

Economic Institute

Inflation projection
of the National Bank of Poland
based on the NECMOD model

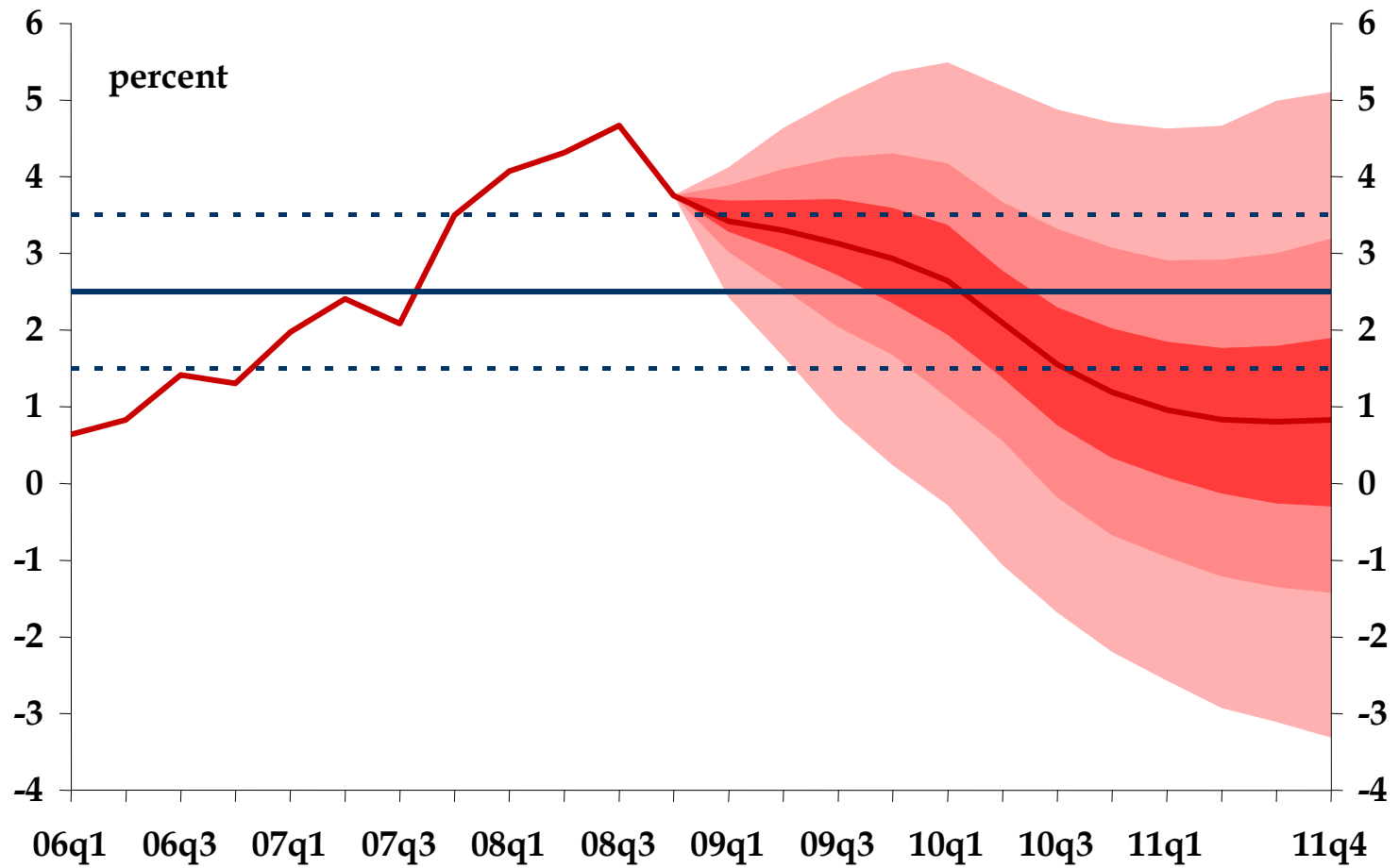
February 2009

Inflation projection – February 2009

I PROJECTION

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY



I PROJECTION

- a) Assumptions
- b) Starting point
- c) Projection for
2009-2011
- d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

CENTRAL PROJECTION

I PROJECTION

a) Assumptions

b) Starting point

c) Projection for
2009-2011

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

Assumptions

- Growth abroad
- Price growth abroad
- Interest rates abroad
- Energy commodity price index
- Agricultural commodity price index

Growth abroad (lower)

I PROJECTION

a) Assumptions

b) Starting point

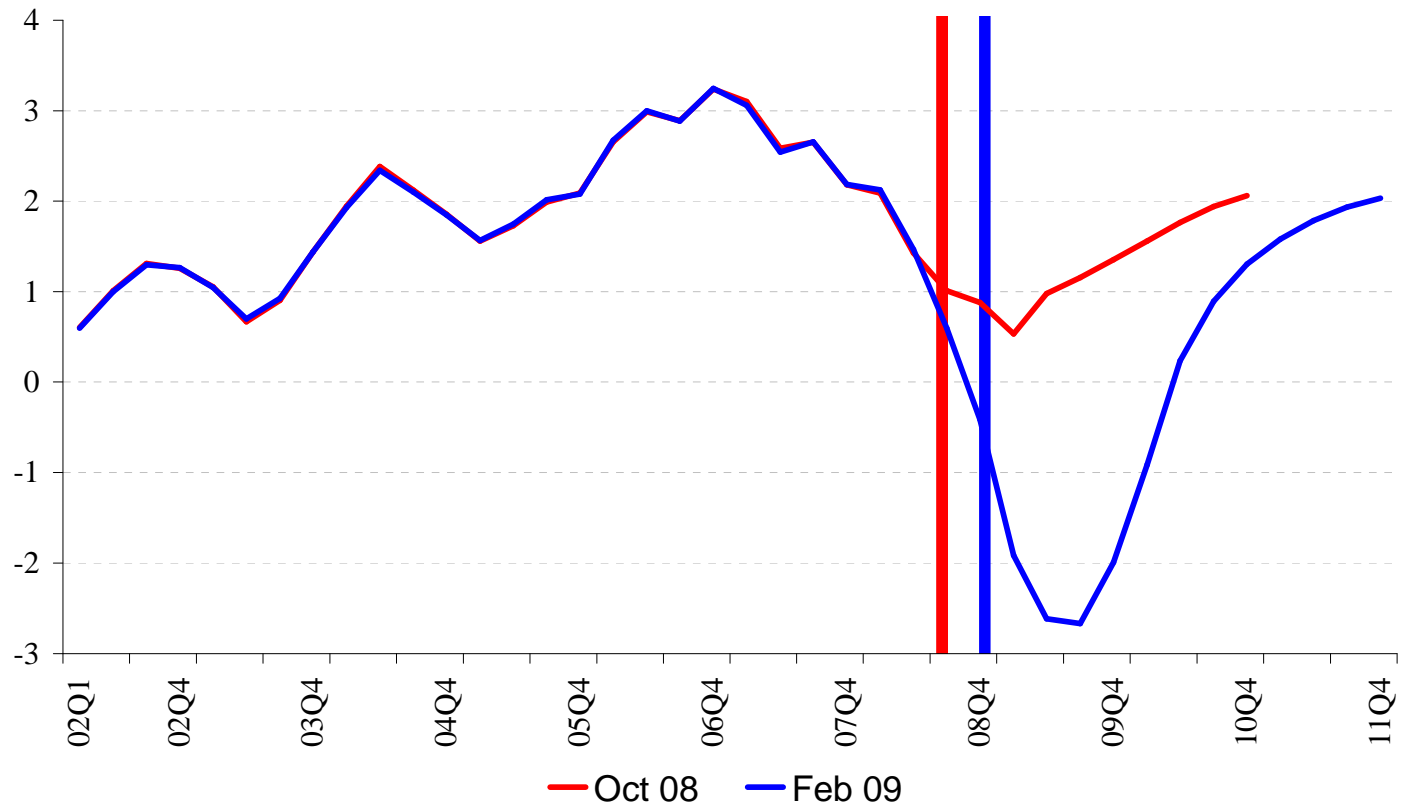
c) Projection for
 2009-2011

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

External GDP (y-o-y) (%)



In NECMOD model, the foreign sector is represented by three economies (with weights, respectively):

- **euro area** (87.8%)
- **Great Britain** (7.2%)
- **United States** (5.0%)

Price growth abroad (lower)

I PROJECTION

a) Assumptions

b) Starting point

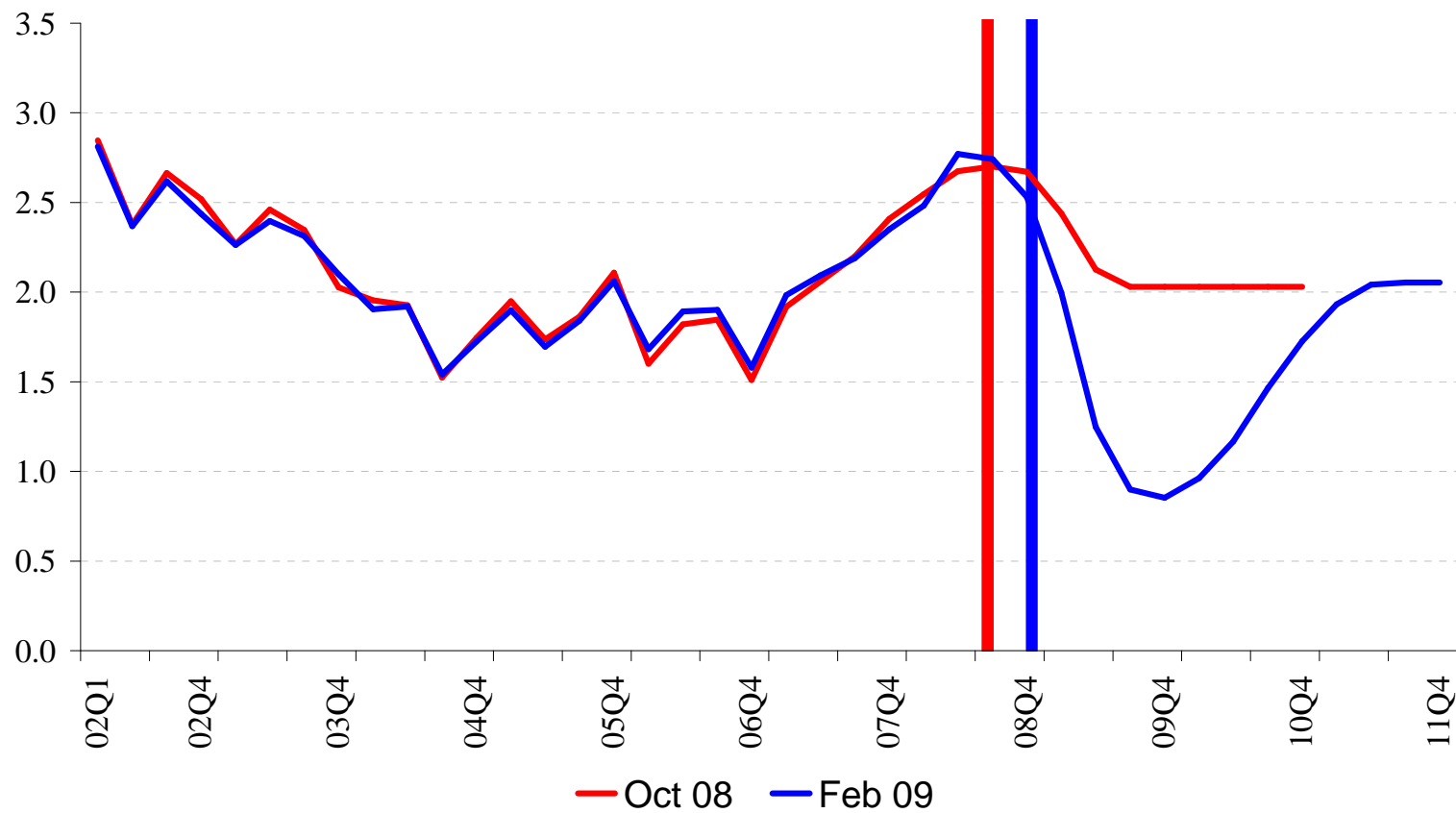
c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

External value added deflator (y-o-y) (%)



Interest rates abroad (lower)

