Saving’s share of disposable income fell initially to 10.4% in the final quarter of 2006 before going back up to 10.9% in the first six months of 2007.

*Private consumption dampened by VAT effect in 2007, but ...*

Once the time shifts in saving caused by the VAT increase have run their course, the fundamental determinants of saving will increasingly return to the fore. Among the major factors contributing to the increase in the household saving ratio since 2000, provisional saving, ie the necessity of making private pension provision, is still a factor. By contrast, precautionary saving is becoming less important in view of the improved labour market

*... more scope during the forecasting horizon*

outlook.<sup>4</sup> The household saving ratio is likely to fall to just over 10½% in 2008 on an annual average and to stay at roughly the same level in 2009.

Households' income situation will likewise show a marked improvement during the forecasting horizon. The continuing growth in employment, higher average compensation of employees and the ongoing rise in profit and investment income will contribute to this in equal measure. Overall, households' nominal disposable income is likely to increase to just under 3½% in 2008 and 3% in 2009. Together with the somewhat reduced propensity to save, this will lead to a perceptible rise in real private consumption of around 1½% in each of the two years.

*Growth more  
employment-  
intensive*

There was a further improvement in the labour market situation in 2007 in the wake of the sharp upswing, and clear progress has been made in reducing long-term unemployment. The wage moderation of the past few years and the integration of persons with below-average productivity into the production process have caused economic growth to become more labour-intensive. This trend is likely to continue during the forecasting horizon. Accordingly, the increase in hourly productivity, at just under 1% in 2008 and 1½% in 2009, will remain below the average rate of the past ten years (+1¾%). Given the economic growth projected here, the total number of hours worked will go up by 1% and just under ½% respectively.

In calendar-adjusted terms, the average number of hours worked per employed person is

unlikely to change much during the forecasting horizon. The increasing part-time ratio could be more or less offset by the cyclically induced additional hours worked by full-time employees used to counter partial shortages in the labour market. The number of persons in work is likely to increase by around ½% in both 2008 and 2009. For the forecasting horizon, it is assumed that the decline in the number of persons of working age for demographic reasons will be roughly offset by increased labour market participation. Under these conditions, the official unemployment figure of not quite 3.7 million in autumn 2007 will fall by more than 400,000 by the end of 2009. On an annual average, this means an official unemployment level of 3.5 million in 2008 and 3.3 million in 2009. Accordingly, the unemployment rate as defined by the Federal Employment Agency will fall from 9.0% in 2007 to 8.3% in 2008 and 7.8% in 2009.

*Further increase  
in employment  
and falling  
unemployment*

### Labour costs and price outlook

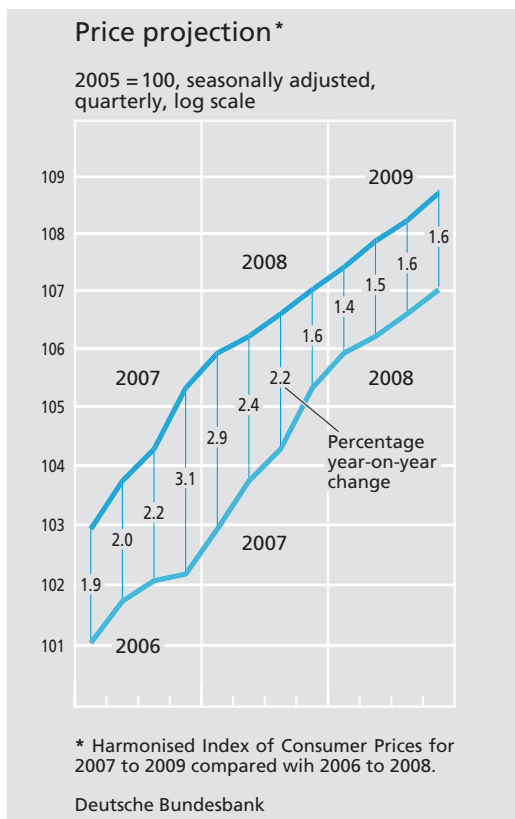
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Following a lengthy period of pronounced wage moderation, negotiated rates of pay may be expected to rise again somewhat. This is already suggested by wage agreements in 2007. Negotiations scheduled for 2008 include those for the public sector (central and local government). As basic pay rates have virtually stood still for a period of three years, a perceptible increase may be expected in line with the pattern in the private sector.

