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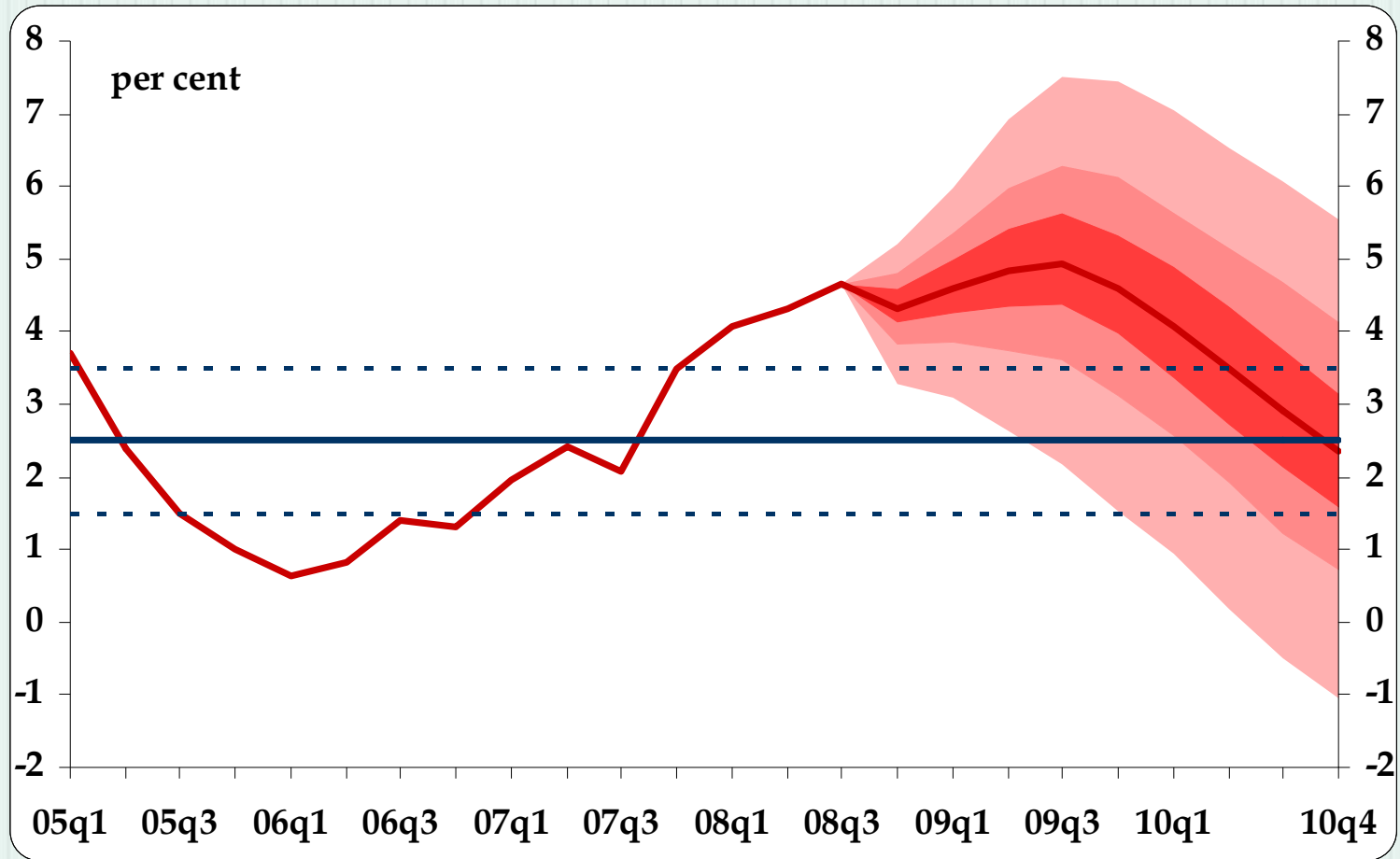
*Economic Institute*

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

October 2008

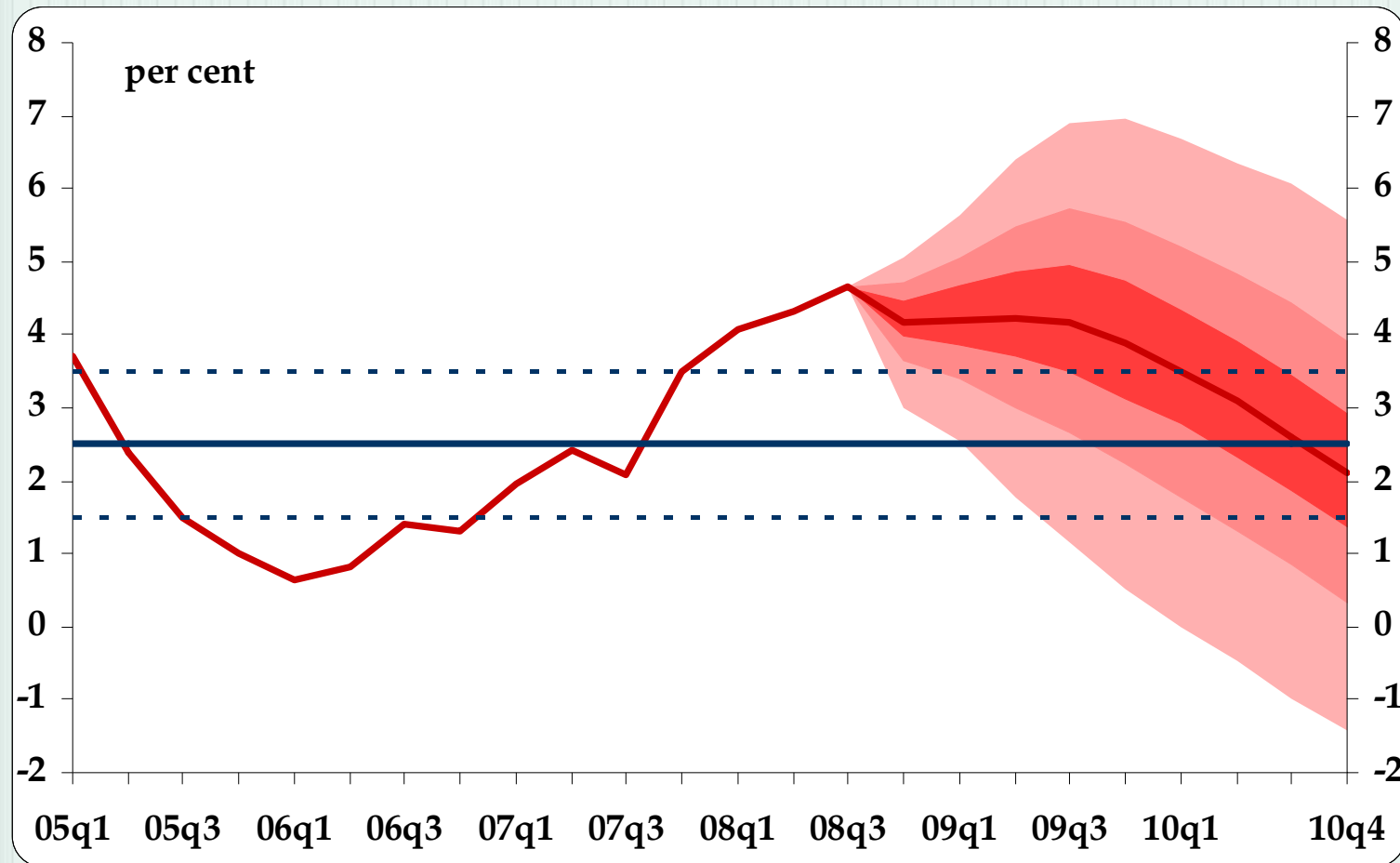
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**Inflation projection - October 2008**



Source: Economic Institute

# Outlook for inflation – risk assessment



Source: Economic Institute

## **Presentation structure**

### **I. Central projection**

- Starting point compared to June projection
- Projection for 2008-2010
- Accounting for deviations from the previous projection
- Expert adjustments

### **II. Inflation projection uncertainty analysis**

- Distribution of risks of the central projection
- Quantification of risks of the projection connected with deteriorating outlook for global growth
- Factors unaccounted for in the model

### **III. Changes in the forecasting process**

- Change in the method of risk assessment of central projection
- Changes in the NECMOD forecasting model

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# Central projection

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## **Starting point of October projection compared to June projection**

- GDP and its components
- Labour market
- Inflation

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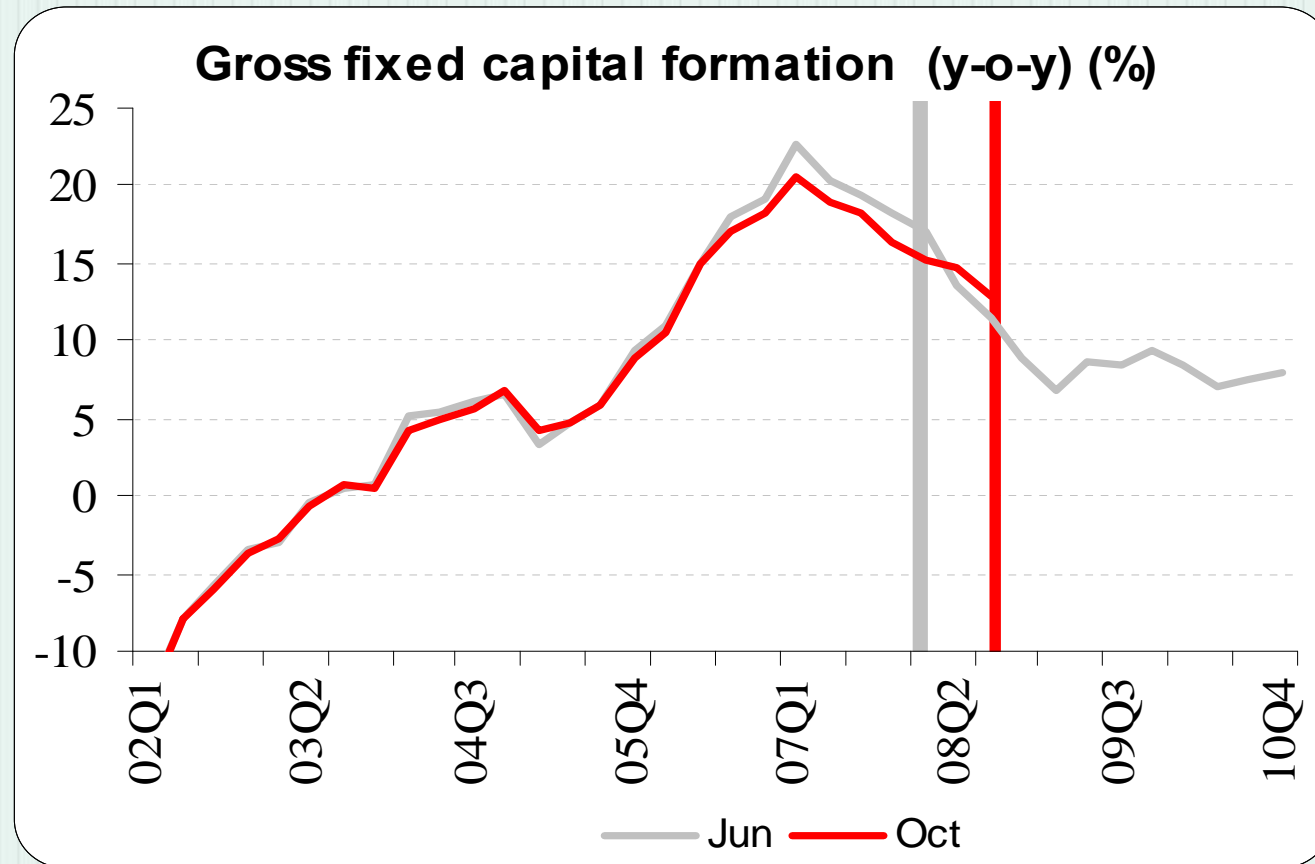
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# **GDP and its components**