I PROJECTION

a) Assumptions

b) Starting point

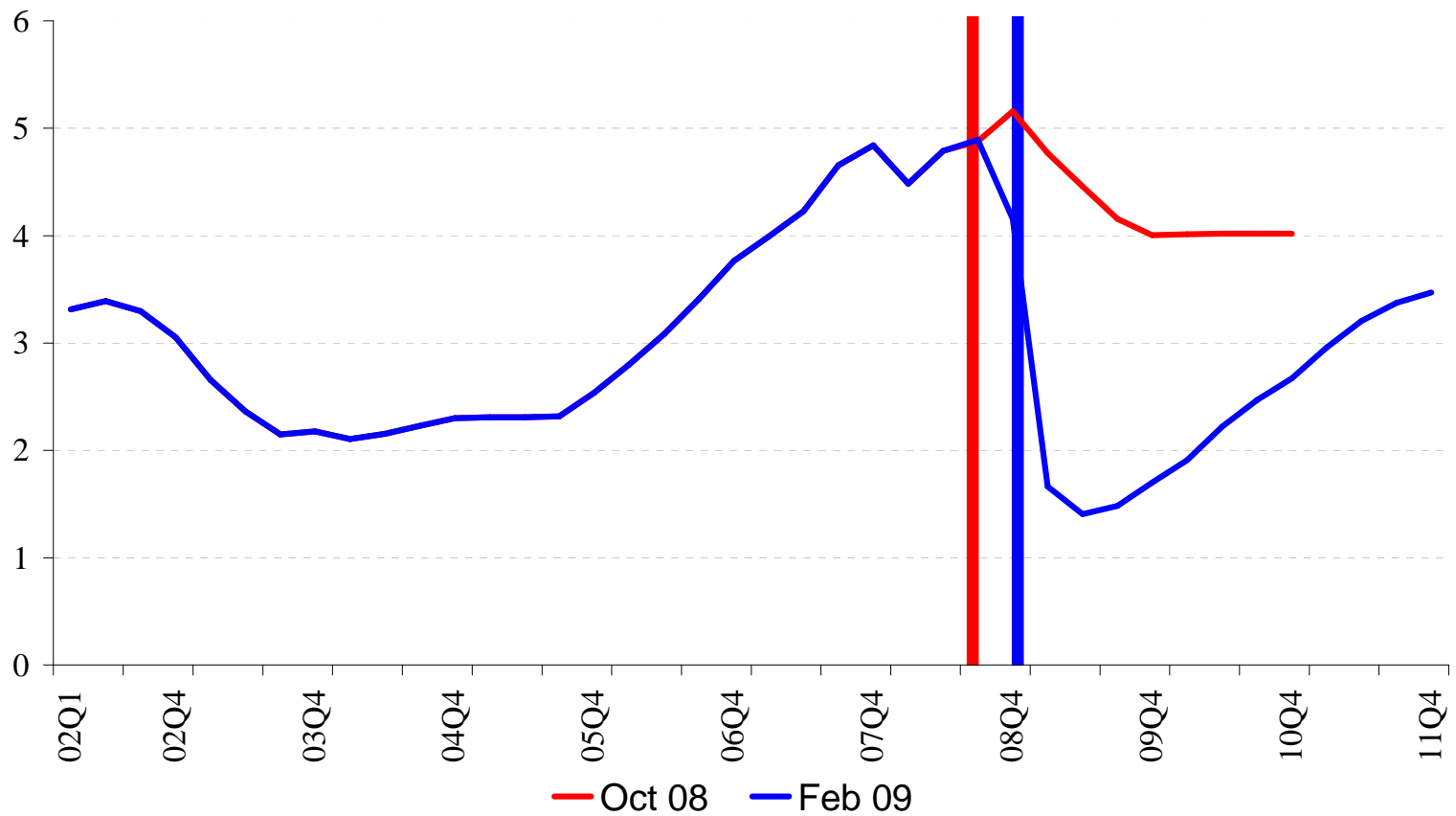
c) Projection for
2009-2011

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

External interest rate



Energy commodity price index* (lower)

I PROJECTION

a) Assumptions

b) Starting point

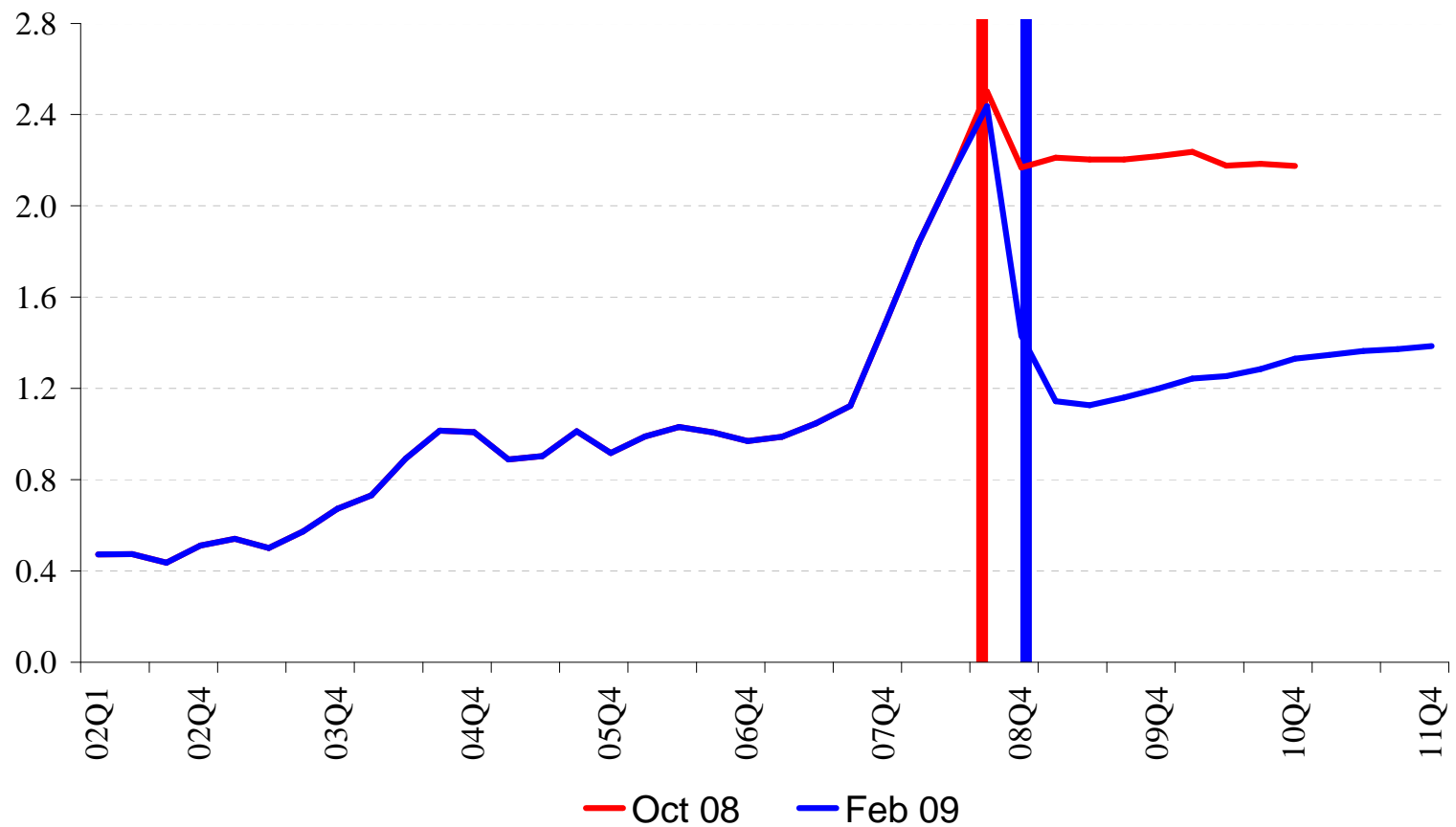
c) Projection for
 2009-2011

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

Energy commodity price index (2006=1)



* Global index of energy prices includes prices of coal, crude oil and natural gas.

Agricultural commodity price index *

(lower)

I PROJECTION

a) Assumptions

b) Starting point

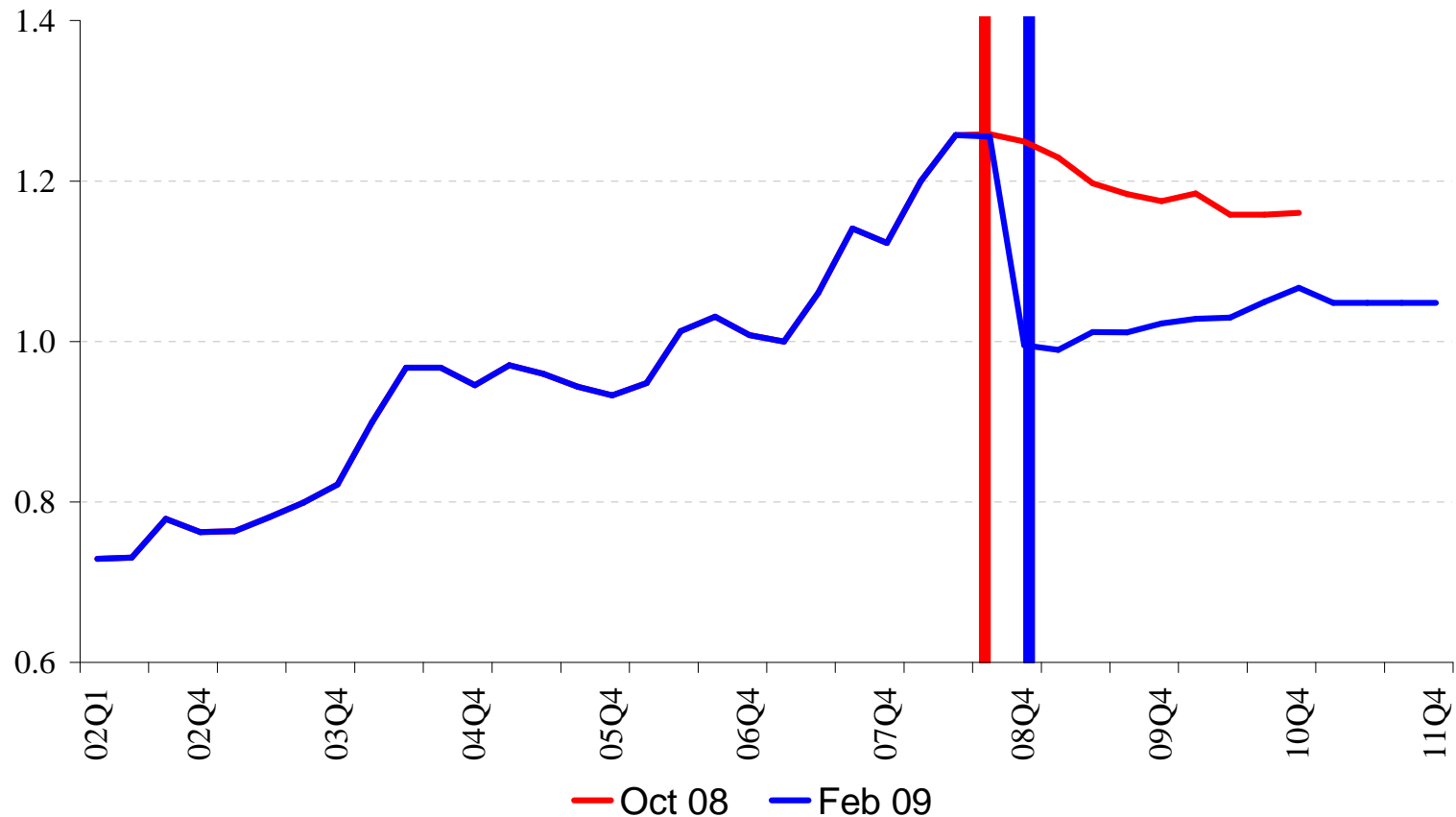
c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

Global prices of agricultural commodities (2006=1)



* Global index of agricultural commodity prices consists of prices of wheat, pork, beef, poultry, fish, olive oil, sugar, oranges and bananas. Index weights represent the structure of consumer consumption (CPI basket).

I PROJECTION

a) Assumptions

b) Starting point

- GDP
- Labour market
- Inflation

c) Projection for
2009-2011

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

Starting point

of February projection compared to October projection

- GDP and its components
- Labour market
- Inflation

GDP and its components – starting point*

I PROJECTION

a) Assumptions

b) Starting point

• GDP

• Labour market

• Inflation

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

| | 08Q4 | |
|---|-----------------------------------|---|
| | February projection (23.01) | Estimate based on GUS [†] data (29.01) |
| GDP (y/y) (%) | 2,9 (4,2) | 2,9 |
| Domestic demand (y/y) (%) | 3,0 (4,5) | 3,2 |
| Individual consumption (y/y) (%) | 4,4 (5,1) | 5,3 |
| Public consumption (y/y) (%) | 1,0 (- 0,1) | 0,0 |
| Gross fixed capital formation (y/y) (%) | 0,3 (9,7) | 3,6 |
| Exports (y/y) (%) | 1,6 (9,4) | 1,3 |
| Imports (y/y) (%) | 1,9 (9,8) | 1,9 |
| Contribution of net exports (percentage points) | -0,2 (- 0,5) | -0,3 |

* Values from the October 2008 projection are given in brackets.

Indicators whose value is higher than in October projection are marked in green colour whereas indicators whose value is lower than in October projection are marked in red colour.

† Central Statistical Office

Labour market – starting point*

I PROJECTION

a) Assumptions

b) Starting point

• GDP

• **Labour market**

• Inflation

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN THE PROJECTIONS

III UNCERTAINTY

| | 08Q4 |
|---|---------------|
| ULC (y/y) (%) [†] | 2,9 (4,3) |
| Non-agricultural ULC (y/y) (%) [†] | 3,4 (4,7) |
| Labour productivity (y/y) (%) [†] | 3,4 (4,1) |
| Non-agricultural labour productivity (y/y) (%) [†] | 2,9 (3,7) |
| Wages (y/y) (%) | 8,4 (10,3) |
| LFS employment (y/y) (%) [†] | 0,0 (0,0) |
| Non-agricultural employment (y/y) (%) [†] | 0,6 (0,5) |
| LFS unemployment rate (%) | 7,6 (8,3) |
| Participation rate (%) | 54,3 (54,7) |
| Population (y/y) (%) [†] | - 1,6 (- 1,6) |

* Values from the October 2008 projection are given in brackets.

Indicators whose value is higher than in October projection are marked in green colour whereas indicators whose value is lower than in October projection are marked in red colour.

[†] Based on LFS adjusted data

Inflation – starting point*

I PROJECTION

a) Assumptions

b) Starting point

• GDP

• Labour market

• **Inflation**

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

| | 08Q4 |
|----------------------------------|-------------|
| CPI inflation (y/y) (%) | 3,8 (4,3) |
| Core inflation (y/y) (%) | 2,9 (3,2) |
| Food price inflation (y/y) (%) | 3,4 (4,1) |
| Energy price inflation (y/y) (%) | 7,8 (9,4) |

* Values from the October 2008 projection are given in brackets.

Indicators whose value is higher than in October projection are marked in green colour whereas indicators whose value is lower than in October projection are marked in red colour.