*Higher pay  
settlements*

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<sup>4</sup> See Deutsche Bundesbank, Private consumption in Germany since reunification, Monthly Report, September 2007, pp 41-55.



Including the increases already agreed in 2007 and the other new agreements, it is assumed that the overall negotiated rates of pay will increase by 2½% in both 2008 and 2009.

*Marked rise in actual earnings*

Given that the outlook for the economy remains positive and that isolated shortages exist in some segments of the labour market, actual earnings, too, are likely to increase at a more rapid pace. The growth of gross remuneration per employed person, at more than 2½% in 2008 and 2¾% in 2009, could therefore outpace that of negotiated rates of pay somewhat. We accordingly expect a slightly positive wage drift during the forecasting horizon.

Along with the expected increase in productivity, this will lead to a growth in nominal unit labour costs, ie the ratio of compensation per employee to real GDP per person employed, of just under 1% in 2008 and roughly 1½% in 2009. This will mean a gradual rise in wage cost pressure despite the fact that a marked easing of social security contributions has been agreed for 2008. At the same time, the price for domestic value added – measured by the GDP deflator at basic prices – will go up by 1½% in both 2008 and 2009. In sum, enterprises will probably only be able to achieve a slight increase in their profit margins.

*Increasing wage cost pressure*

Consumer price inflation in 2007 was influenced to a particular extent by government measures (3% increase both in the standard rate of VAT and in insurance tax, introduction of university tuition fees in a number of federal states, and compulsory admixture of bio-fuels to petrol and diesel). In purely nominal terms, these measures added around 1½ percentage points to the expected annual average HICP rate of 2.3%.<sup>5</sup>

*High rate of price increase continuing in 2008, easing of inflation in 2009*

A similarly sharp rise in consumer prices is anticipated for 2008 on average, although the fiscal strains will be far less severe. Despite the dampening effects of appreciation, inflationary pressure will be exerted mainly by higher crude oil prices, which are also reflected in the prices of other energy sources and – like the prices of other commodities – add to

<sup>5</sup> As is customary in the Eurosystem, the inflation projections are based on the Harmonised Index of Consumer Prices (HICP) and not on the national consumer price index (CPI).



firms' costs. Added to this is the upward pressure on prices emanating from the international agricultural markets.<sup>6</sup> According to the assumptions on which the projection is based, these unfavourable effects will either diminish or even go into reverse in 2009. At 1.5% for 2009, therefore, a distinctly lower rate of price increase is expected than in the two preceding years. The absence of a more marked difference between 2007-08 and 2009 is mainly because the stronger wage cost pressure is being gradually reflected in consumer prices. The HICP inflation rate during the forecasting horizon may be expected to remain above 2½% well into 2008 before going down to 2¼% in the third quarter of that year. Under the given assumptions and provided there are no further price shocks, HICP rates of 1½% can be anticipated for the rest of the forecasting horizon.

### Public finances

*Balanced general government budget to be expected for 2007*

The public finance situation in Germany continued to improve perceptibly in 2007.<sup>7</sup> Following a deficit of 1.6% of nominal GDP in 2006, a more or less balanced general government budget is likely to be achieved in 2007. Although the favourable development of the economy played a part in this decrease, much of it is due to structural factors such as, in particular, the increase in VAT and the continued moderate development of expenditure.

*Slight deficit to be expected again in 2008*

The general government budget situation is likely to worsen again in 2008. However, the renewed positive cyclical influence, as seen

from the current perspective, will partially offset the foreseeable structural deterioration. Besides a lowering of the contribution rate to the Federal Employment Agency, the development in profit-related taxes will contribute to what will probably be a slight overall budget deficit. First, the marked tax shortfalls in connection with the business tax reform have to be taken into account in this context. Second, following the sharp growth rates of the past few years, revenue from profit-related taxes is now likely to have reached a level that is perceptibly higher than normal. With this in mind and given the persistent financial market turbulence, rather weak growth appears probable for the immediate future. Overall, the general government revenue ratio is therefore likely to show a marked fall. Nevertheless, the expenditure ratio will also decline – albeit to a lesser extent – since pension and labour market expenditure, in particular, is continuing to grow at a lower rate than nominal GDP.