*Starting point*

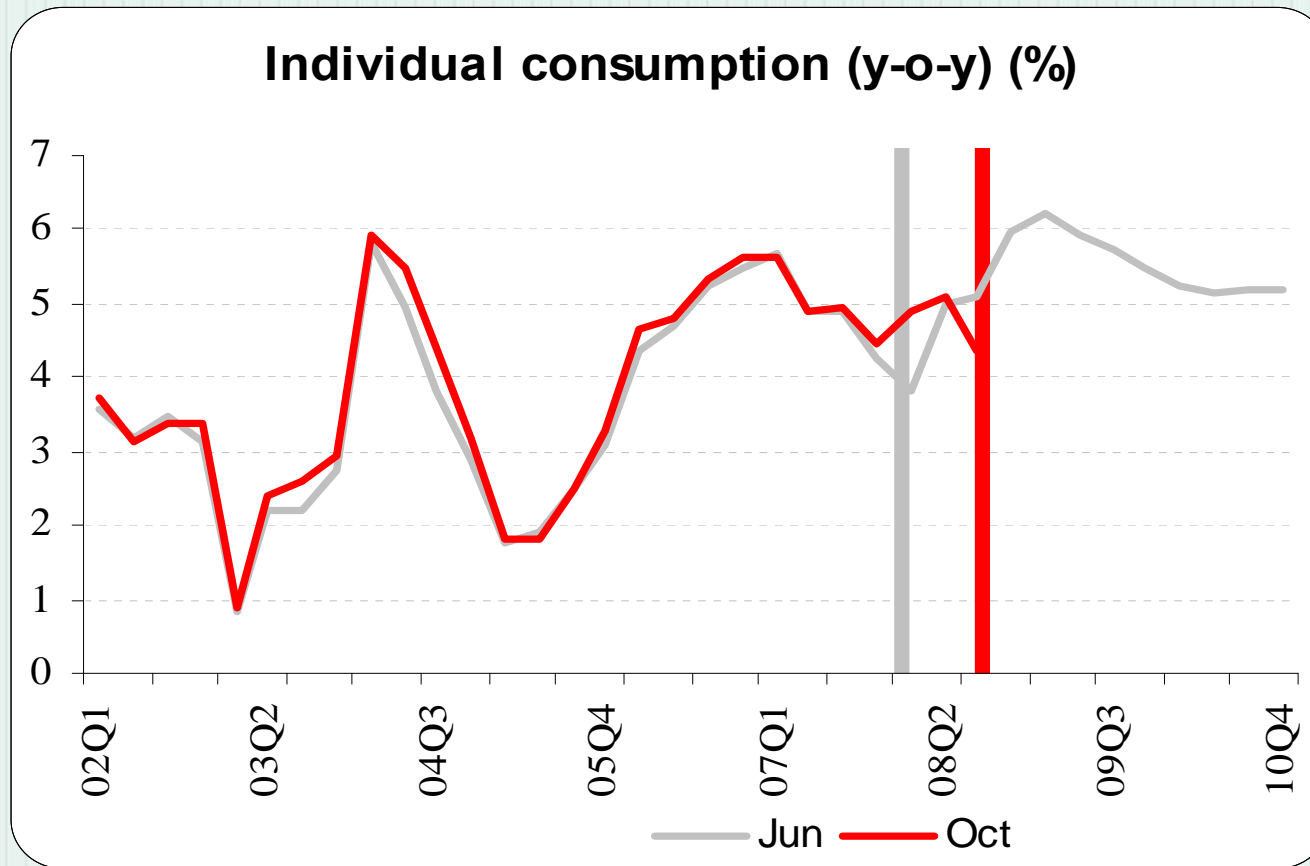
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Gross fixed capital formation  
(slightly higher growth rate)

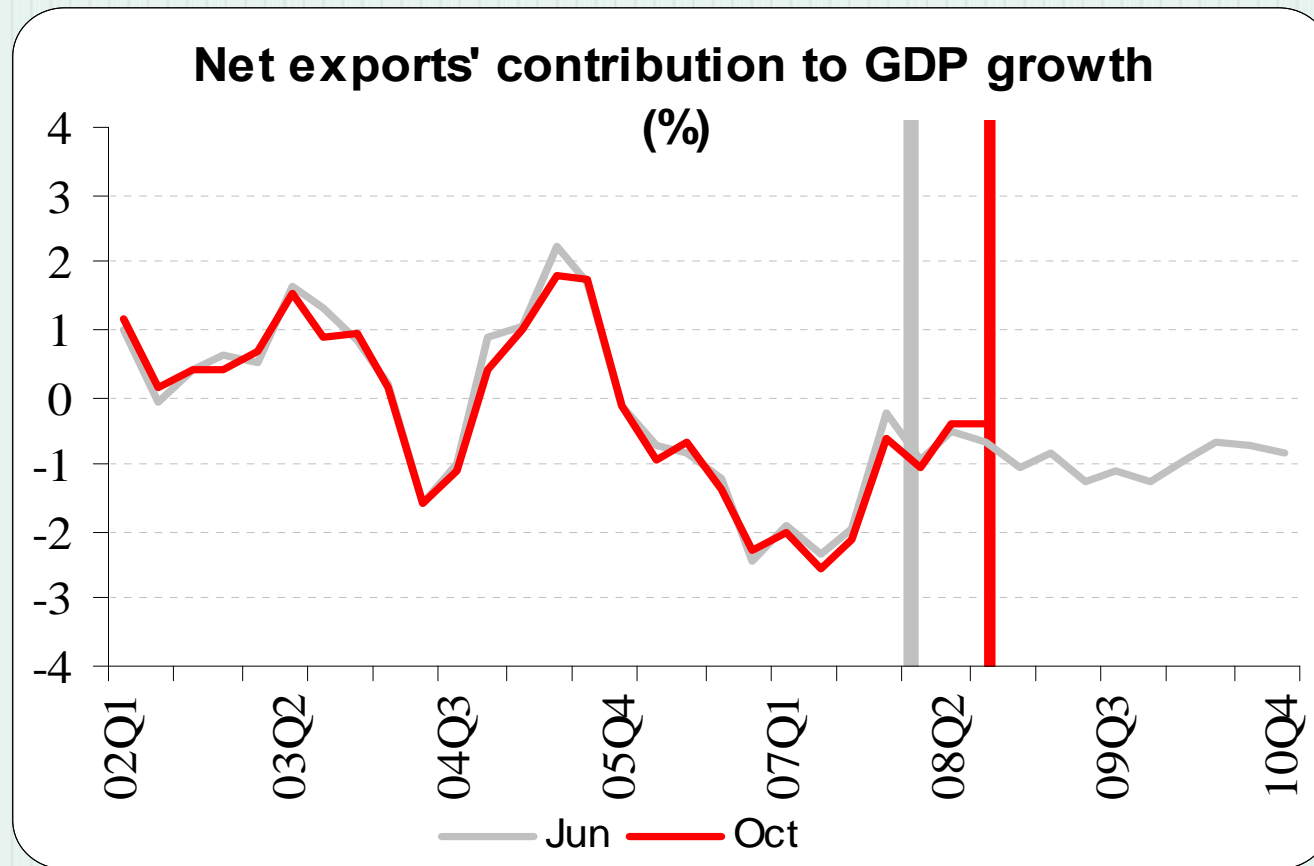




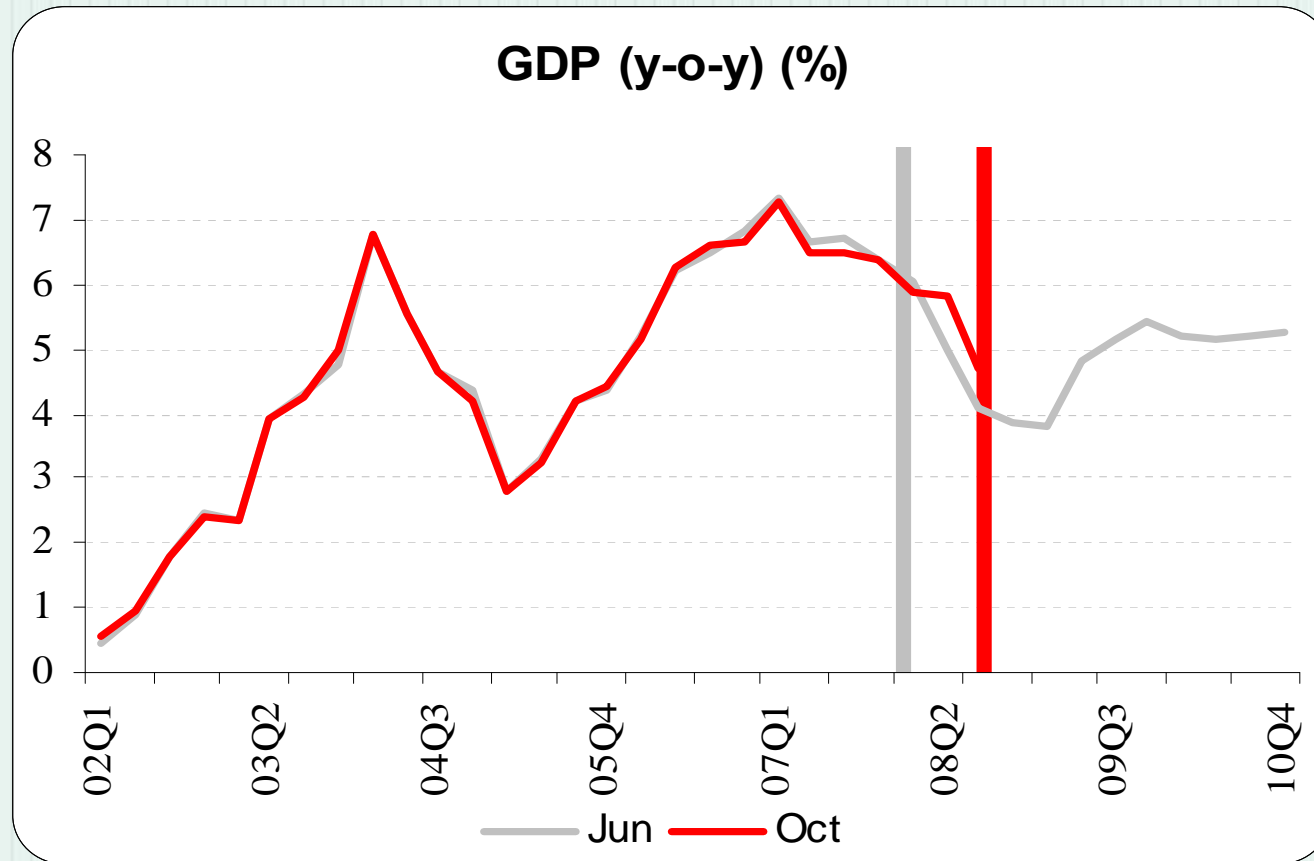
### Individual consumption (lower growth rate)



Net exports' contribution to GDP growth (similar)



### GDP (higher growth rate)



## GDP– starting point\*

	08Q2		08Q3	
	October projection	June projection	October projection	June projection
GDP (y/y) (%)	5.8	5.0	4.7	4.1
Domestic demand (y/y) (%)	6.0	5.3	4.9	4.6
Individual consumption (y/y) (%)	5.1	5.0	4.3	5.1
Public consumption (y/y) (%)	-0.3	4.1	-0.5	2.9
Gross fixed capital formation (y/y) (%)	14.8	13.5	12.8	11.4
Exports (y/y) (%)	8.3	10.6	10.2	9.8
Imports (y/y) (%)	8.6	11.1	10.4	10.6
Contribution of net exports (%)	-0.4	-0.5	-0.4	-0.7

\* Indicators whose value is higher than in June projection are marked in green colour and indicators whose value is lower than in June projection are marked in red colour