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
2009-2011**

• GDP

• Labour market

• Inflation

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

Projection for the years 2009-2011

- GDP and its components
- Labour market
- Inflation

Investment outlays

(lower until 2010 Q3)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• **GDP**

• Labour market

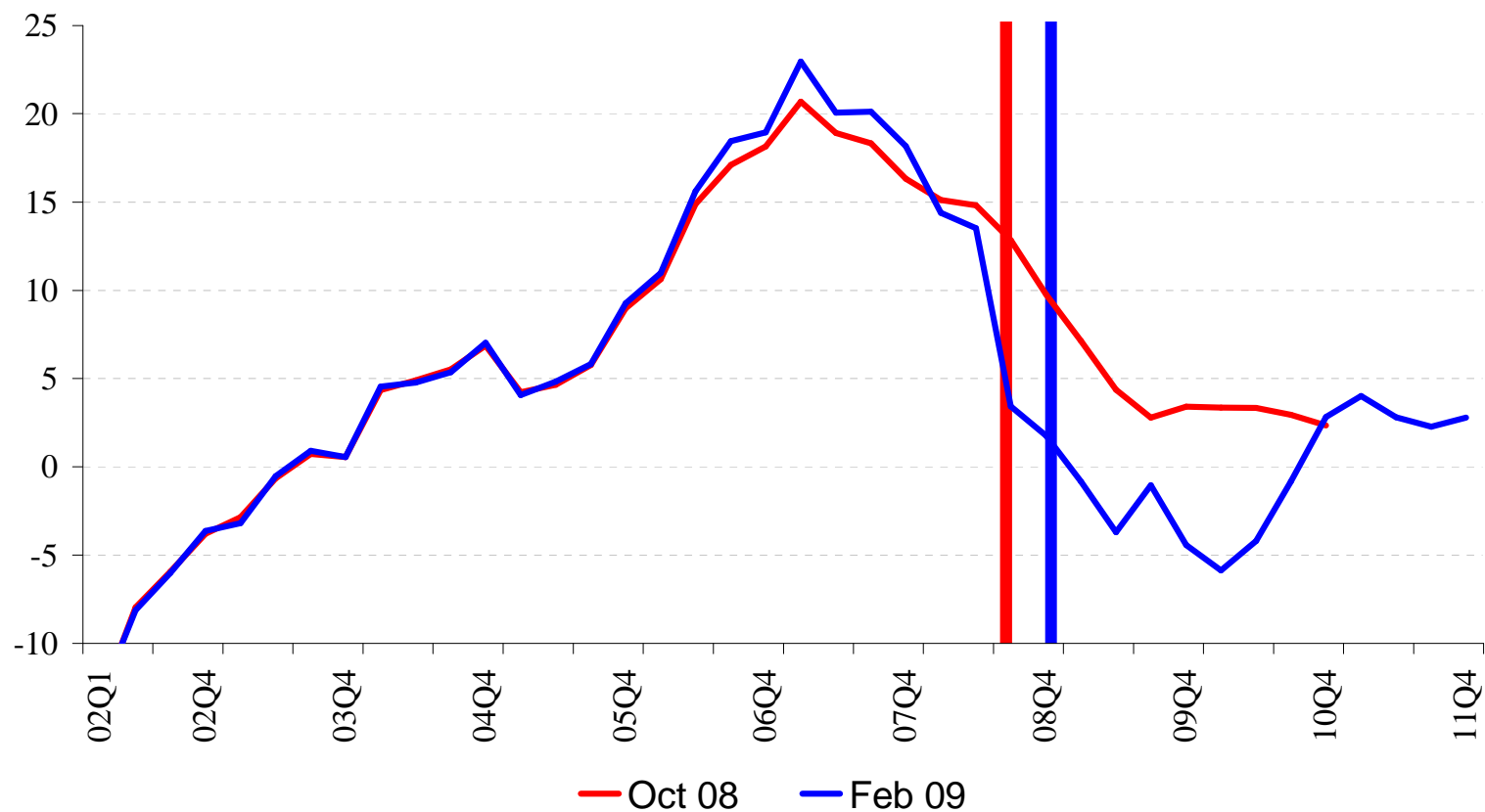
• Inflation

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

Gross fixed capital formation (y-o-y) (%)



Fixed capital formation : decomposition

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• GDP

• Labour market

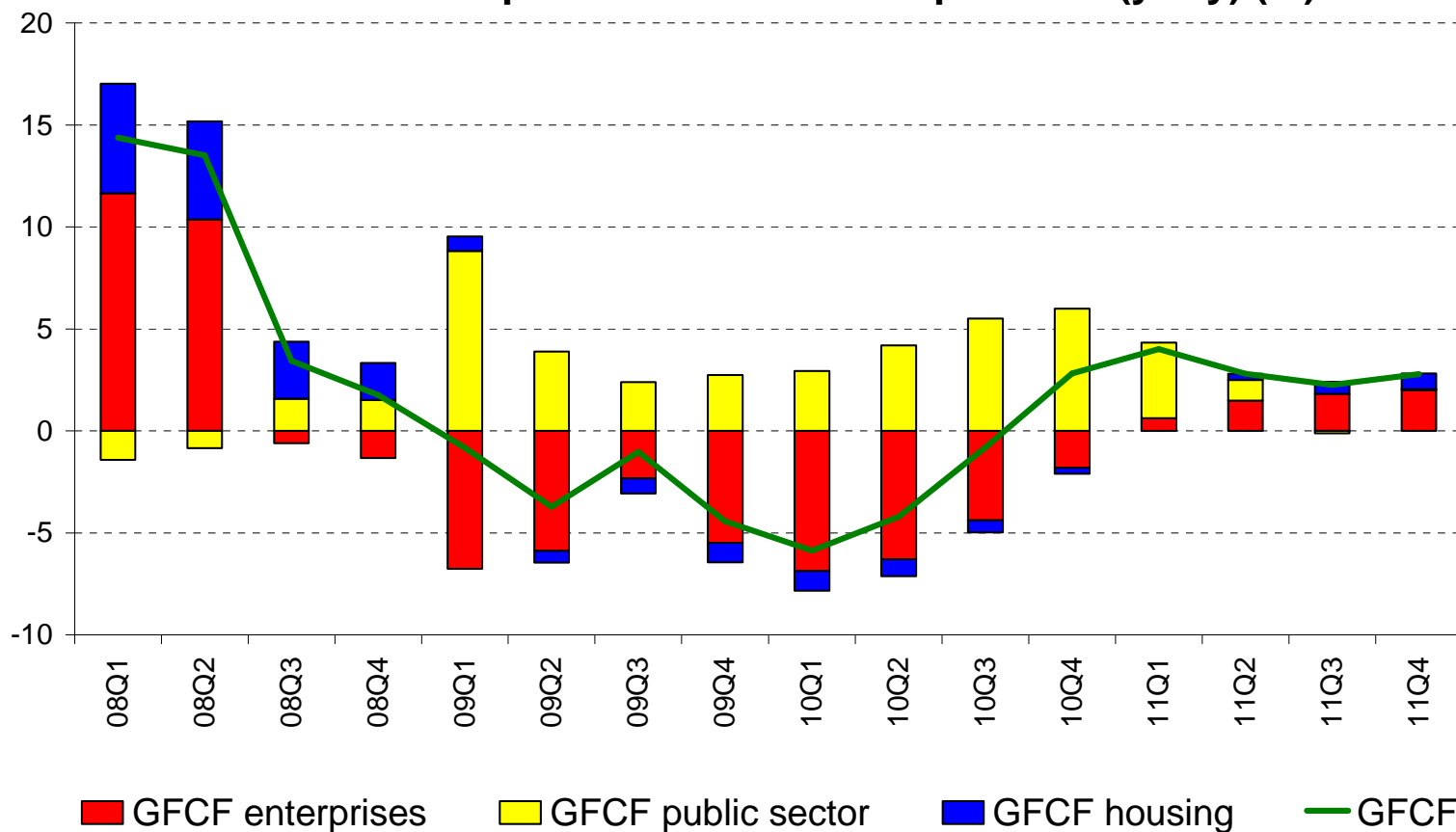
• Inflation

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

Gross fixed capital formation decomposition (y-o-y) (%)



Individual consumption (lower)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• **GDP**

• Labour market

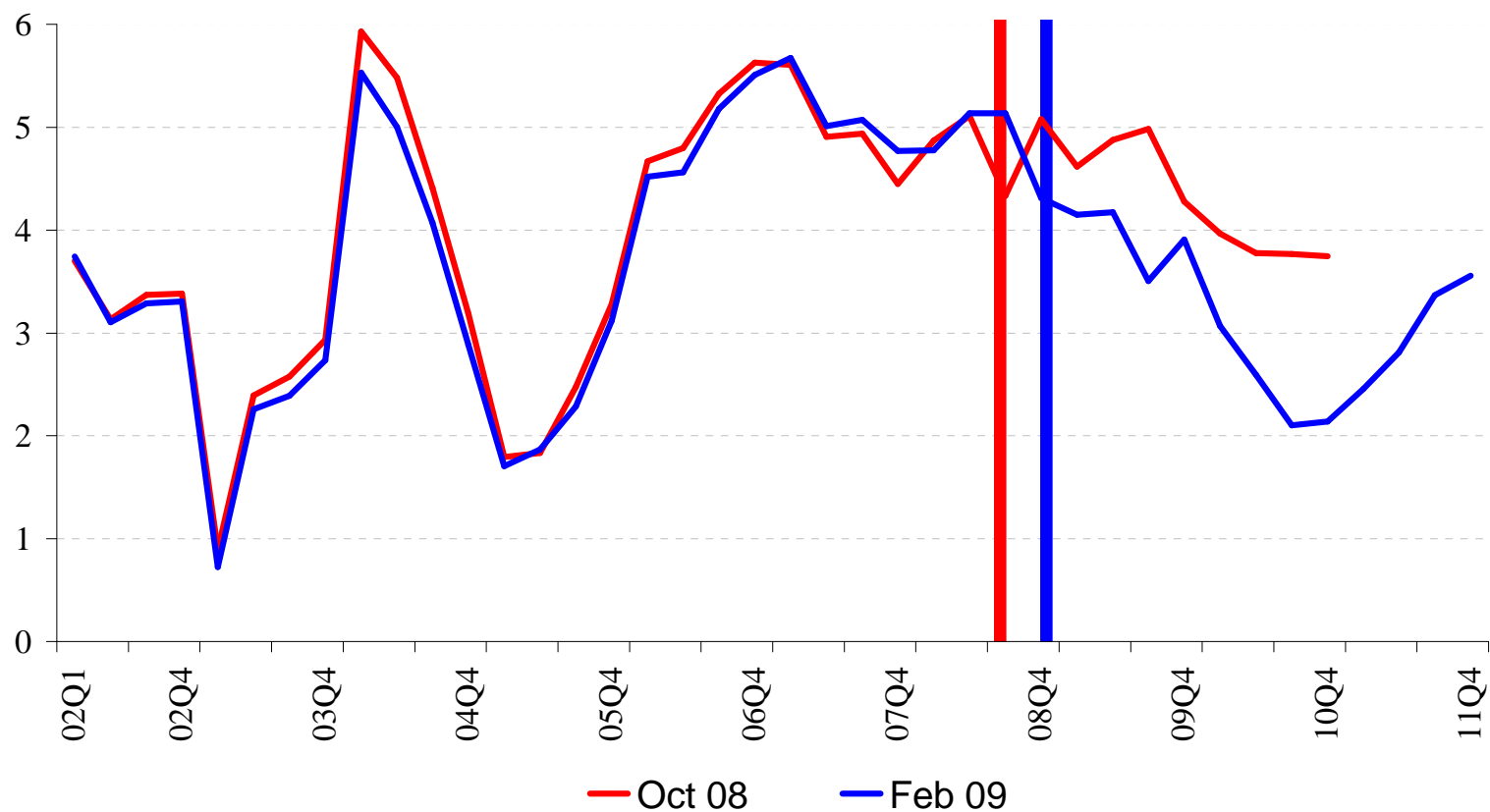
• Inflation

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

Individual consumption (y-o-y) (%)



Contribution of net exports (higher until 2010 Q3)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• GDP

• Labour market

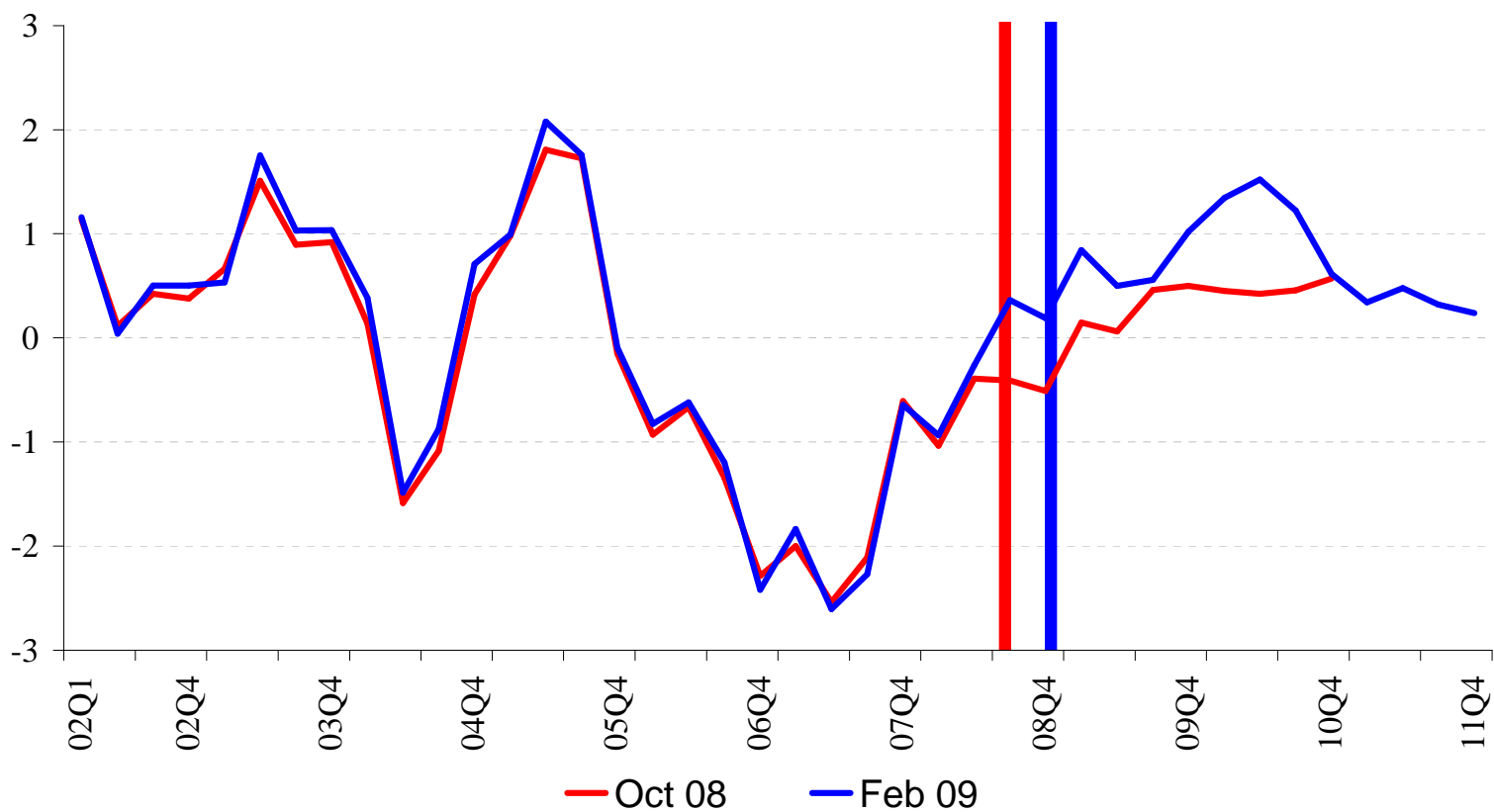
• Inflation

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

Contribution of net exports (percentage points)