Assuming that no further fiscal measures are taken and that the overall economic setting for public finances remains favourable, general government budget balances are likely to improve again in 2009. The expenditure ratio could continue to fall, albeit more slowly, while the revenue ratio will probably show hardly any change from how things stand at

*Slight improvement possible in 2009*

<sup>6</sup> For details, see the comments in the November 2007 Monthly Report, p 50 ff.

<sup>7</sup> The account below is of the finances of general government as defined in the national accounts; this definition is also used largely as the basis for assessment of the Maastricht criteria. For a more detailed assessment of budgetary developments at central, state and local government level and of the social security funds, see Deutsche Bundesbank, Monthly Report, November 2007, p 60 ff.

## The uncertainty and risks involved in macroeconomic forecasts

Macroeconomic forecasts are fraught with uncertainty for a number of reasons. The subsequent realisation of the forecast variables will therefore usually deviate from the point forecasts. The greater these differences are on average, the more uncertain the forecasts. Conversely, if the average deviation is low, this indicates that the forecasts are comparatively secure.

Five sources of forecasting uncertainty and possible causes of forecast errors can be distinguished. The model used for forecasting can differ from the actual data generation process (model uncertainty). Models generally describe the macroeconomic process at a very high degree of abstraction and aggregation and must thus necessarily hide some of the complexities of economic processes that are based largely on division of labour or confine the illustration to certain elements which are deemed characteristic. For the forecast, it is assumed that the relationships considered in the model are of sufficient relevance and will remain valid over the forecasting horizon. In addition, the starting values upon which a forecast is based can be tentative and thus subject to future statistical revisions (data uncertainty). The "real-time data problem" has been discussed particularly intensively in recent times.<sup>1</sup> Furthermore, estimates are also necessary for the exogenous variables in the model, and these can be fraught with errors (exogenous uncertainty). The development paths for oil prices and capital market rates used for the forecasts are seen as classic examples of this. In addition, it cannot be ruled out that a number of non-systematic disruptions will occur in the forecast period – "stochastic shocks" that cannot

be foreseen owing to their incidental nature but that are temporarily able to influence, more or less strongly, the underlying relationships between the economically relevant variables (residual uncertainty). For instance, unusual weather conditions can temporarily have a stronger impact on value added than in the usual seasonal pattern, particularly in the construction industry. Estimation of the model parameters is also subject to uncertainty as samples of only a limited size are available and the data used can be fraught with errors (estimation uncertainty). The different sources of forecasting uncertainty are not generally independent of one another; they can be mutually reinforcing but may also offset one another. It is thus conceivable that if the exchange rate of the euro against the US dollar is underestimated, this will go some way towards "correcting" an underestimation of the dollar price of imported crude oil in terms of the effect on domestic prices.

The precise extent of the forecasting uncertainty is unknown and must be estimated.<sup>2</sup> One procedure is to carry out stochastic simulations with a model, such as the Bundesbank's macroeconomic model. Alternatively, the forecast errors discovered ex post can be used. The Bundesbank's forecasts are not, in fact, purely model-based: a wealth of other information and expert opinions are included. Forecasting uncertainty generally increases the larger the forecast horizon. However, it often decreases along with the size of the aggregate under review. It can thus be observed that forecasting uncertainty is lower for gross domestic product (GDP) than for individual demand components.