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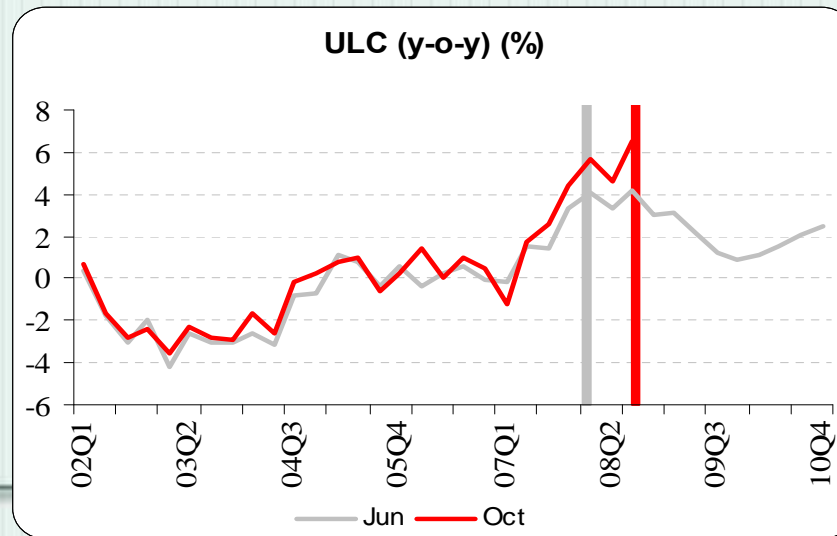
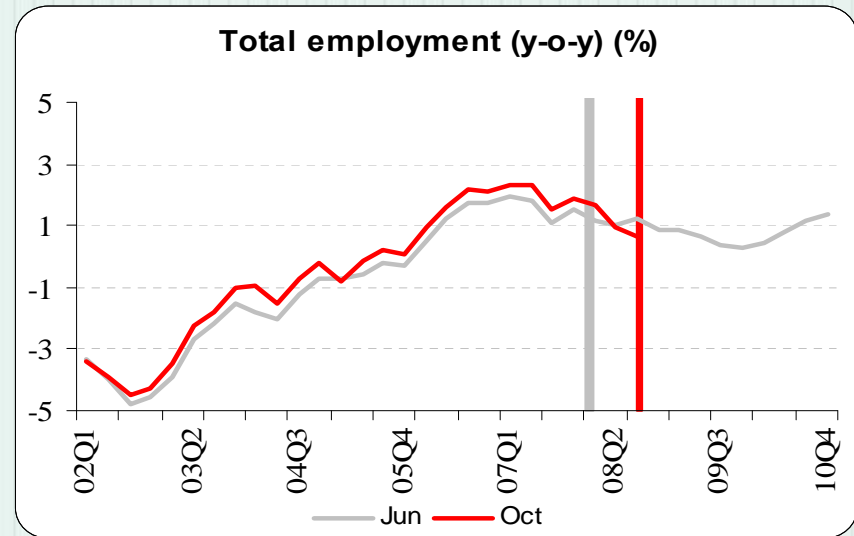
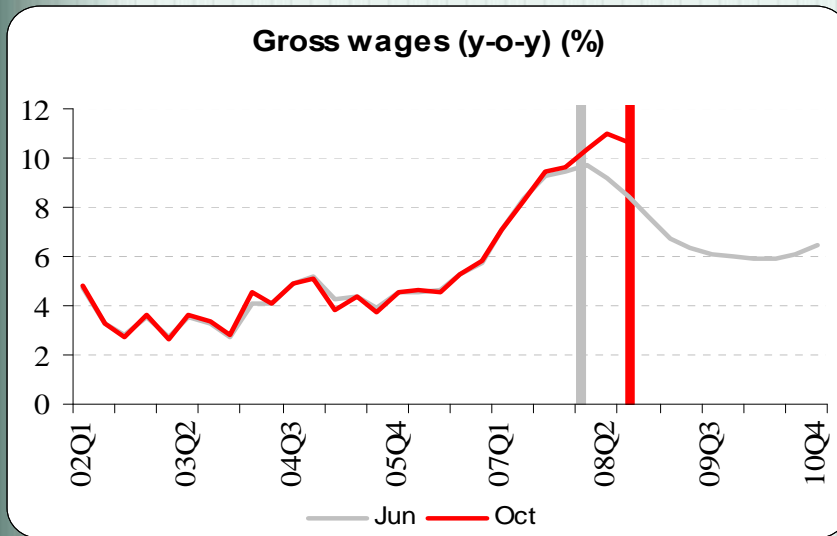
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# **Labour market**

*Starting point*

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### ULC (higher growth rate)



### Labour market – starting point\*

	08Q2		08Q3	
	October projection	June projection	October projection	June projection
ULC (y/y) (%) <sup>†</sup>	4.6	3.3	6.5	4.2
Non-agricultural ULC (y/y) (%) <sup>†</sup>	5.6	4.3	7.8	4.9
Labour productivity (y/y) (%) <sup>†</sup>	4.9	4.0	4.0	2.9
Non-agricultural labour productivity (y/y) (%) <sup>†</sup>	3.9	3.0	2.8	2.2
Wages (y/y) (%)	11.0	9.2	10.6	8.5
NAWRU (%)	10.4	10.7	10.5	10.5
LFS employment (y/y) (%) <sup>†</sup>	1.0	1.0	0.6	1.2
Non-agricultural employment (y/y) (%) <sup>†</sup>	1.9	1.9	1.9	1.9
LFS unemployment rate (%)	7.4	6.6	7.6	6.8
Participation rate (%)	54.1	53.5	54.4	53.8
Population (y/y) (%) <sup>†</sup>	-2.2	-1.9	-2.2	-1.3

\*Indicators whose value is higher than in June projection are marked in green colour and indicators whose value is lower than in June projection are marked in red colour

<sup>†</sup> Based on LFS adjusted data

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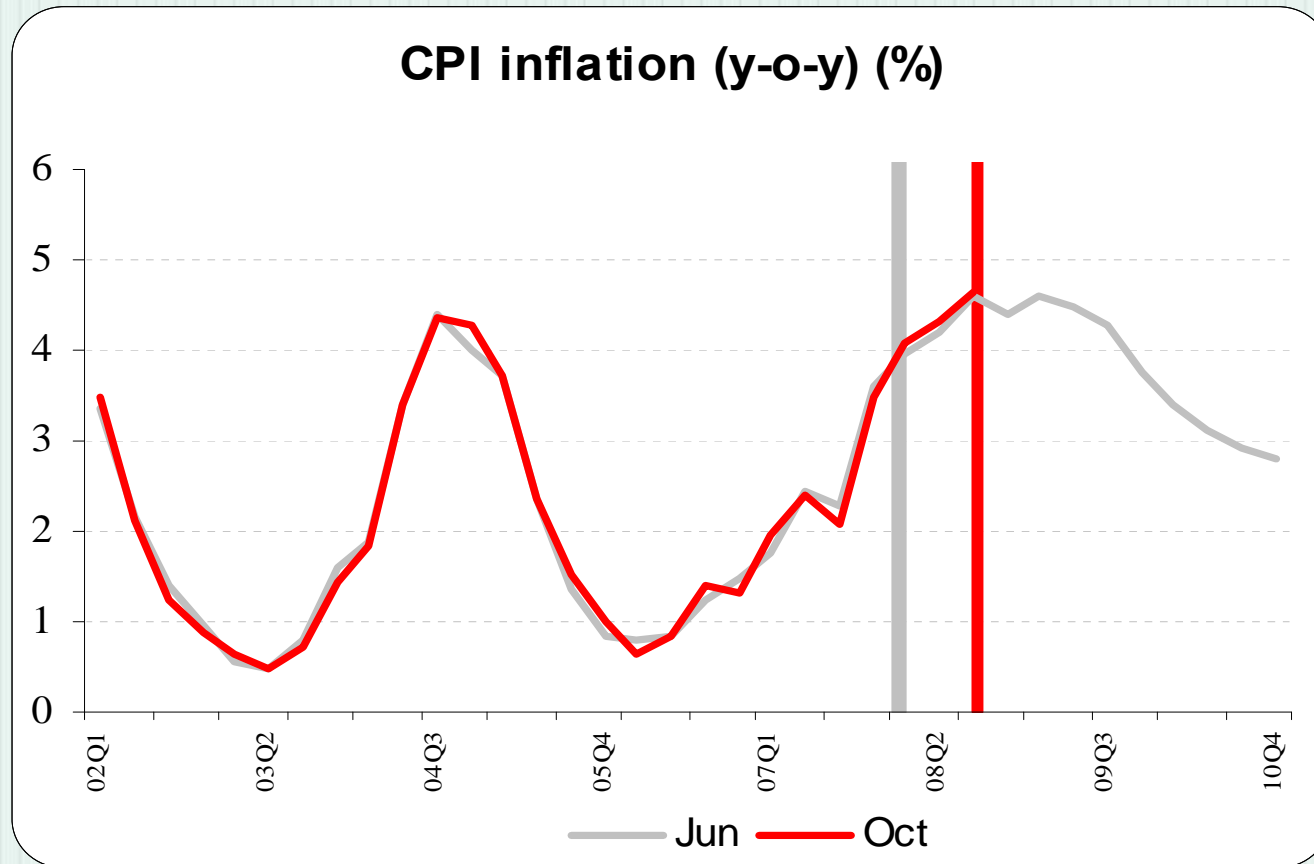
# **Inflation**

*Starting point*

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### Inflation (slightly higher)



## Inflation – starting point\*

	08Q2		08Q3	
	October projection	June projection	October projection	June projection
CPI inflation (y/y) (%)	4.3	4.2	4.7	4.6
Core inflation (y/y) (%)	2.0	1.9	2.6	2.6
Food price inflation (y/y) (%)	7.2	7.0	6.5	6.5
Energy price inflation (y/y) (%)	8.5	8.3	9.9	9.3

\* Indicators whose value is higher than in June projection are marked in green colour and indicators whose value is lower than in June projection are marked in red colour

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**Macroeconomic projection  
2008 - 2010**

*Constant interest rates*

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# **Assumptions**

*Macroeconomic projection*

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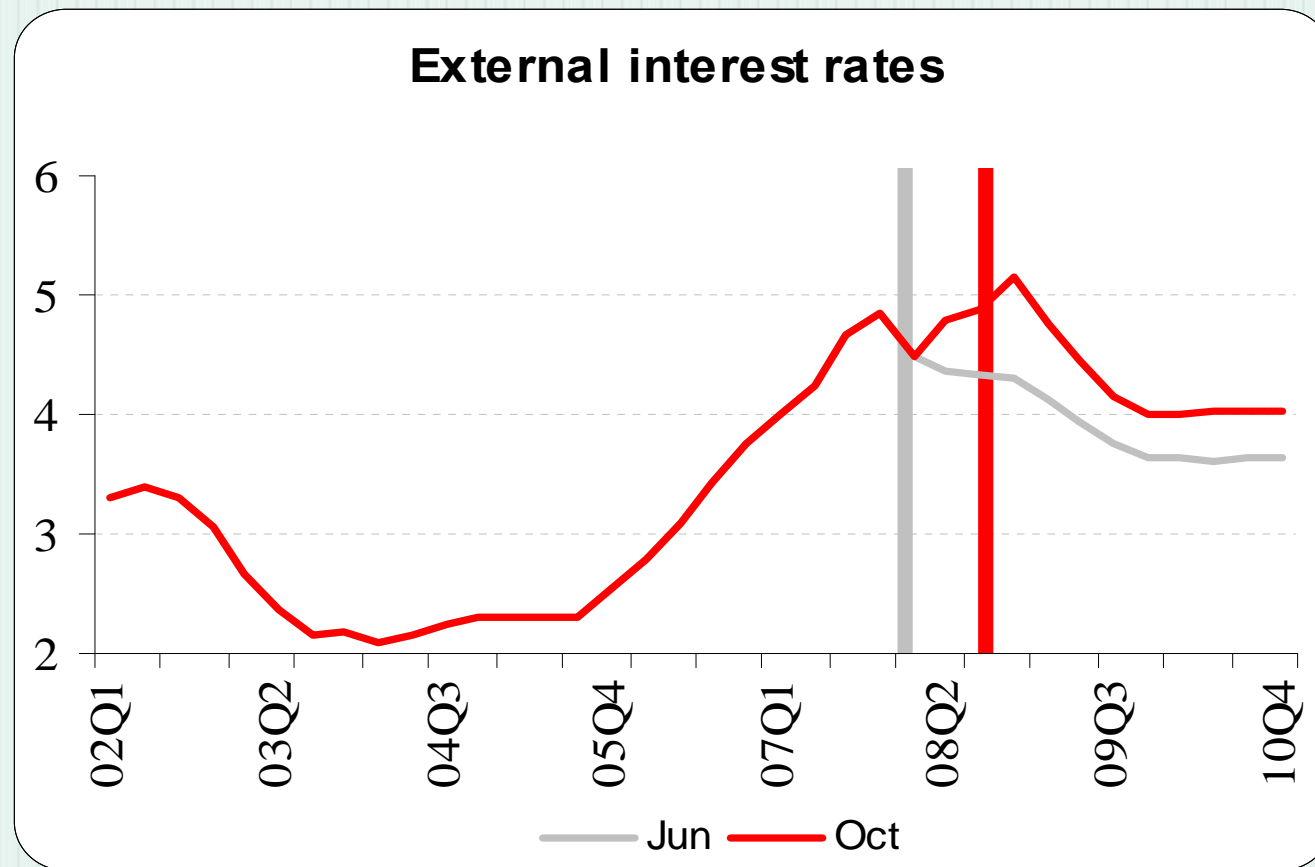
### External growth (lower)