GDP

(lower growth rate)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

- GDP

- Labour market

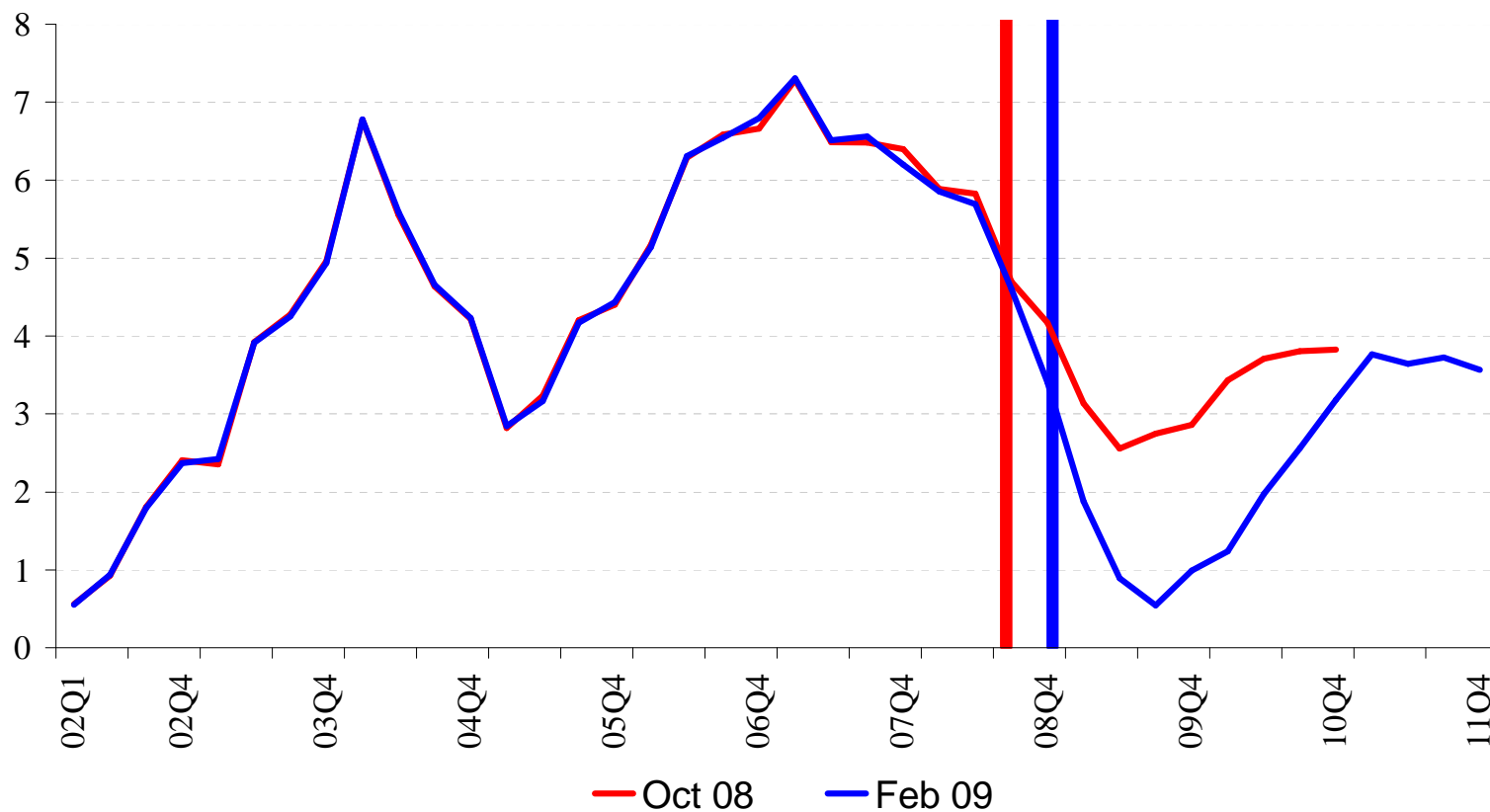
- Inflation

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

GDP (y-o-y) (%)



Labour market

(employment - lower growth rate in the short-term, higher unemployment rate from 2009 Q2, wages and labour productivity – lower growth rate)

I PROJECTION

a) Assumptions

b) Starting point

c) Projection for 2009-2011

• GDP

• Labour market

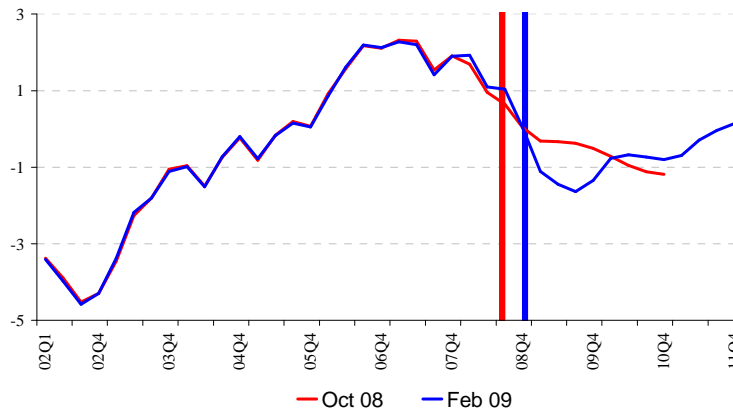
• Inflation

d) Fan chart

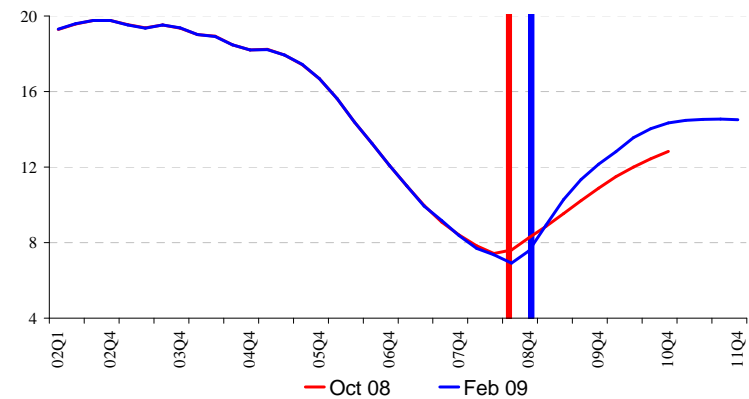
II CHANGES IN THE PROJECTIONS

III UNCERTAINTY

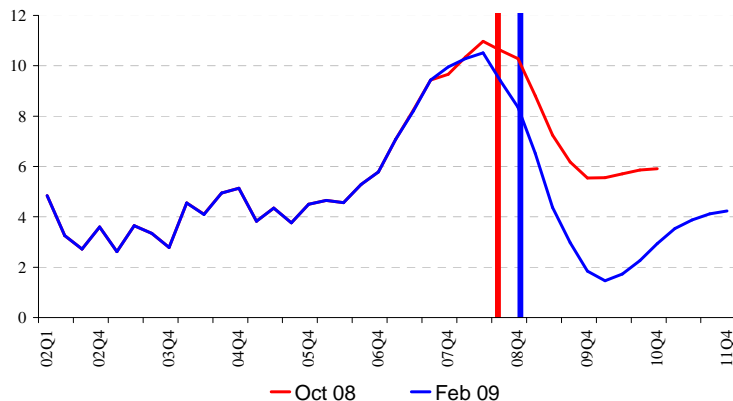
Total employment (y-o-y) (%)



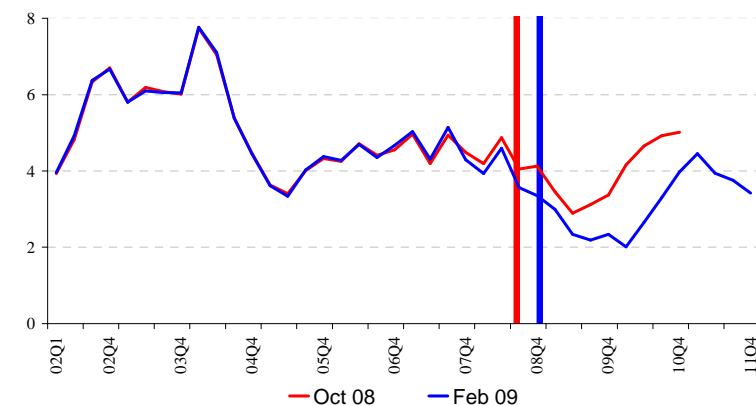
Unemployment (%)



Gross wages (y-o-y) (%)



Labour productivity (y-o-y) (%)



ULC

(lower growth rate throughout the whole projection horizon)

I PROJECTION

a) Assumptions

b) Starting point

c) Projection for
2009-2011

- GDP

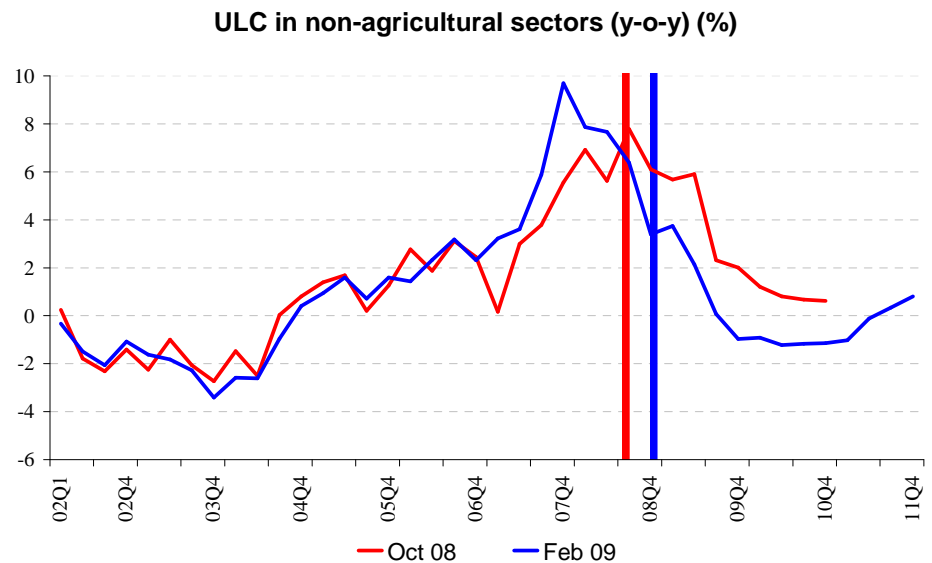
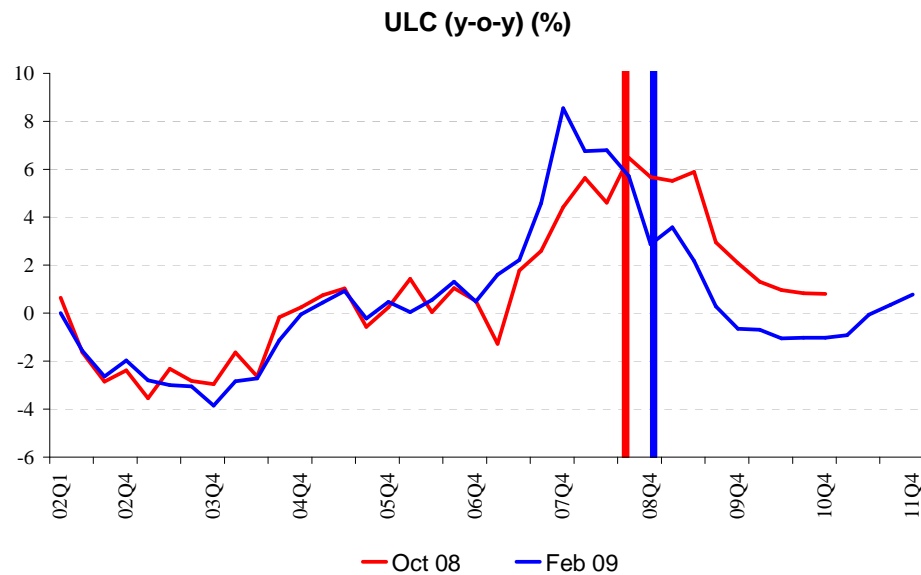
- Labour market