<sup>1</sup> See J Breitung und C Schumacher, Real-time forecasting of GDP based on a large factor model with monthly and quarterly data, Deutsche Bundesbank Research Centre, Discussion Paper, Series 1, No 33/2006. — <sup>2</sup> See K F Wallis (1989), Macroeconomic forecasting: a

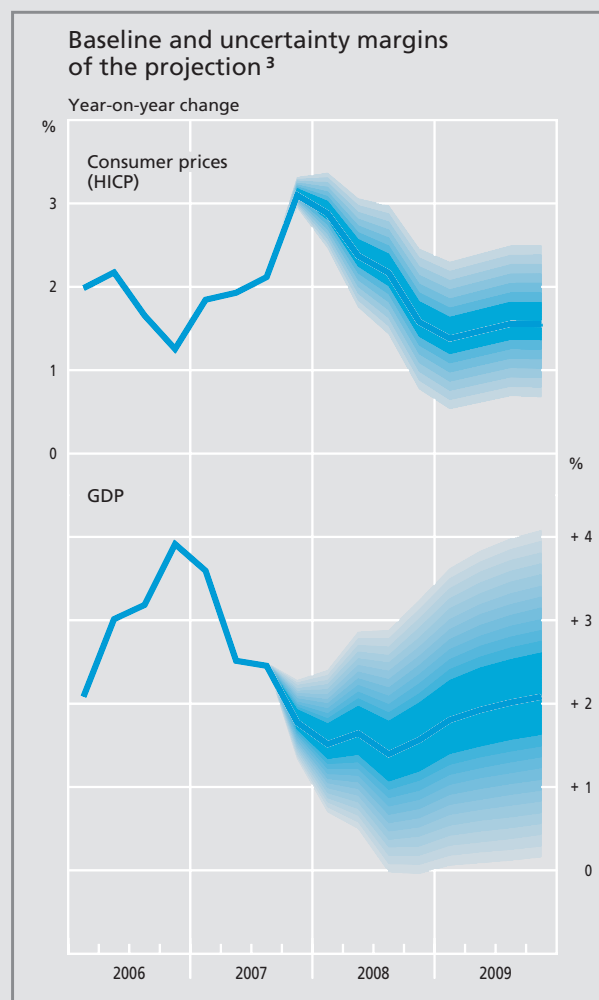
survey, *Economic Journal*, pp 28–61; K-H Tödter (1992), Structural estimation and stochastic simulation of large non-linear models, *Economic Modelling*, pp 121–128; A S Tay und K F Wallis (2002), Density forecasting: a survey, in: M P Clements and D F Hendry (eds), *A companion*

For instance, the variance, the standard deviation of the errors or the mean absolute error can be used as a measure of forecast uncertainty. In accordance with ECB practice for publishing Eurosystem projections, the measure of uncertainty used here is the mean absolute forecast error above and below the point projection, which constitutes an uncertainty band. Overall, the width of the band is double the mean absolute forecast error. If the errors occur at random and are normally distributed, this area covers just under 60% of the distribution. The narrower band shown in the adjacent chart covers an area of half of the mean absolute forecast error. To calculate the forecast errors, the data published in the third subsequent quarter were used as realisations of GDP. For the Harmonised Index of Consumer Prices (HICP), in which data uncertainty is virtually irrelevant, data published in the following year were used.

It is generally assumed that uncertainties are distributed symmetrically around the most likely value, ie the baseline. Depending on the specific data situation and conditions, there may well be signs when the projections are produced that this will not be the case. Indeed, unlike in the historical patterns, there is often a skewed distribution. In this case, the terms upside or downside risks are used. In our view, the current risk profile is characterised by downside risks to growth and, towards the end of the forecast horizon, upside risks to prices. A broad explanation of the reasons for this can be found in the corresponding section beginning on page 28ff. The intensity of these risks cannot be accurately quantified. To do this, the impact of the various risk factors on the form

to economic forecasting, Malden, Mass (USA); and M Knüppel and K-H Tödter, Quantifying risk and uncertainty in macroeconomic forecasts, Deutsche Bundesbank Research Centre, Discussion Paper, Series 1,

and position of the density function of the forecast variable would have to be quantified. Although different approaches currently exist, there is not yet any generally accepted procedure for achieving this.



No 25/2007. — 3 Uncertainty margin calculated on the basis of the mean absolute forecast error.

present. The government debt ratio, which stood at 67.5% at the end of 2006, is likely to fall to just over 60% by 2009.