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

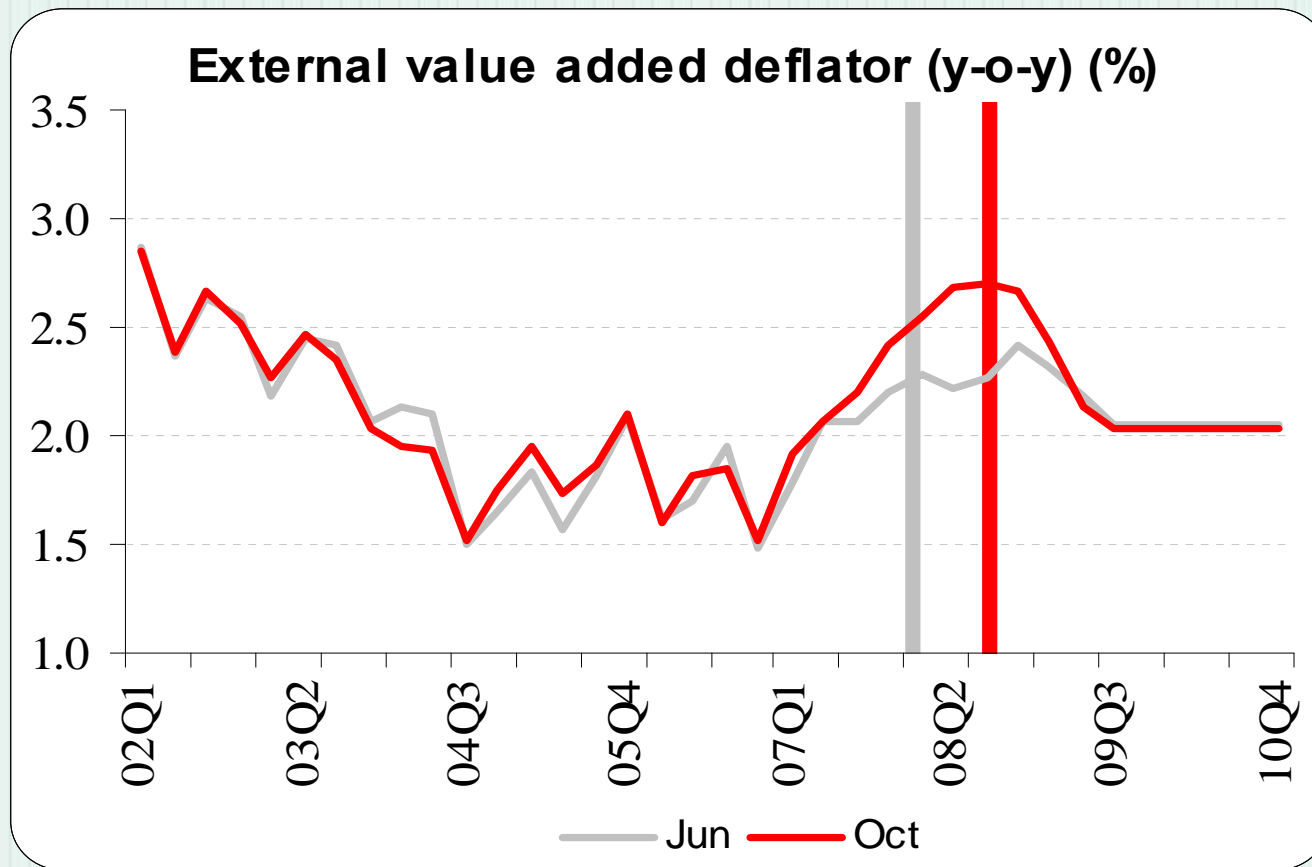
- **euro area** (87.8%)
- **Great Britain** (7.2%)
- **United States** (5.0%)

### External interest rates (higher)

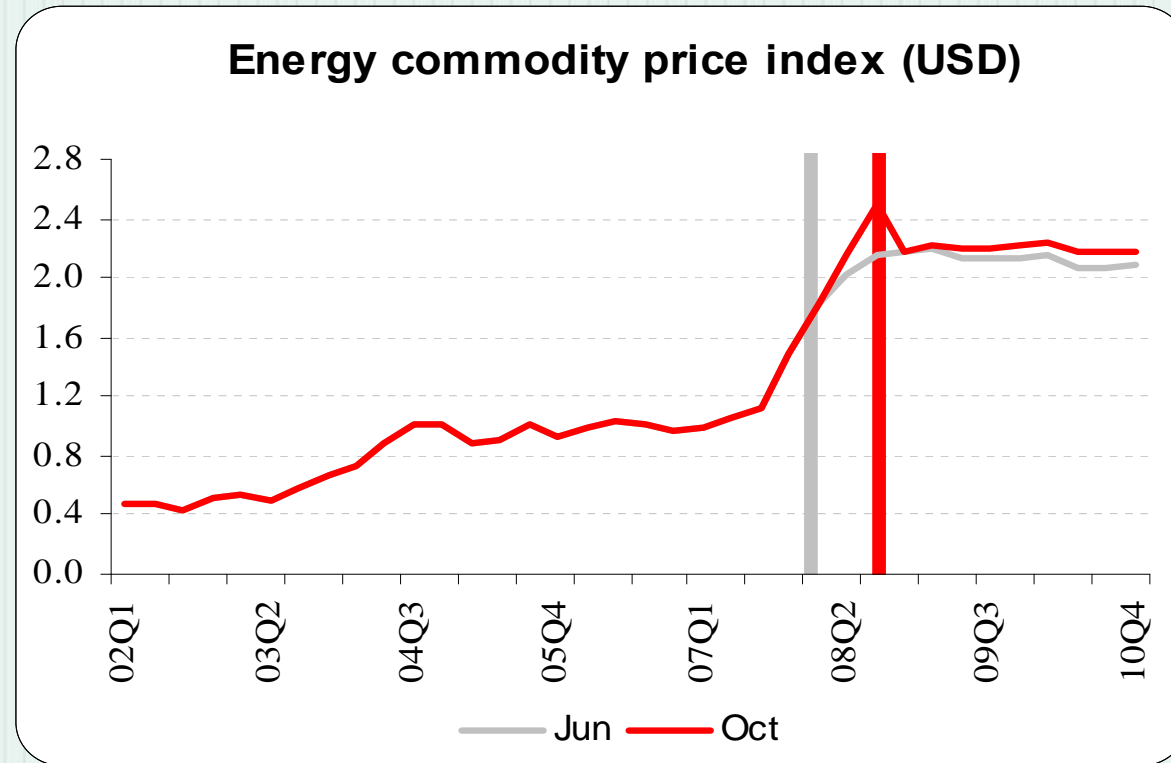


### External value added deflator

(higher from 2009 Q1, with no changes in the long-term horizon)



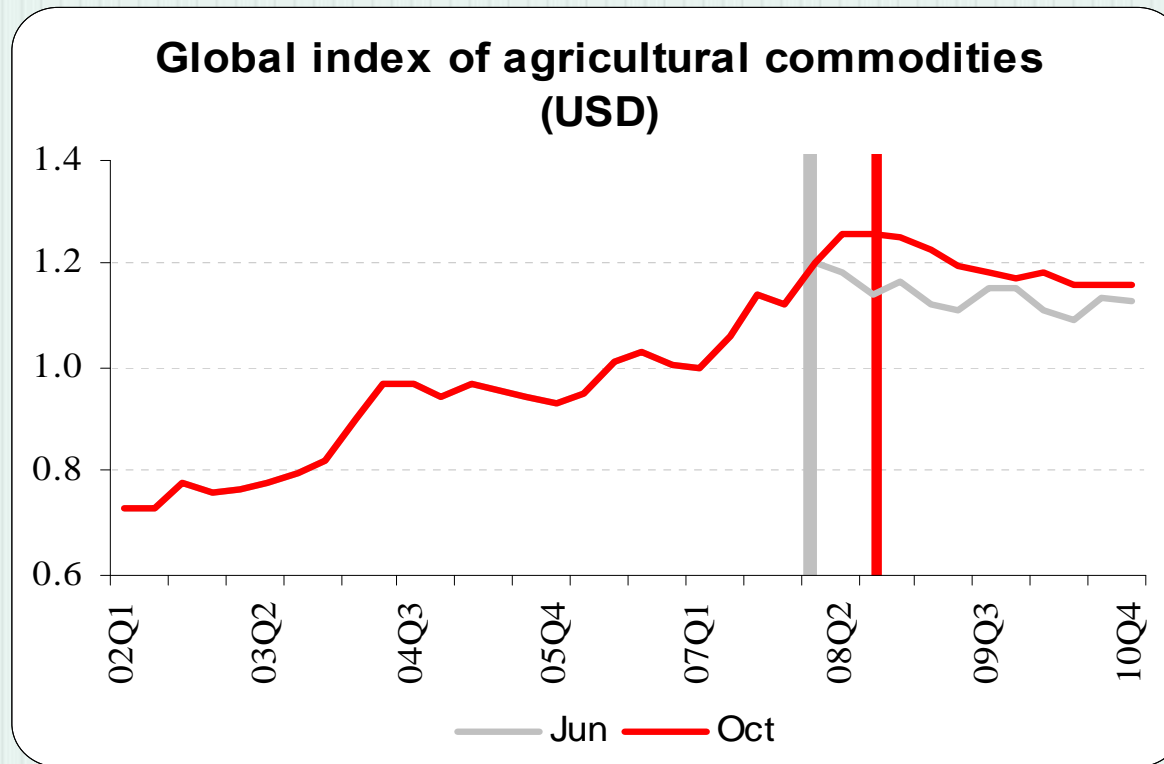
Energy commodity price index\*  
(slightly higher in the long-term)



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



Global prices of agricultural commodities\*  
(higher throughout the projection horizon)



•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).