- Inflation

d) Fan chart

II CHANGES IN THE PROJECTIONS

III UNCERTAINTY



Core inflation*

(lower)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• GDP

• Labour market

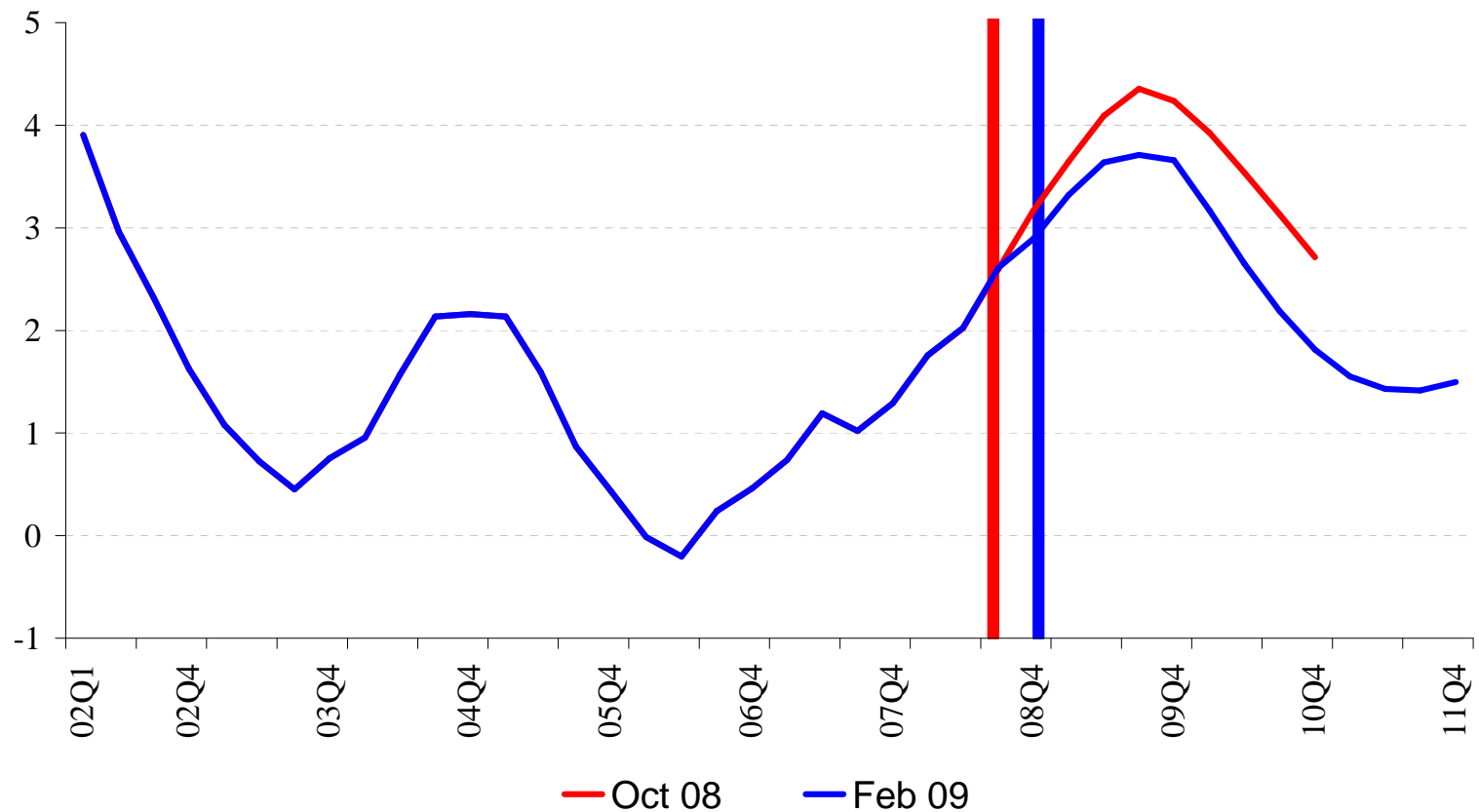
• Inflation

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

Core inflation (%)



* Core inflation does not include prices of food and non-alcoholic beverages and prices of energy carriers

Determinants of core inflation

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

- GDP

- Labour market

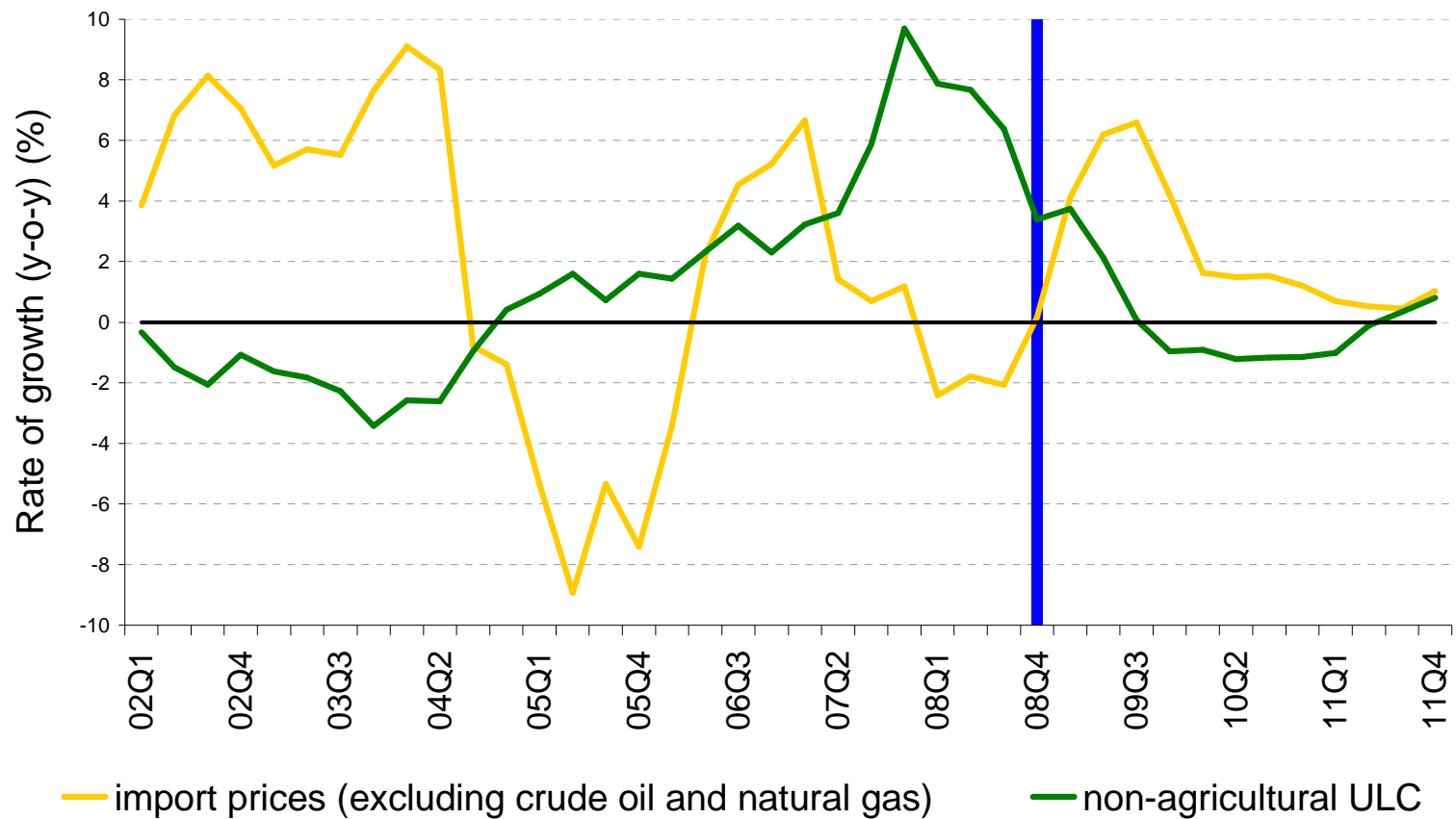
- **Inflation**

d) Fan chart

II CHANGES IN
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III UNCERTAINTY

Determinants of core inflation (y-o-y) (%)



CPI inflation (lower)

I PROJECTION

a) Assumptions

b) Starting point

**c) Projection for
 2009-2011**

• GDP

• Labour market

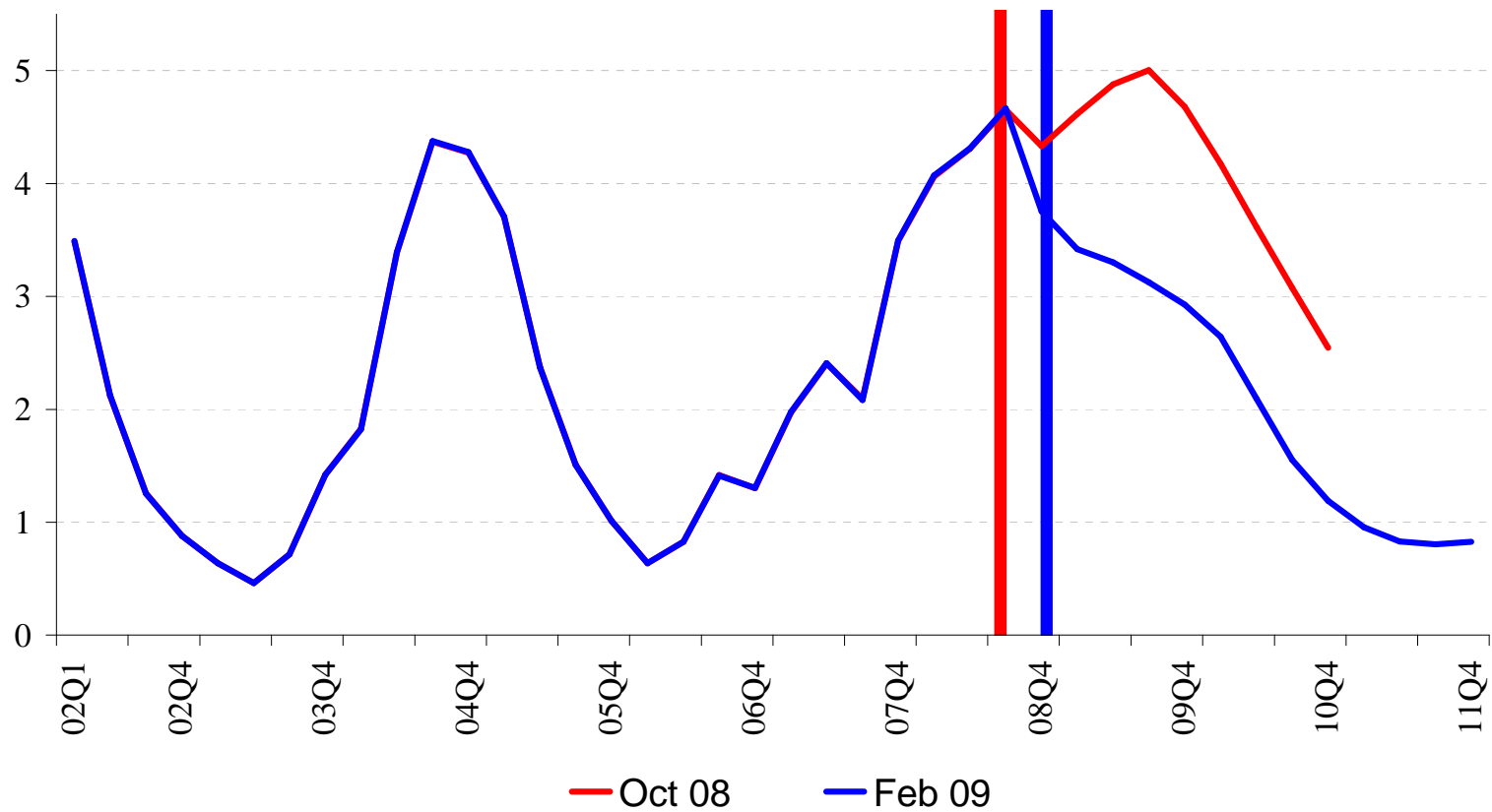
• **Inflation**

d) Fan chart

**II CHANGES IN
 THE PROJECTIONS**

III UNCERTAINTY

CPI inflation (%)



I PROJECTION

- a) Assumptions
- b) Starting point
- c) Projection for
2009-2011

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

Fan chart

Construction of fan chart

I PROJECTION

a) Assumptions

b) Starting point

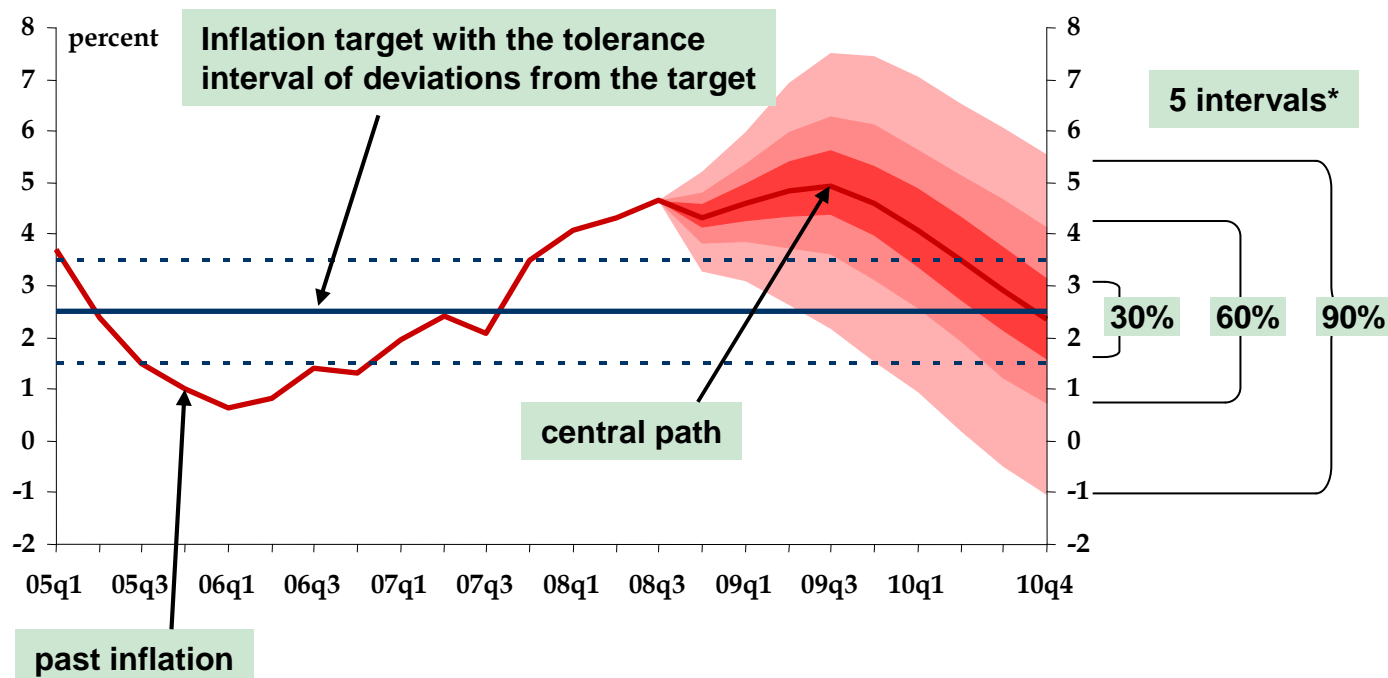
c) Projection for
2009-2011

d) Fan chart

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

- Uncertainty of inflation and GDP projection is estimated on the basis of past forecasting errors from the ECMOD/NECMOD model and on the basis of risk assessment of forecasts of selected exogenous variables.