## Risk assessment

### *Macroeconomic risk analysis*

Even though the baseline scenario presented here is to be regarded as the most likely development given the assumptions made, it is, naturally enough, fraught with risks and uncertainties which might lead to actual developments deviating from expected developments (see the explanatory notes on page 26-27). The impact of such factors on the macroeconomic projection of GDP and prices is studied as part of the Bundesbank's macroeconomic risk analysis. In this context, a distinction has to be made between exogenous risk factors (especially developments in the world economy and interest rates) and endogenous (domestic) risk factors. Deviations from the usual degree of forecast uncertainty are of particular interest.

### *Robust economic activity along with increased risks*

The upswing in Germany in 2007 became stronger insofar as the endogenous expansionary forces gained in importance and key underlying conditions for growth improved. From summer onwards, however, risks to both the real economy and price stability increased. Depending on the given circumstances, there could be significant downward departures from the baseline scenario for the real economy if the various risks were to materialise. The extent of the cyclical slowdown would hinge on the confluence of risk factors and on how strongly they would affect ex-

pectations. Specifically, it is possible to identify the risks outlined below.

In view of the continuing problems that have stemmed from the US subprime mortgage market, a marked slowdown in the US economy cannot be ruled out. Dampening effects would then spread not only through the foreign trade channel but also via the financial and foreign exchange markets. Nevertheless, as things stand at present, the global risk from a sharp slump in overall economic activity in the United States is considered to be comparatively slight.

*US economy*

The international oil markets still harbour a substantial potential for economic disruption. This is all the more the case as very high oil spot prices have now been reached in real terms, too, ie taking into account consumer price movements in the industrial countries. Given the expected continuation of dynamic global growth, especially in regions with a sharply rising demand for energy, further oil price surges – owing, say, to heightened geopolitical tensions or unfavourable weather conditions – cannot be ruled out. Although this would lead to an increase in demand for imported industrial goods in the oil-exporting countries, a fairly stronger dampening of domestic demand in the oil-consuming countries would occur, particularly in the short term. If the cooling of the US economy were more marked than expected, leading to a slower pace of growth in the other industrial countries, oil prices would also come under pressure.

*Oil prices*

*Exchange rates*

At the end of the period under review, the euro's exchange rate was at new record highs against the US dollar. This development could continue; on the one hand, this would harm German enterprises' competitive position in the international sales markets and encourage import substitution. On the other hand, an appreciation of the euro in the foreign exchange markets would have a dampening impact on domestic prices and tend to strengthen domestic purchasing power. The other side of the story regarding the downside risk to the economy is that the euro area accounts for more than two-fifths of Germany's international trade – a share which is therefore not directly influenced by the exchange rate. Moreover, the majority of trade with the other EU member countries is unlikely to be affected directly by the change in euro-US dollar parity.

*Financial  
market  
turbulence*

The turbulence in the international money and capital markets and their possible implications now have to be newly incorporated into the risk scenario. Despite the current adverse conditions, the German banking and financial system has fully retained its functional viability and stability.<sup>8</sup> However, at least in the short term, the necessary repricing of risk positions for certain financial products will pose a certain strain, even though a more moderate pace will be quite conducive to the sustainability of the global growth process

from an allocational point of view. It may be that the real economic consequences will be all the greater, the longer the lack of transparency continues and the functioning of certain market segments is disrupted.

The described profile of the price projections for 2008 and 2009 will be shaped crucially by the underlying oil price assumption. If the price of oil does not, as expected, come back down in the foreseeable future, but goes up instead, considerably less favourable rates of price increase may be anticipated. Much the same applies to the assumption that the recent sharp upward price trends in the international agricultural markets will ease off markedly throughout the forecasting horizon. This effect might be reinforced by a sharp price increase having a knock-on effect on wages. On the other hand, the price trend could also be more favourable if there is a marked downward correction of prices for agricultural products, which is not implausible given the typical high elasticity of supply in this sector. The price-dampening impact of the appreciation of the euro so far might also be stronger than expected and the euro could continue to appreciate. Taking everything together, however, the upside risks to future price developments predominate at the end of the forecasting horizon.

*Price risks*

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<sup>8</sup> See Deutsche Bundesbank. Financial Stability Review 2007, November 2007.