## Interest rate level in Poland

- Due to high level of risk premium on the money market at the starting point of the projection, it was assumed that constant level of NBP interest rates will equalise 3-month WIBOR of 6.2%, this level being reached gradually, falling from the current level of 6.7%

*Constant interest rates*

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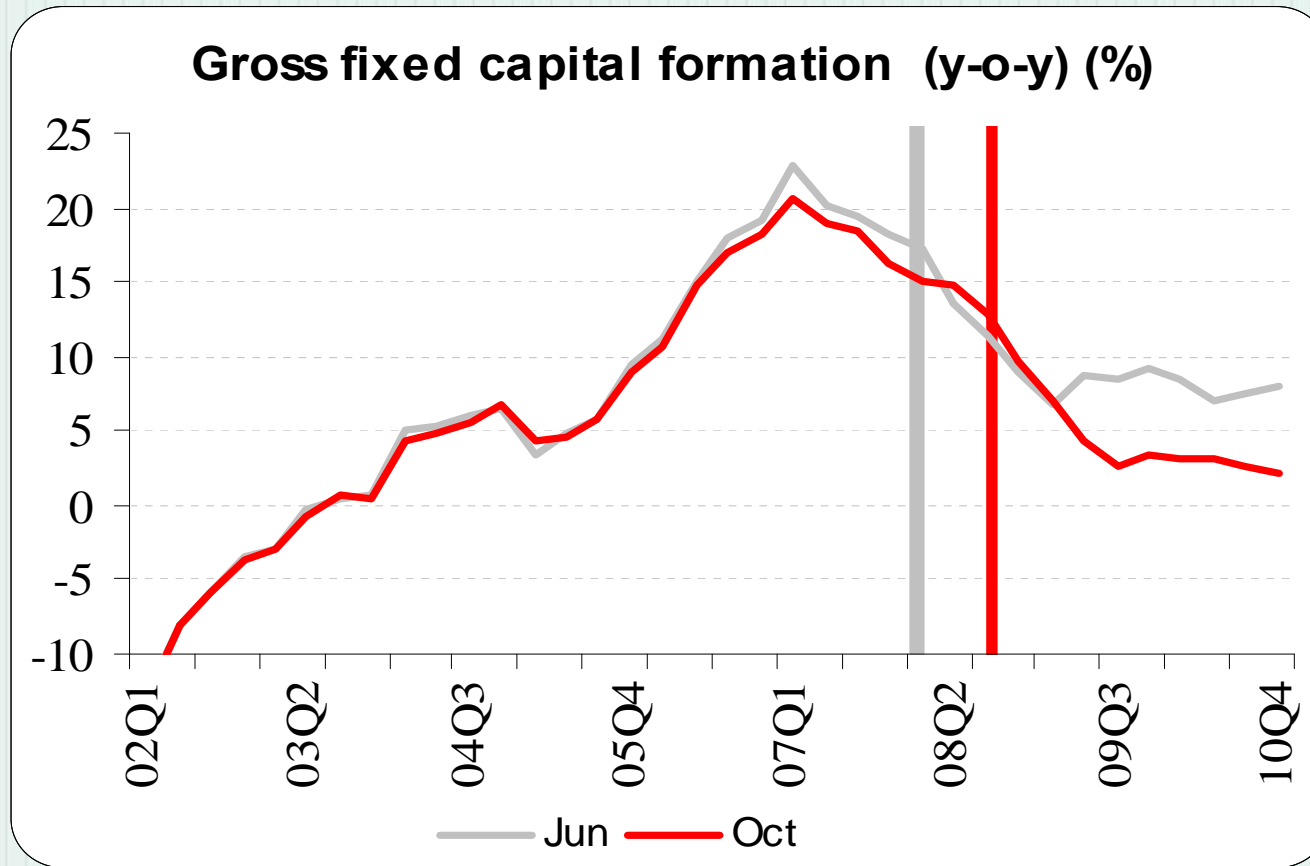
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# **GDP and its components**

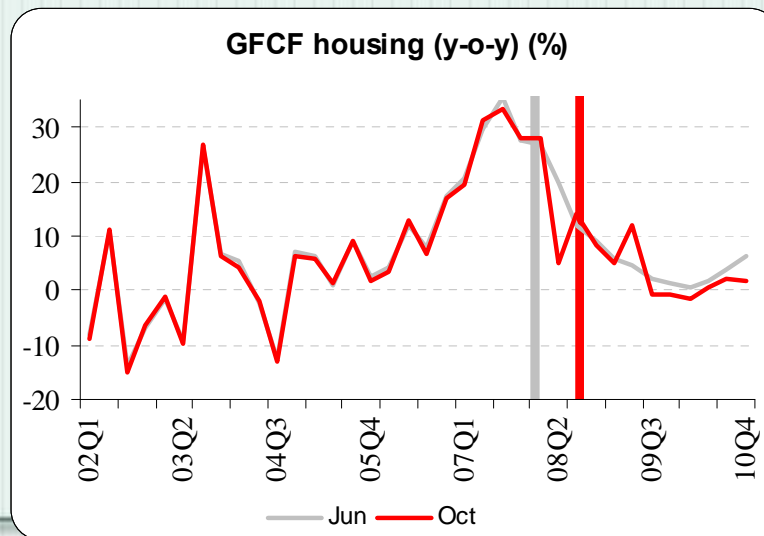
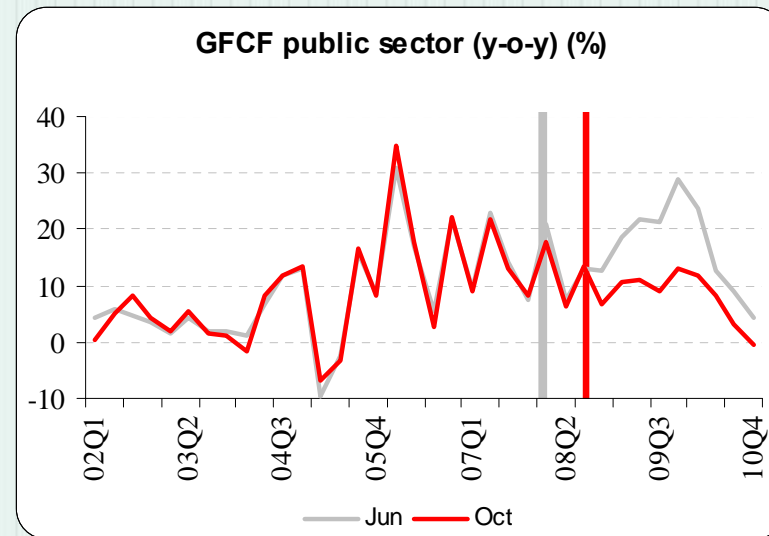
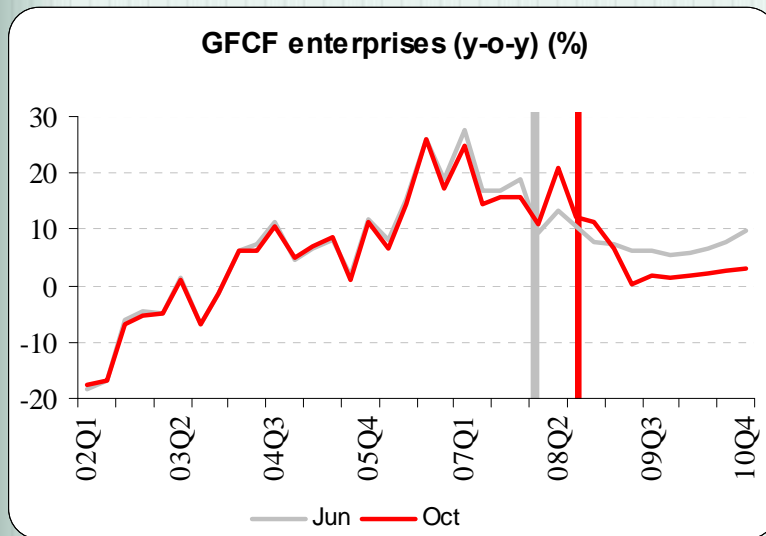
*Macroeconomic projection*

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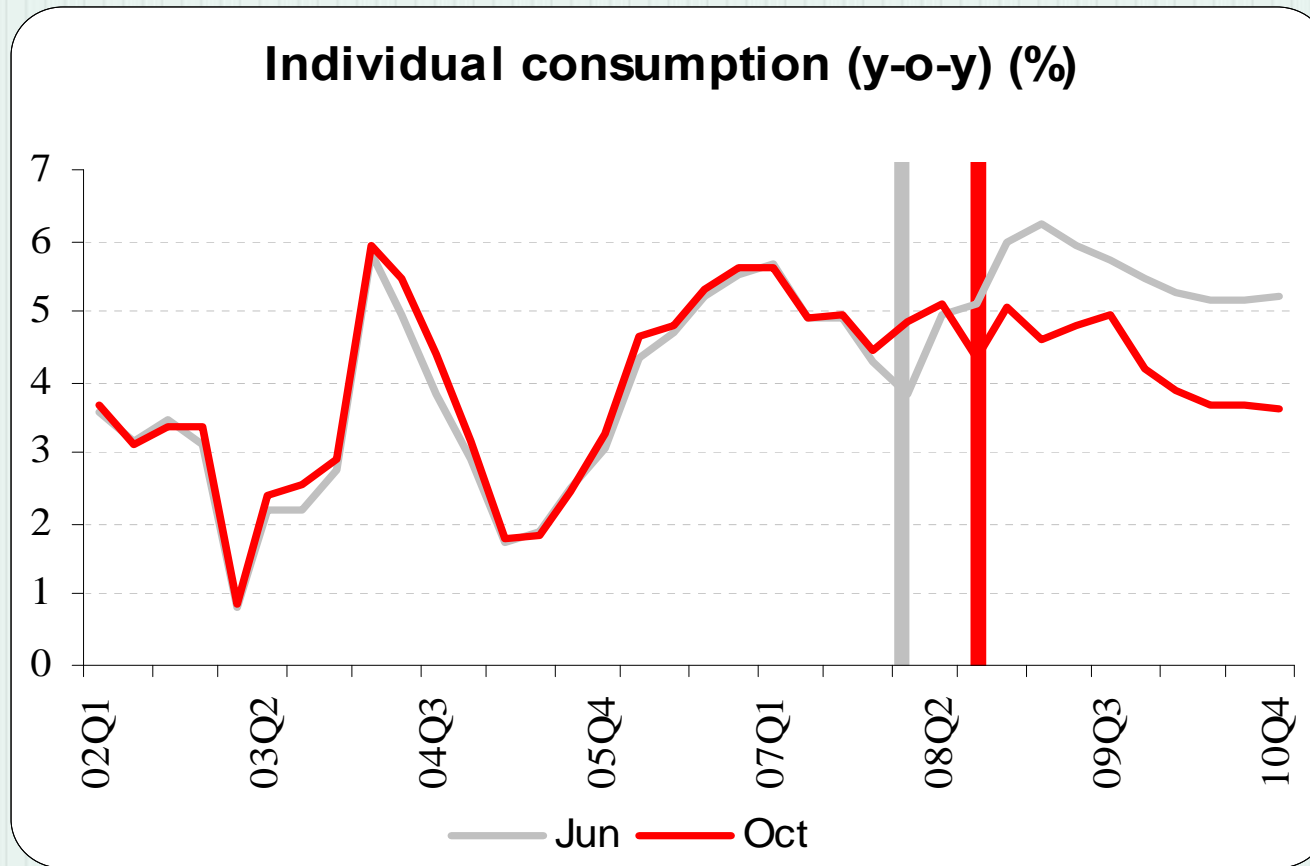
Gross fixed capital formation:  
 (markedly lower growth rate in the long-term projection horizon)