*Intervals have been chosen to ensure that the probability of inflation running below the lower limit of the tolerance interval equals the probability of inflation running above the upper limit of the tolerance range.

Inflation projection – February 2009

I PROJECTION

a) Assumptions

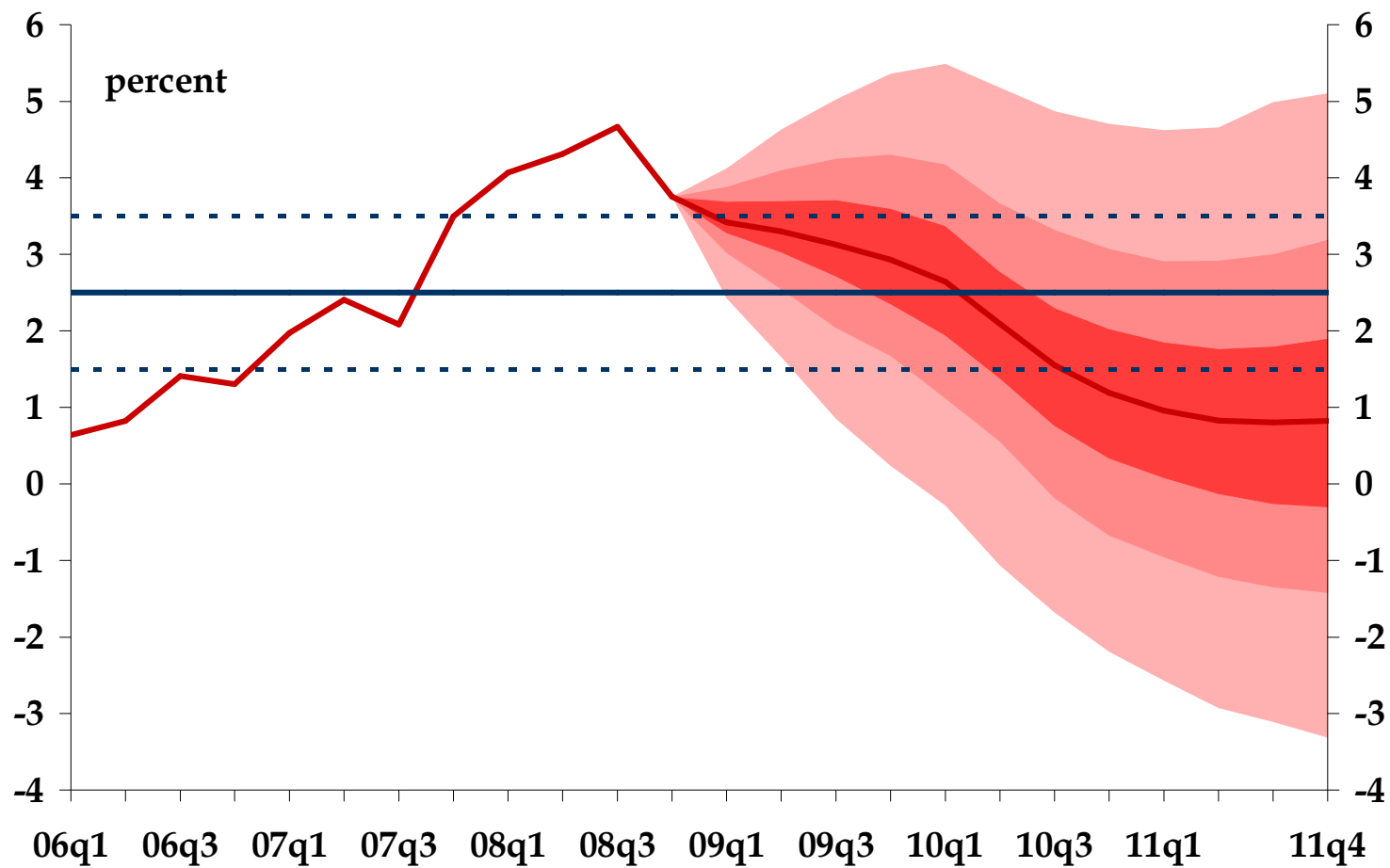
b) Starting point

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY



Overview of probabilities for inflation

I PROJECTION

a) Assumptions

b) Starting point

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY

Probability of inflation running:

| | below 1,5% | below 2,5% | below 3,5% | below the central path | in the range (1,5%; 3,5%) |
|--------------|------------|------------|------------|---------------------------|------------------------------|
| I kw. 2009 | 0.00 | 0.06 | 0.51 | 0.45 | 0.51 |
| II kw. 2009 | 0.04 | 0.18 | 0.56 | 0.47 | 0.52 |
| III kw. 2009 | 0.12 | 0.31 | 0.59 | 0.47 | 0.47 |
| IV kw. 2009 | 0.17 | 0.38 | 0.62 | 0.49 | 0.45 |
| I kw. 2010 | 0.26 | 0.46 | 0.68 | 0.48 | 0.42 |
| II kw. 2010 | 0.38 | 0.59 | 0.77 | 0.51 | 0.40 |
| III kw. 2010 | 0.49 | 0.69 | 0.83 | 0.51 | 0.34 |
| IV kw. 2010 | 0.56 | 0.73 | 0.85 | 0.50 | 0.29 |
| I kw. 2011 | 0.59 | 0.75 | 0.88 | 0.50 | 0.29 |
| II kw. 2011 | 0.60 | 0.75 | 0.87 | 0.50 | 0.27 |
| III kw. 2011 | 0.60 | 0.74 | 0.86 | 0.50 | 0.26 |
| IV kw. 2011 | 0.59 | 0.73 | 0.84 | 0.50 | 0.25 |

Projection of GDP growth – February 2009

I PROJECTION

a) Assumptions

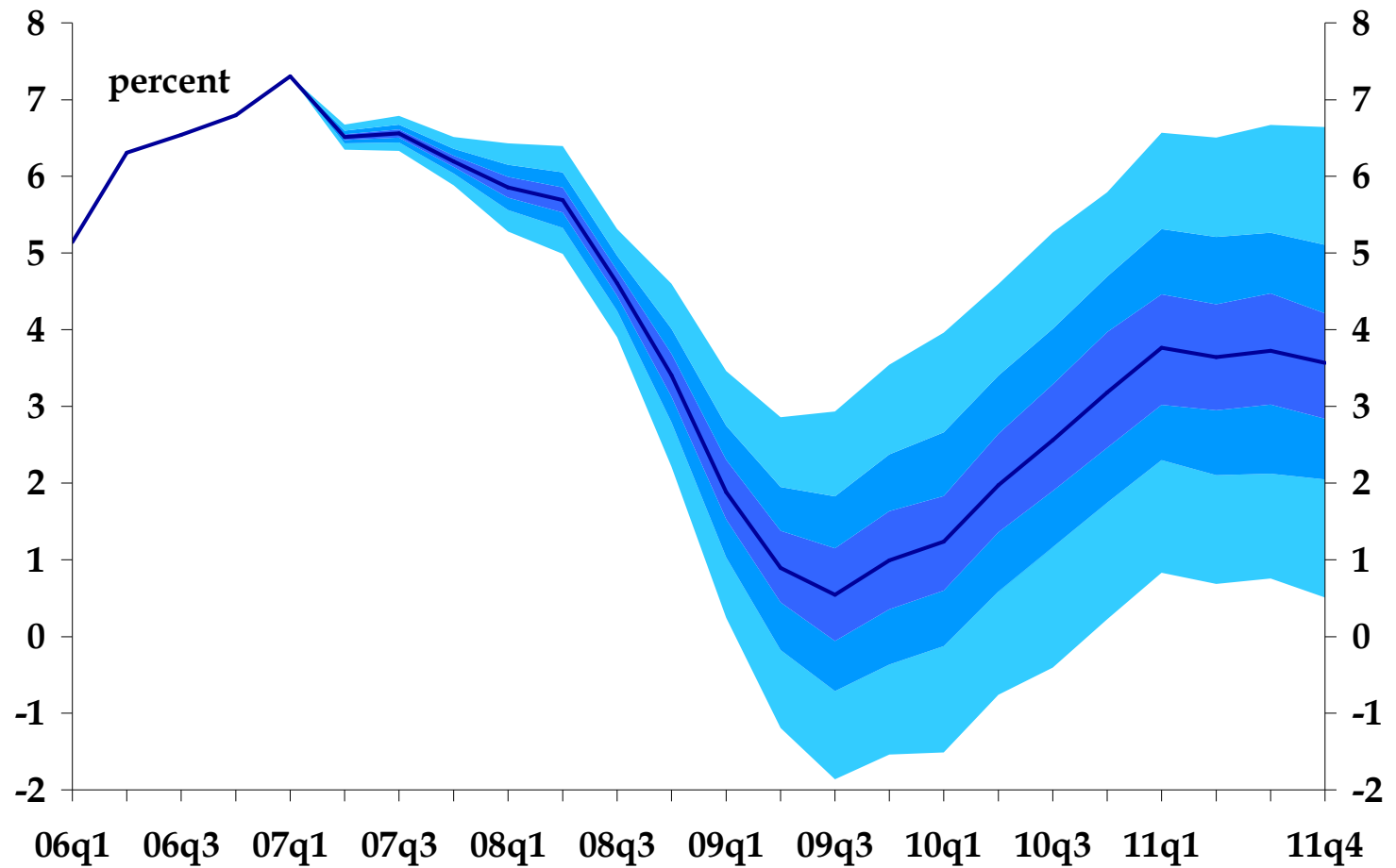
b) Starting point

c) Projection for
 2009-2011

d) Fan chart

II CHANGES IN
 THE PROJECTIONS

III UNCERTAINTY



I PROJECTION

II CHANGES IN THE PROJECTIONS

- a) With respect to the previous projection
- b) Expert adjustments
- c) Changes in the previous year

III UNCERTAINTY

CHANGES IN THE PROJECTIONS

I PROJECTION

**II CHANGES IN
THE PROJECTIONS**

**a) With respect to the
previous projection**

b) Expert
adjustments

c) Changes in the
previous year

III UNCERTAINTY

February projection in comparison with the October projection

February projection in comparison with the October projection: CPI inflation

I PROJECTION

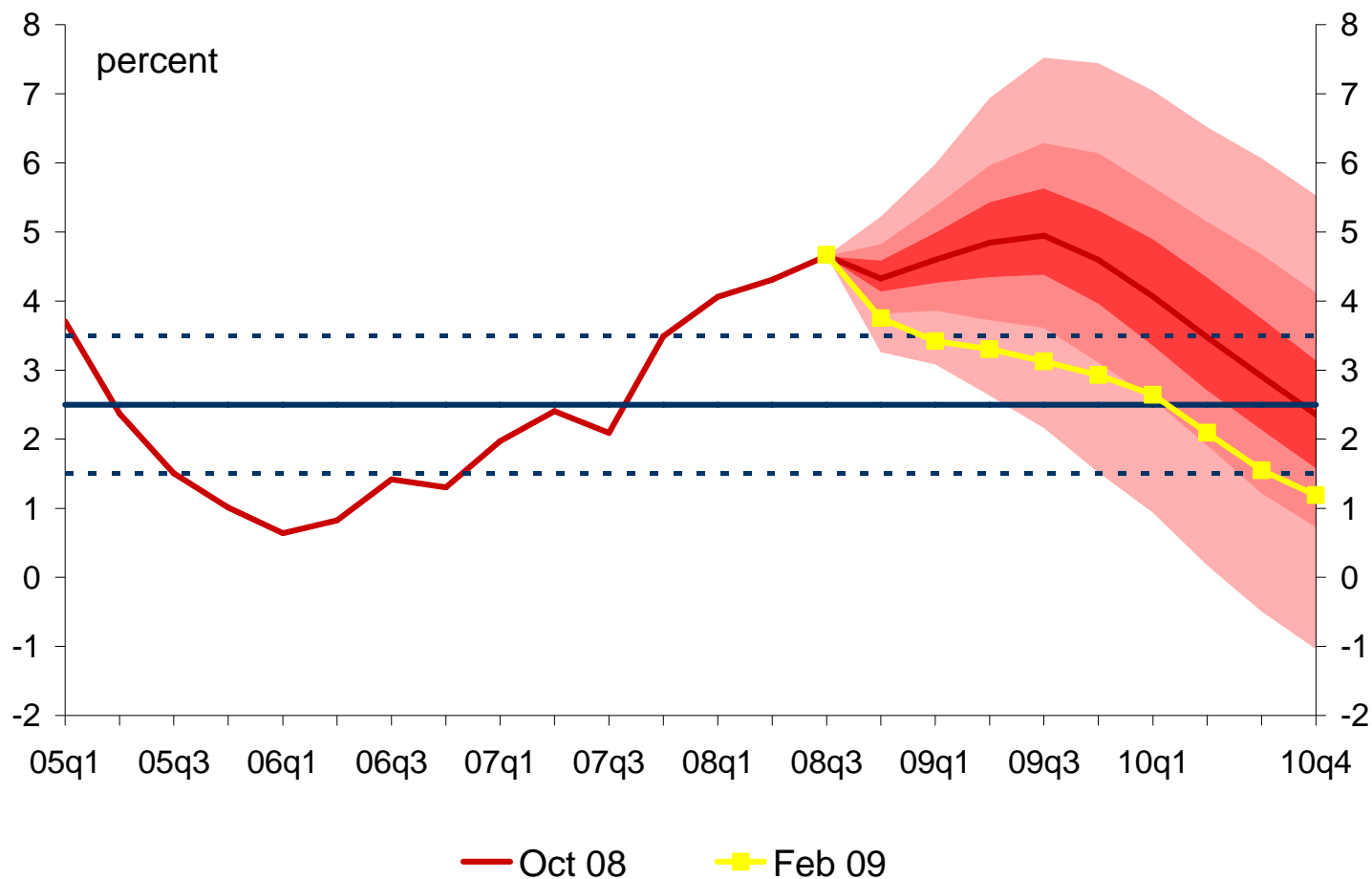
II CHANGES IN
 THE PROJECTIONS

a) With respect to the
 previous projection

b) Expert
 adjustments

c) Changes in the
 previous year

III UNCERTAINTY



Decomposition of CPI inflation

I PROJECTION

II CHANGES IN THE PROJECTIONS

a) With respect to the previous projection

b) Expert adjustments

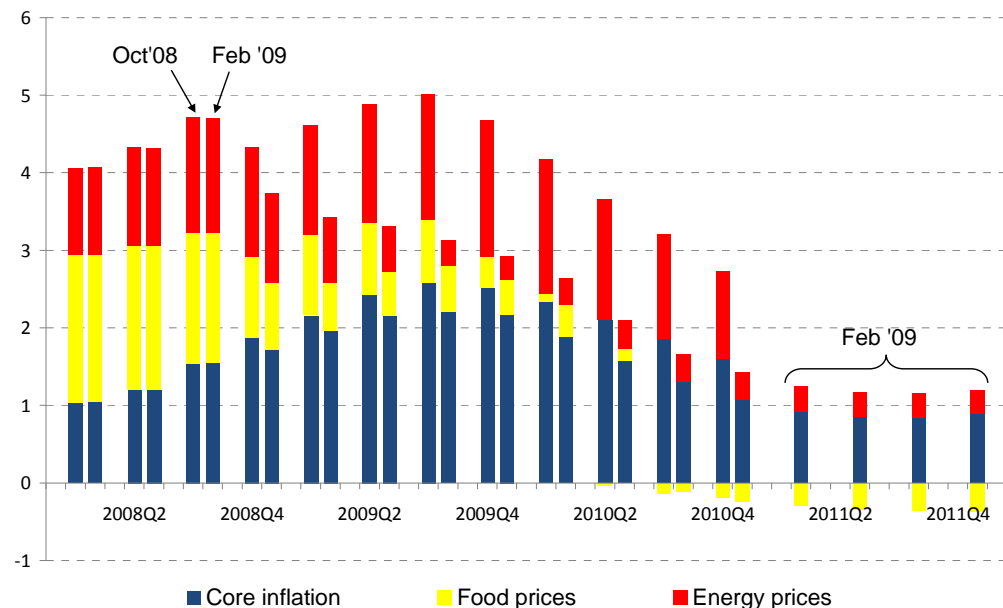
c) Changes in the previous year

III UNCERTAINTY

- The CPI inflation path is running **below** the path from October in the whole horizon of the projection.
- At the starting point of the projection the difference amounts to -0.5 pp. and rises to -1.2 pp. in 2010 Q4.

The lower CPI inflation will be due to:

- Slower rise of **energy prices** than forecasted in October (by 7.1 pp. in 2009. and 6.9 pp.in 2010)
- lower increase in **core inflation** (by 0.4 pp. in 2009 and 0.8 pp. in 2010)
- inflation of **food prices** lower by 0.8 pp. in 2009. and higher by 0.6 pp. in 2010. in comparison with October results



February projection in comparison with October projection: GDP

I PROJECTION

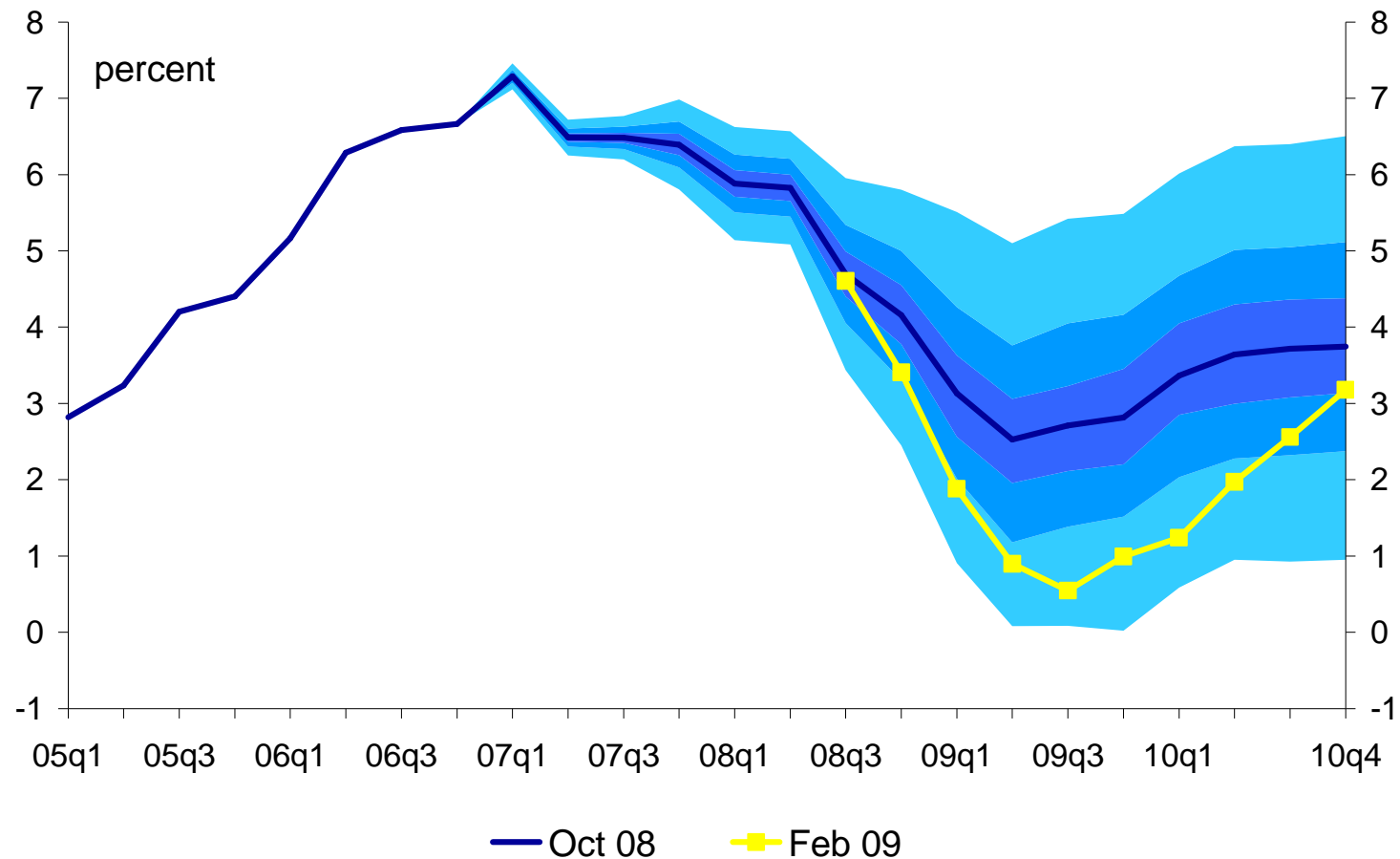
II CHANGES IN
 THE PROJECTIONS

a) With respect to the
 previous projection

b) Expert
 adjustments

c) Changes in the
 previous year

III UNCERTAINTY



Change in the projection scenario

I PROJECTION

II CHANGES IN THE PROJECTIONS

a) With respect to the previous projection

b) Expert adjustments

c) Changes in the previous year

III UNCERTAINTY

- Revision of assumptions concerning the global economy ***
 - Recession in Poland's main trading partners economies
 - Larger than expected impact of global slump on demand for energy and agricultural materials
- Depreciation of the zloty exchange rate***
- Change in the level of interest rates*
- Difference in the assessment of situation on the labour market*

| | | |
|-----------------|-----|-------------|
| Scale of impact | *** | significant |
| | ** | medium |
| | * | small |

I PROJECTION

II CHANGES IN THE PROJECTIONS

a) With respect to the
previous projection

**b) Expert
adjustments**

c) Changes in the
previous year

III UNCERTAINTY

Expert adjustments

Main areas of expert adjustments

I PROJECTION

II CHANGES IN THE PROJECTIONS

a) With respect to the
previous projection

b) Expert
adjustments

c) Changes in the
previous year

III UNCERTAINTY

- Observed sentiment of foreign investors and the ensuing strong depreciation of the zloty exchange rate as well as uncertainty still observed in the financial markets led to the revision of both the forecast of the exchange rate at the beginning of 2009 and the assumptions concerning the **pace of the exchange rate approaching fundamental values**
- The projection takes into account the possibility of the weakening of the mechanisms of **transmission of changes in the exchange rate and the market interest rate** to developments in prices and economic growth in times of economic slowdown
- Corrections of labour market variables and some components of aggregate demand aimed at a more accurate **rendering of cyclical regularities**

Joint impact of adjustments on inflation and GDP

I PROJECTION

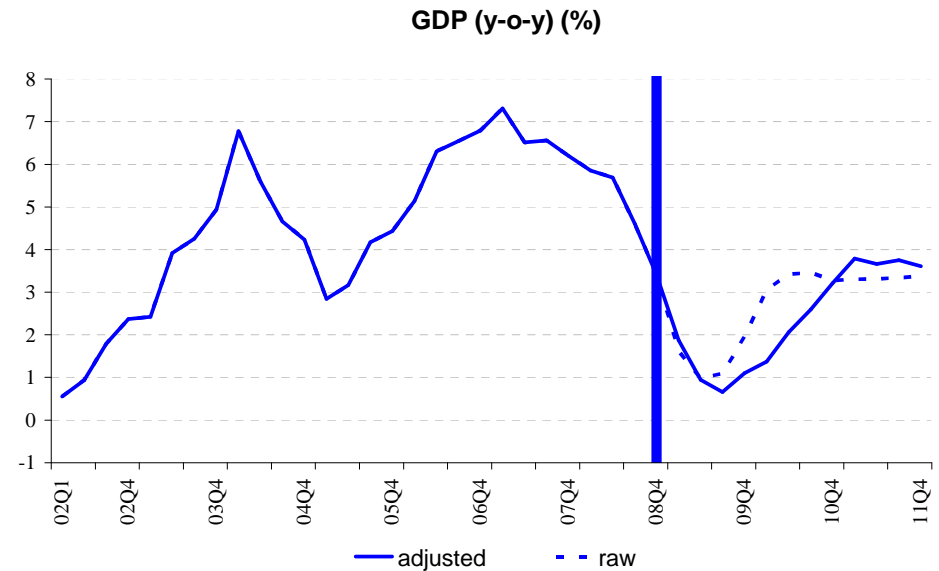
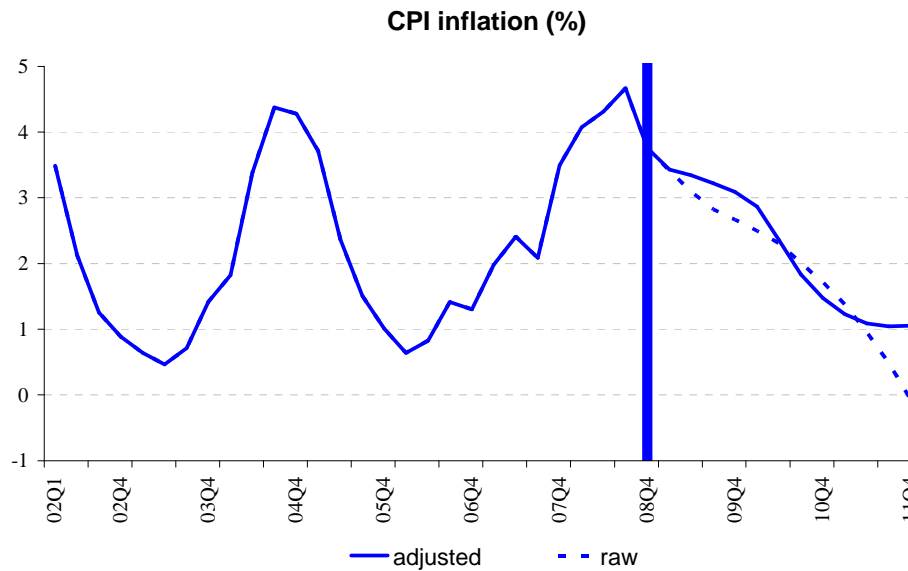
II CHANGES IN THE PROJECTIONS

a) With respect to the previous projection

b) Expert adjustments

c) Changes in the previous year

III UNCERTAINTY



Expert adjustments

I PROJECTION

II CHANGES IN
THE PROJECTIONS

a) With respect to the
previous projection

**b) Expert
adjustments**

c) Changes in the
previous year

III UNCERTAINTY

Expert adjustments in the February forecasting round:

- Import and export prices***
- Volume of imports and exports***
- Exchange rate**
- Employment and wages**
- Housing prices**
- Gross fixed corporate capital formation*
- Gross fixed public capital formation*
- Inventories*
- Private consumption*
- Public sector finance*
- Energy prices*

Scale of adjustments:

| | |
|-----|-------------|
| *** | significant |
| ** | medium |
| * | small |

The following slides show the paths of variables before adjustments (the so-called raw projection) and after introducing all expert adjustments to the model (February projection)