### Gross fixed capital formation: decomposition

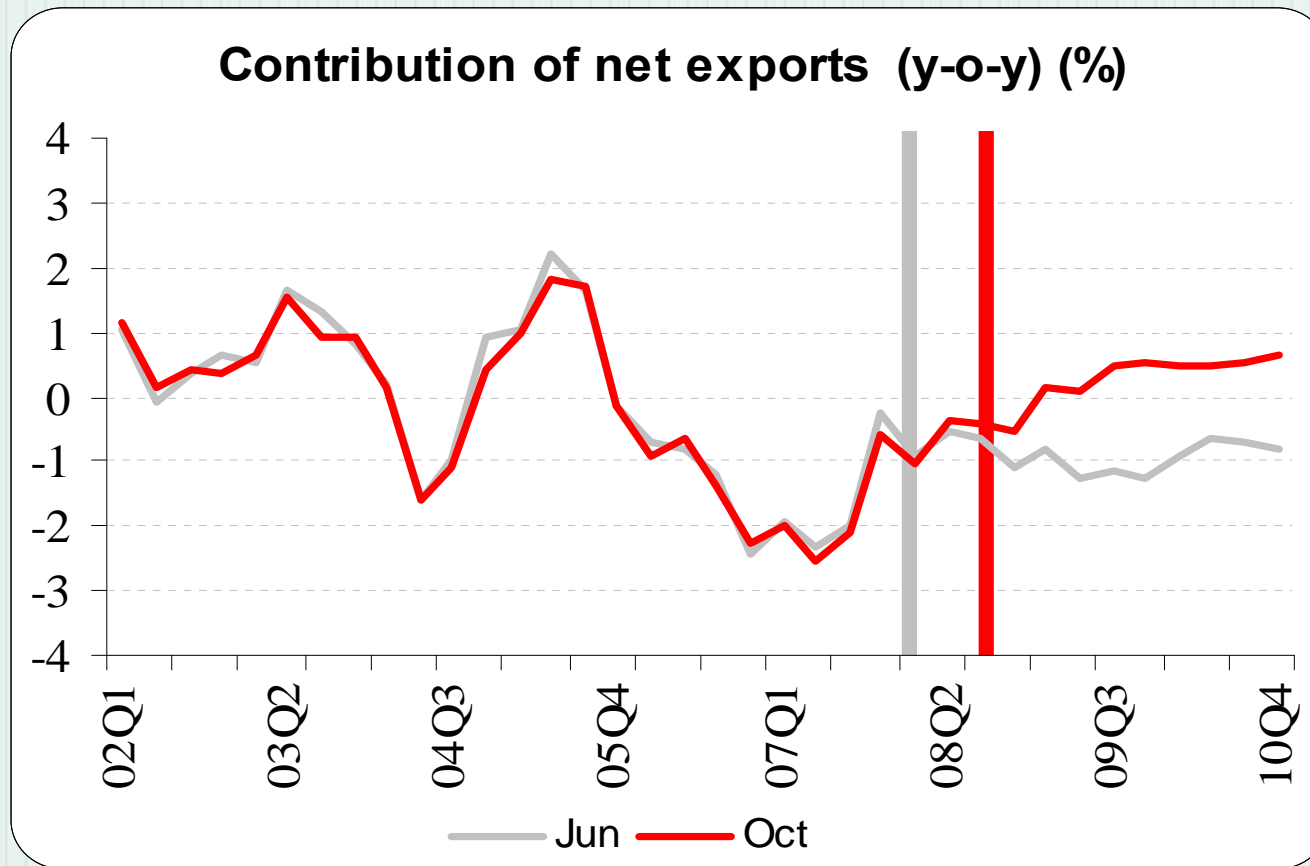


Individual consumption  
(markedly below June path)



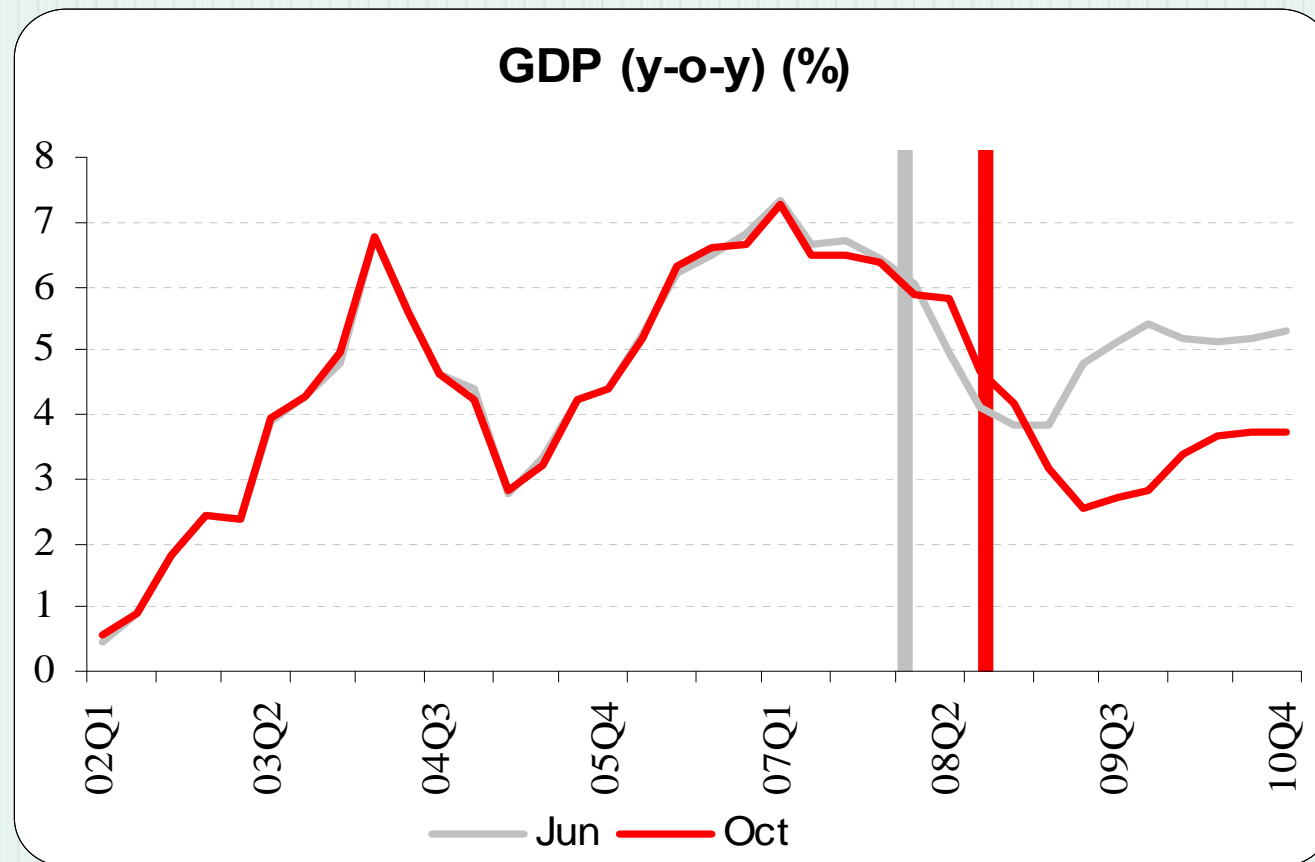
### Contribution of net exports

(higher than in June projection, positive contribution from 2009)



### GDP

(higher growth rate in the short-term horizon,  
markedly below June path from 2009)





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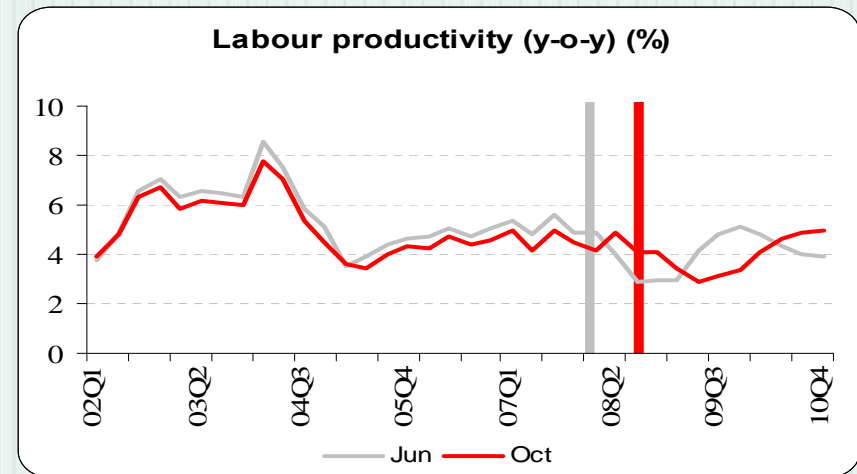
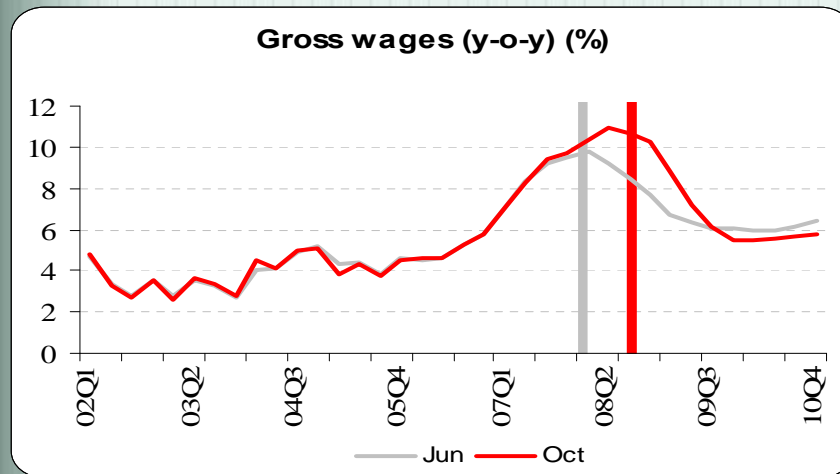
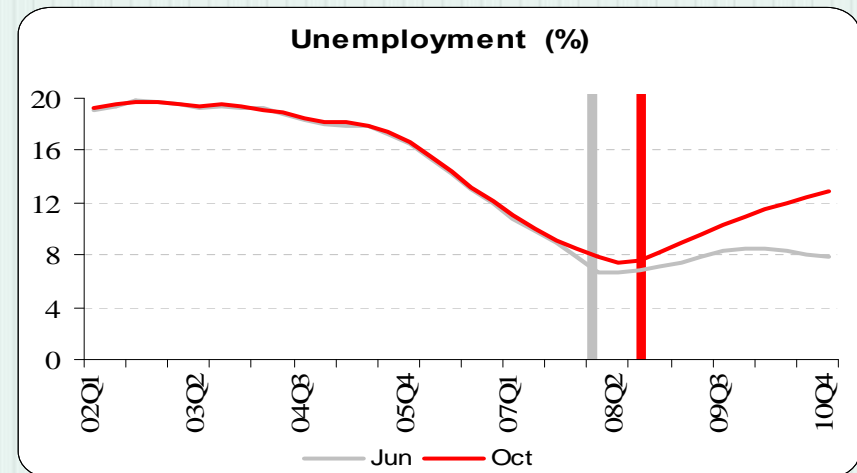
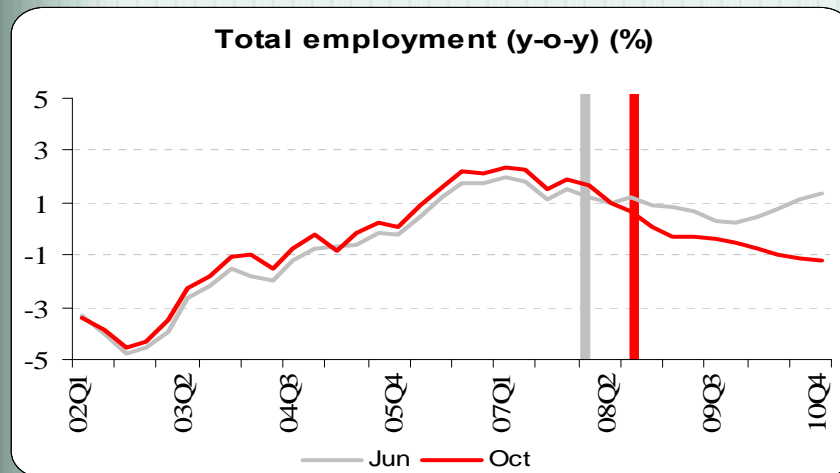
# **Labour market**

*Macroeconomic projection*

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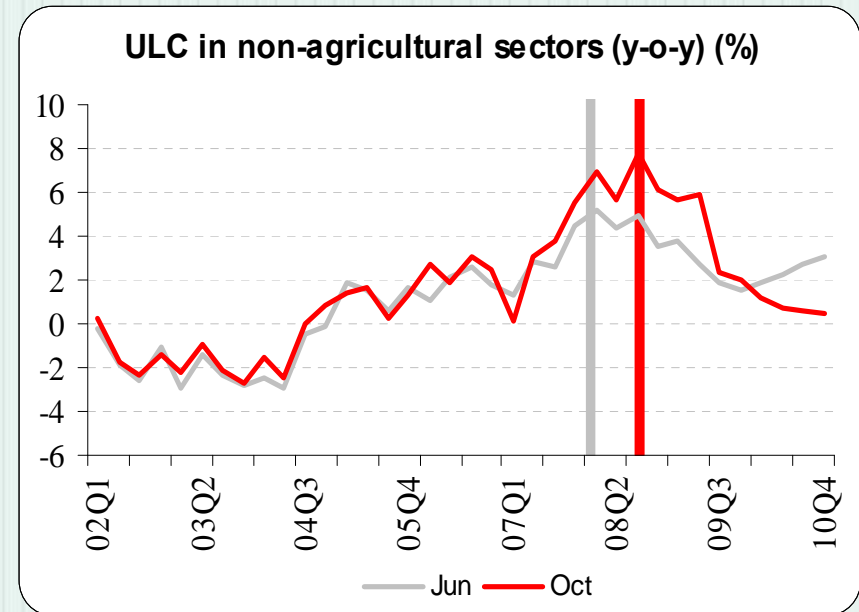
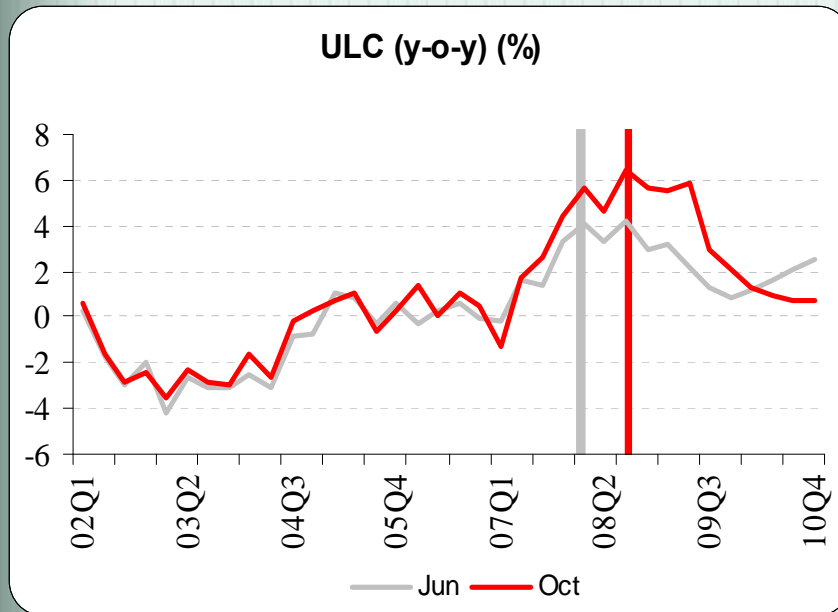
### Labour market

(higher productivity of wages in the short-term, negative growth of the number of working persons from 2009, higher unemployment rate)



### ULC

(higher growth rate until the end of 2009)



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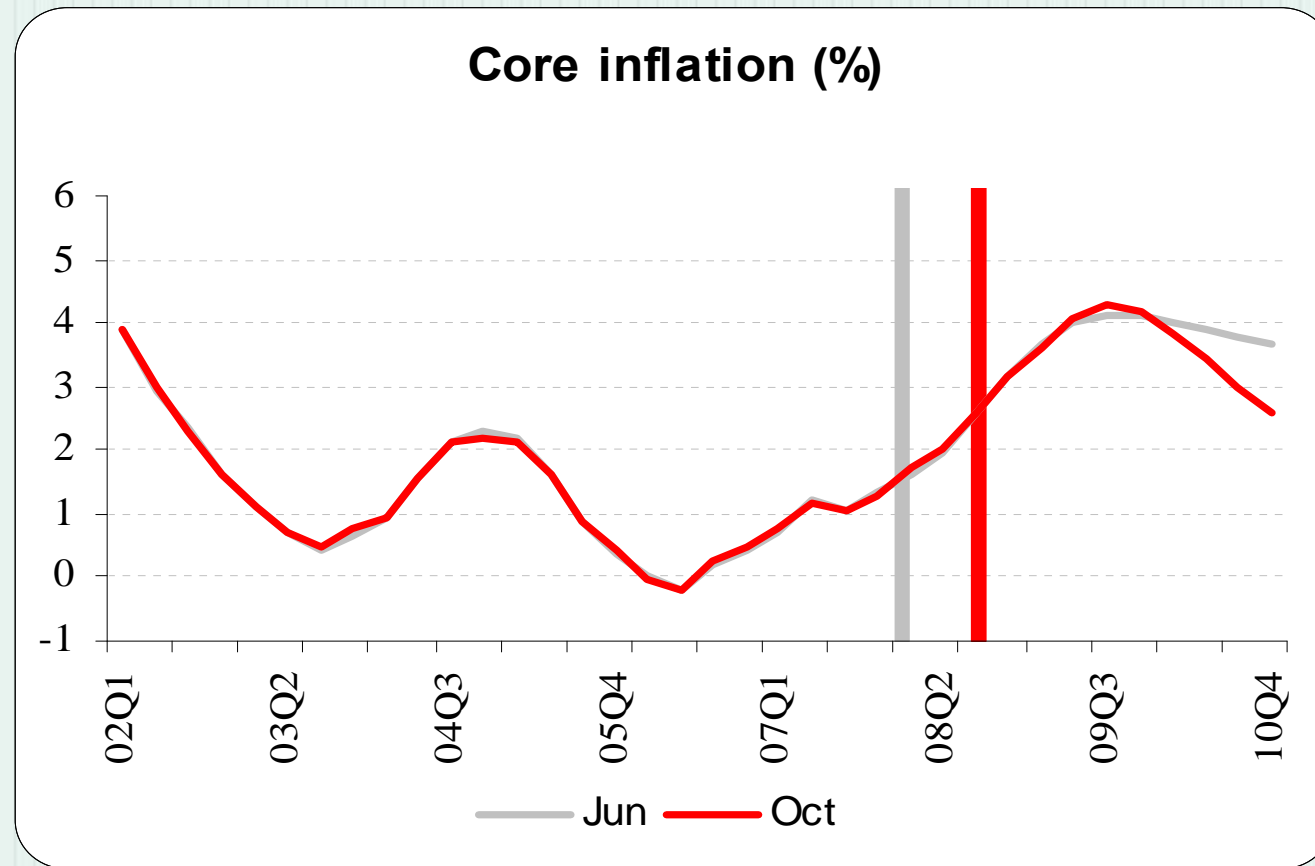
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# **Inflation**

*Macroeconomic projection*

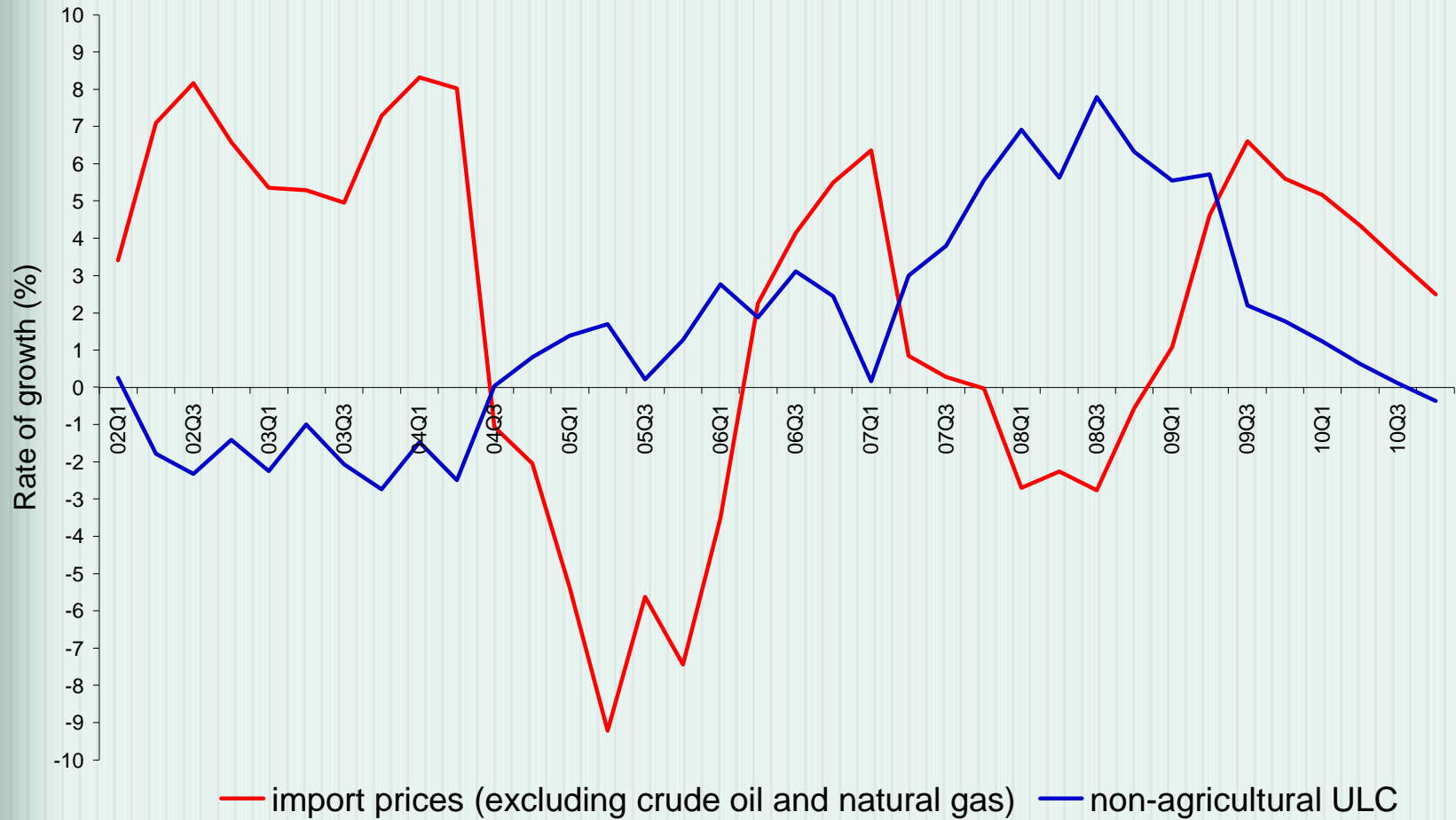
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### Core inflation\* (lower from 2010)