I PROJECTION

II CHANGES IN THE PROJECTIONS

a) With respect to the
previous projection

b) Expert
adjustments

**c) Changes in the
previous year**

III UNCERTAINTY

Review of projection changes in the previous year

CPI inflation in subsequent projections

I PROJECTION

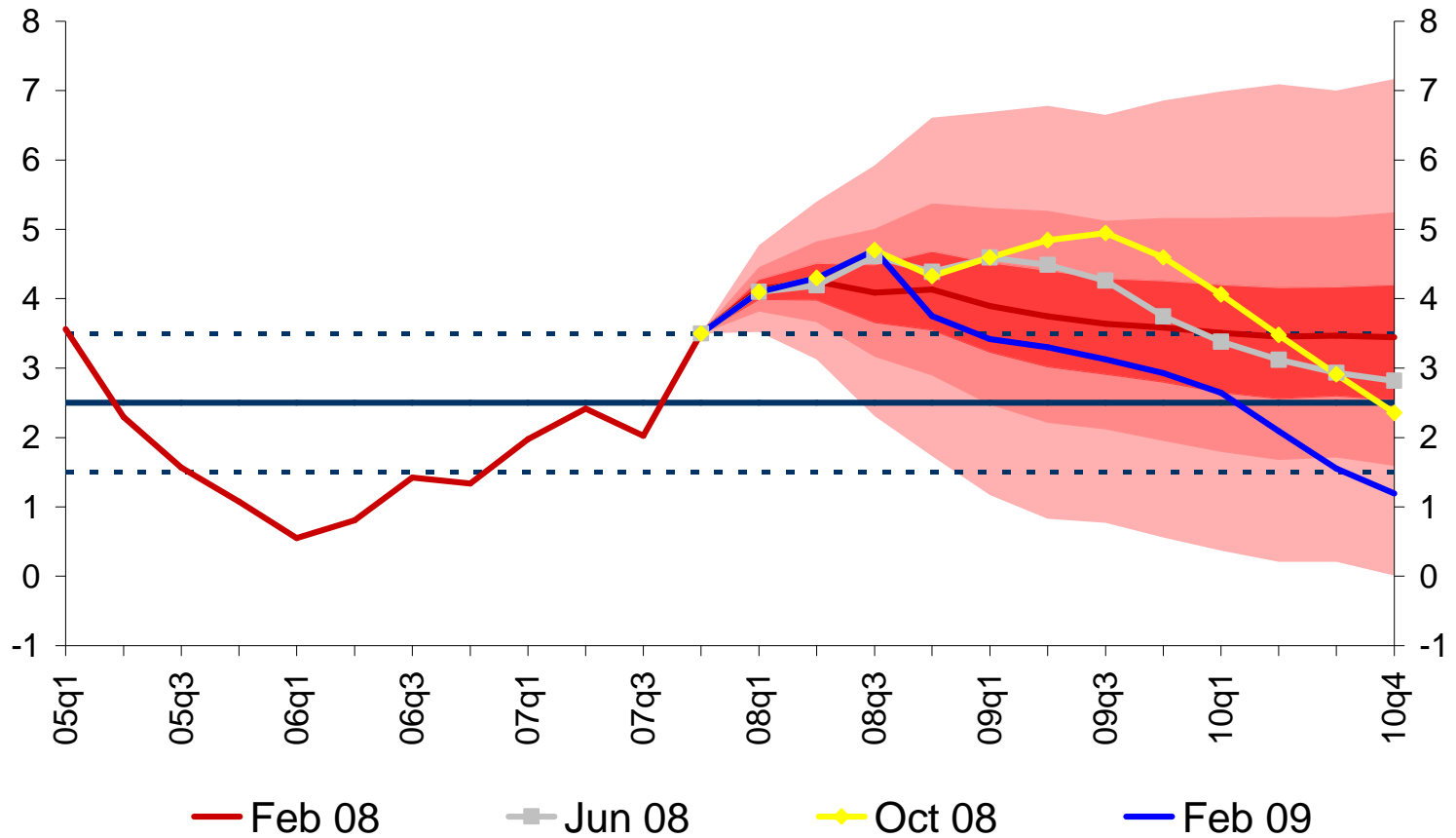
II CHANGES IN THE PROJECTIONS

a) With respect to the previous projection

b) Expert adjustments

c) Changes in the previous year

III UNCERTAINTY



GDP in subsequent projections

I PROJECTION

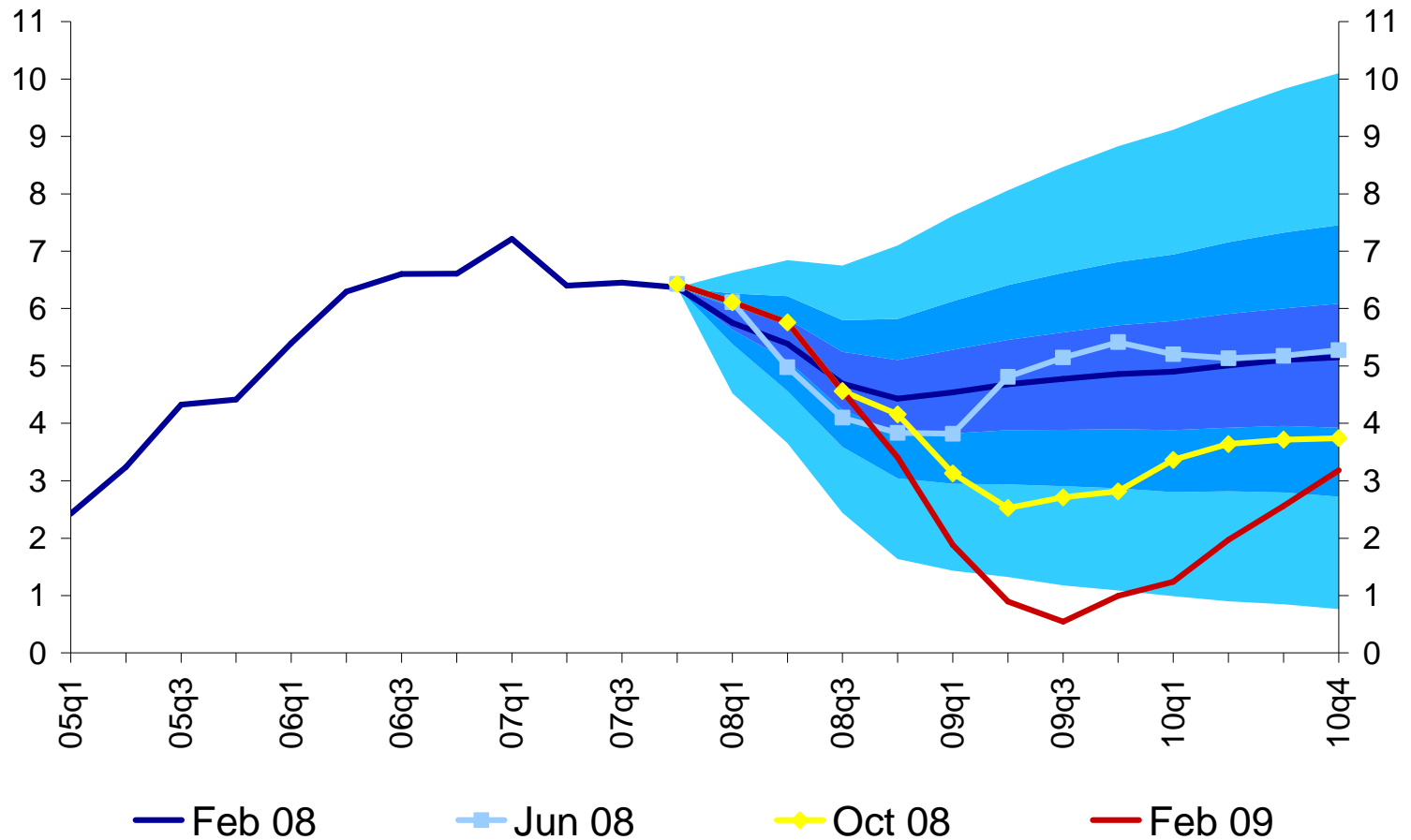
II CHANGES IN THE PROJECTIONS

a) With respect to the previous projection

b) Expert adjustments

c) Changes in the previous year

III UNCERTAINTY



External assumptions in subsequent projections

I PROJECTION

II CHANGES IN THE PROJECTIONS

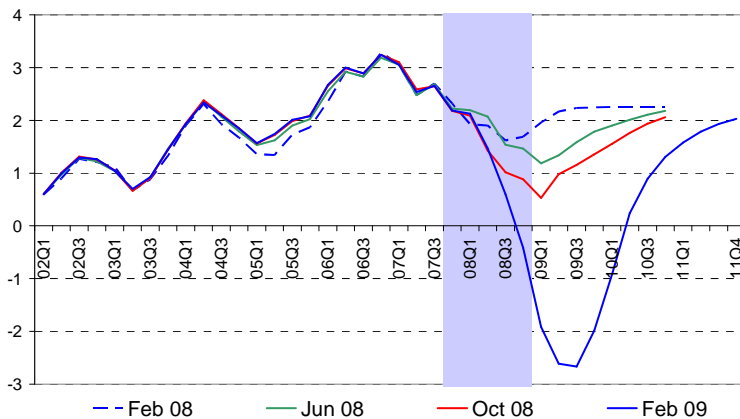
a) With respect to the previous projection

b) Expert adjustments

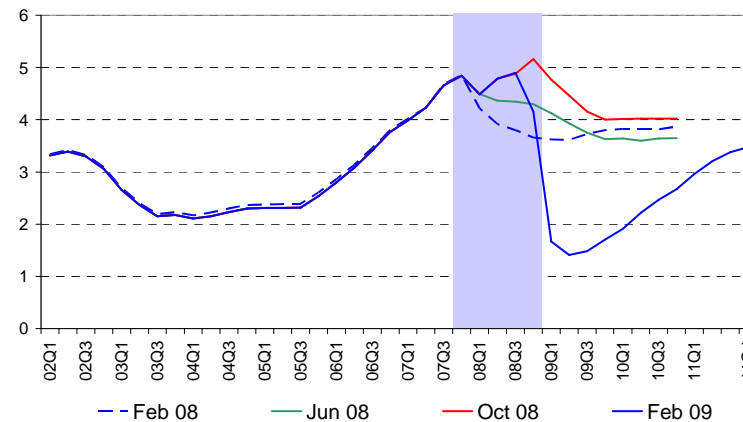
c) Changes in the previous year

III UNCERTAINTY

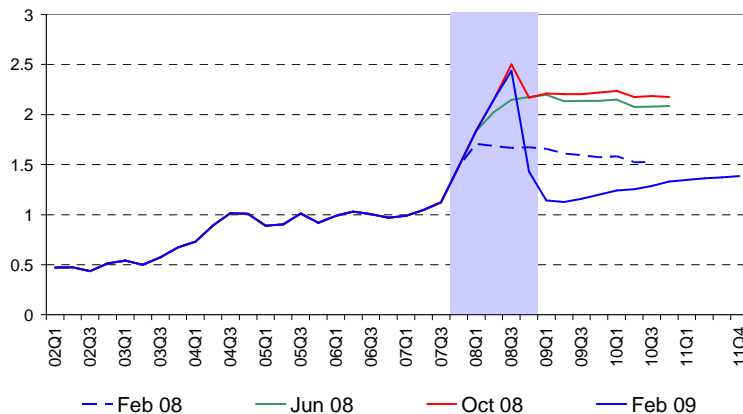
External GDP (y-o-y) (%)



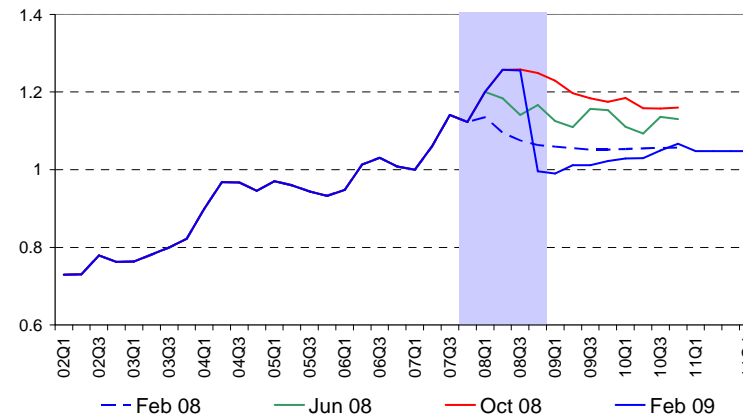
External interest rates



Energy commodity price index



Global prices of agricultural commodities



NBP

*ECONOMIC
INSTITUTE*

I PROJECTION

II CHANGES IN
THE PROJECTIONS

III UNCERTAINTY

UNCERTAINTY OF PROJECTION

1. Slowdown in the global and domestic economy

- Prolonged global recession, and, as a result, lower elasticity and, consequently, resistance of the Polish economy to shocks, may undermine the growth prospects in the years of the projection.

2. Fiscal policy in the period of crisis

- Effectiveness of government's proposals (inter alia, „Stability and Development Plan”) depends on the economic effectiveness of the proposed instruments, date of finalisation of the legislative process, effectiveness in laying down the procedures and organisational effectiveness of the concerned institutions.
- Faced with falling income driven by the economic slowdown, stability of the public finance sector may require the tightening of the monetary policy. Fiscal policy path is a risk factor for:
 - **domestic demand** (negative - curbing expenditure on goods and services, freezing wages in the public finance sector),
 - **growth rate and labour market in the mid-term** (negative – curbing public investment, increasing fiscal burden)
 - **inflation** (downside – contraction of current expenditure of the public finance sector, upside – increasing fiscal and parafiscal burden)
- Risk of strong increase in the costs of financing public debt amidst risk aversion in the global financial markets and further depreciation of the zloty.

3. Risks for EU funds utilisation

- Deteriorating income of the local government entities and banks' tightening of their lending criteria threaten the EU funds utilisation by the public sector.

4. Monetary policy transmission into economic activity

- Given higher credit risk and deteriorating outlook for growth of banks and enterprises, the scale of cuts in the central bank reference interest rates translating into credit costs may be limited.

5. Exchange rate developments and competitiveness of the economy

- As a result of uncertainty about processes in the global real and nominal economy, uncertainty about future exchange rate of the zloty, *terms-of-trade* and contribution of net exports to growth has increased.

6. Changes connected with uncertainty about the date of Poland's entry into the euro area

- Lack of political consensus and uncertainty about the date of entry into the euro area may affect the volatility of exchange rates and long-term interest rates.

7. Labour market developments

- The scenario of labour market developments is subject to a number of multidirectional risks connected with:
 - government's structural policy,
 - impact of scheduled or already implemented regulations (such as cuts in tax rates or changes in the minimum wage level) on the labour market,
 - scale of the actual return migration,
 - quality of labour resources and their adjustment to the structure of labour demand.

8. Relation between costs and inflation

- Amidst considerable economic slowdown, enterprises may delay price increases, even if production costs are maintained at a high level.

Uncertainty factors – summary

I PROJECTION

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Taking into account the discussed uncertainty factors it is assessed that in the short-term projection horizon, downside risks for inflation slightly prevail; on the other hand, upside risks for inflation prevail in the long-term projection horizon.

As far as growth is concerned, non-projection risk factors indicate higher probability of prolonged economic slowdown.