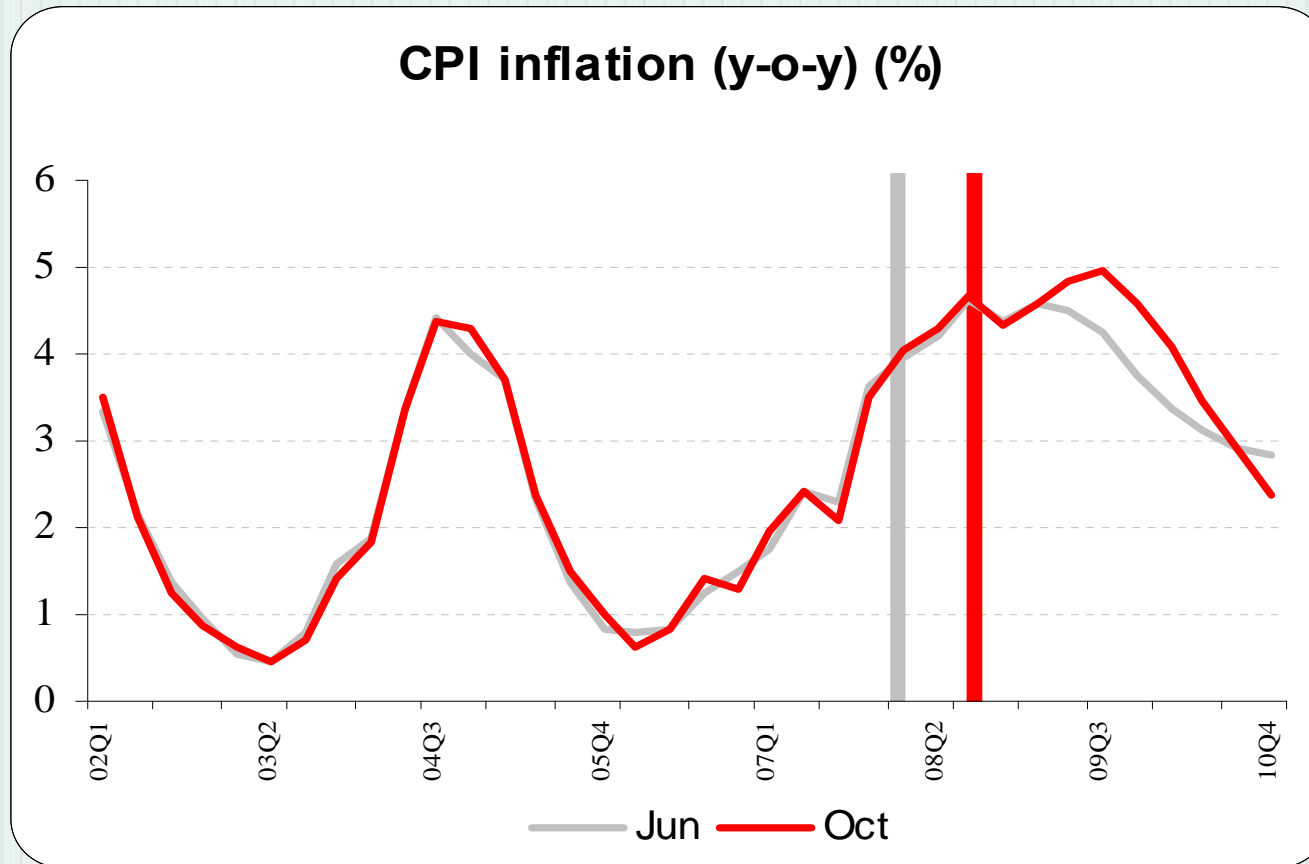
\* Core inflation does not include prices of food and non-alcoholic beverages and prices of energy carriers

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



Source: NBP

### CPI inflation (higher until 2010 Q3)



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**October projection  
compared to June projection**

*Macroeconomic projection*

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## **October projection compared to June projection: CPI inflation**

- CPI inflation remains above its path in June projection until 2010 Q3
- Lower inflation level is driven by the following:
  - Energy price growth faster than forecast in June (0.6 percentage point in 2009 and 1.1 percentage point in 2010),
  - Food price growth in 2009 exceeding the forecast of June 2008 (by 1.5 percentage point), and its slower drop in 2010. (by 1.7 percentage point).

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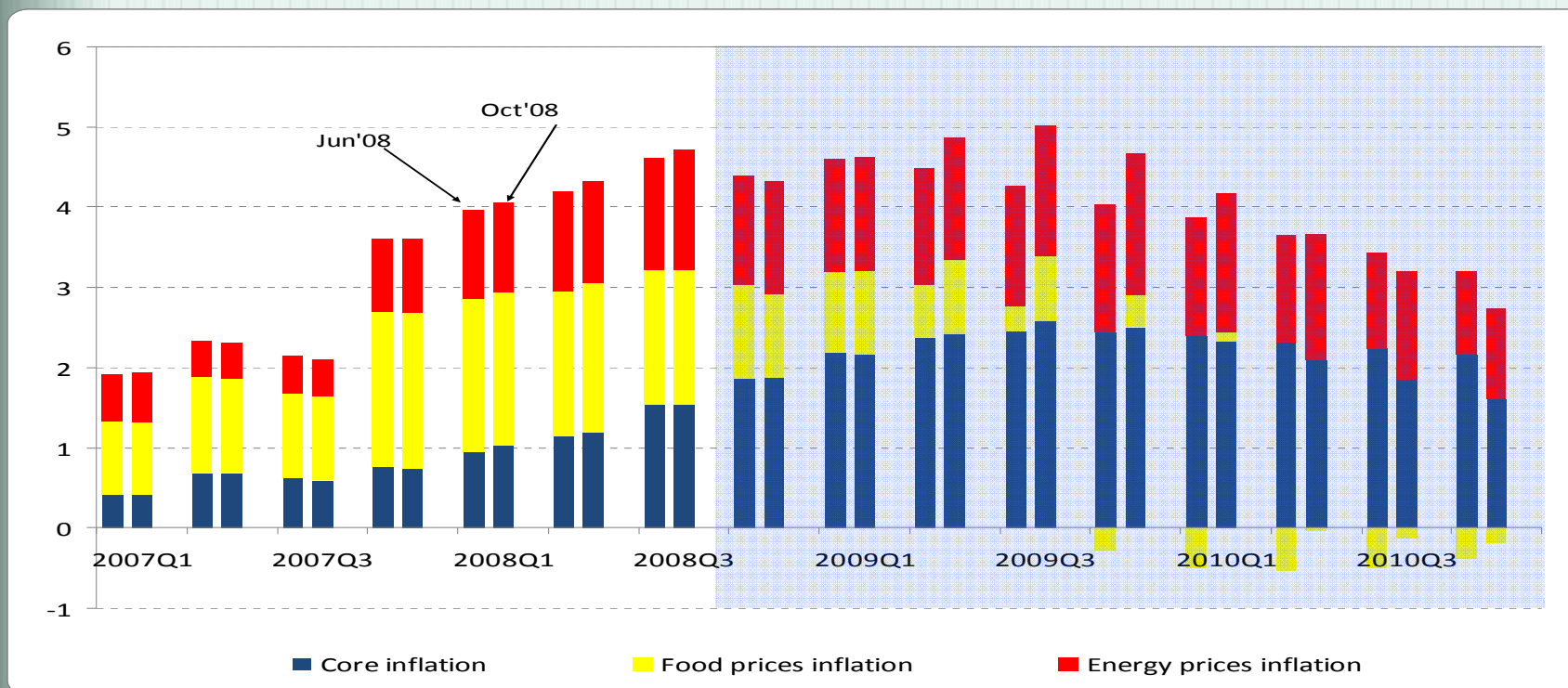
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# **Accounting for CPI inflation**

*Macroeconomic projection*

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## Decomposition of CPI inflation



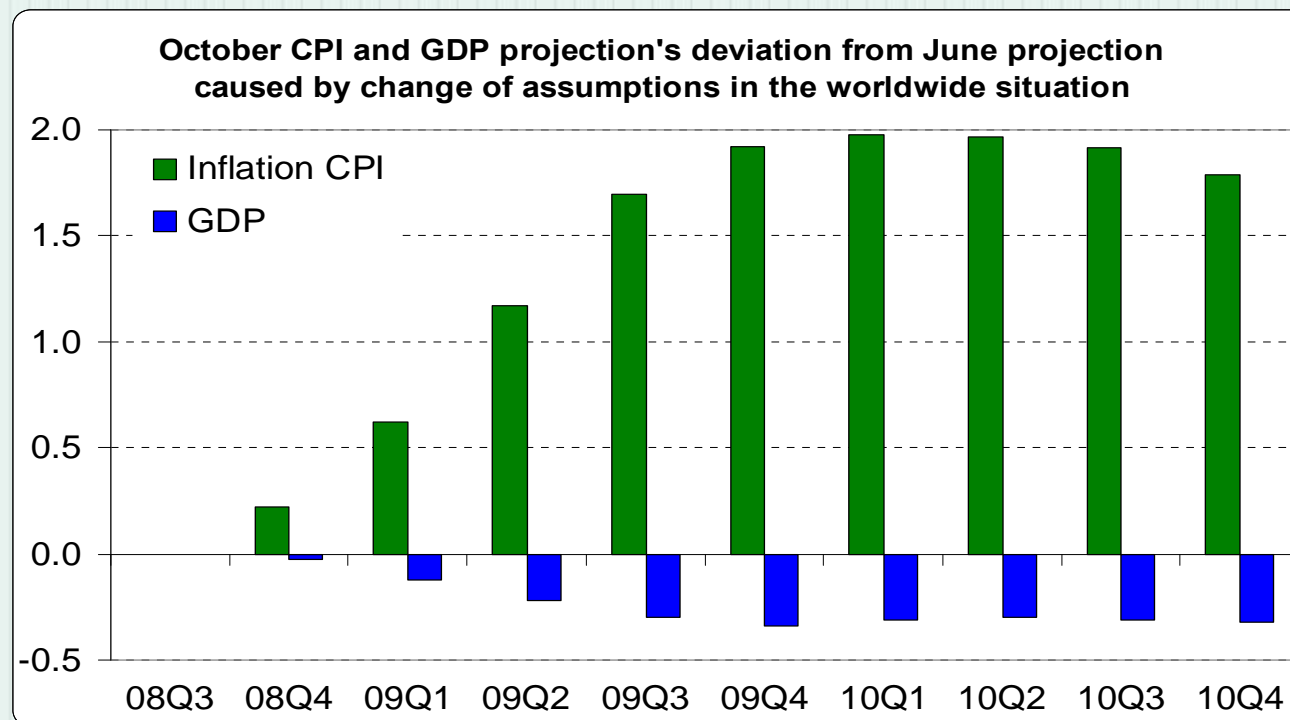
- In comparison with June projection:
  - higher contribution of food prices,
  - higher contribution of energy prices,
  - lower contribution of core inflation in the long-term projection horizon.

**Analysis of deviations between October  
and June inflation projection**

*Macroeconomic projection*

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### Difference in the assessment of the worldwide economic situation



Changed assumptions resulted in:

- Inflation higher by:

- 1.4 percentage point in 2009
- 1.9 percentage point in 2010

- GDP growth lower by:

- 0.2 percentage point in 2009
- 0.3 percentage point in 2010

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# **Expert adjustments**

*Macroeconomic projection*

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## Expert adjustments

- Expert adjustments in the October forecasting round may be divided into two categories:
  - **Adjustments of the main macroeconomic scenario**
  - **Coherence adjustments:**  
accounting for forecasts exogenous to the model.

## Expert adjustments

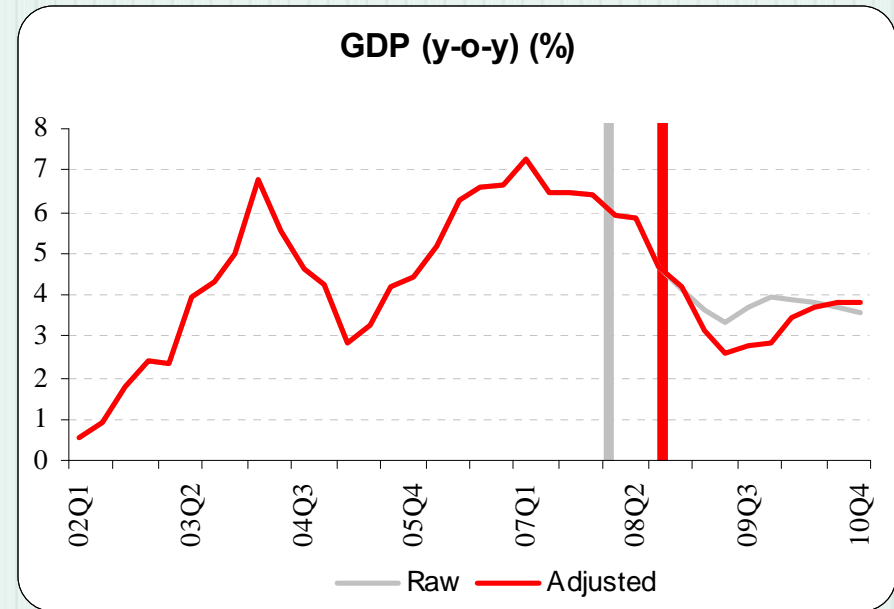
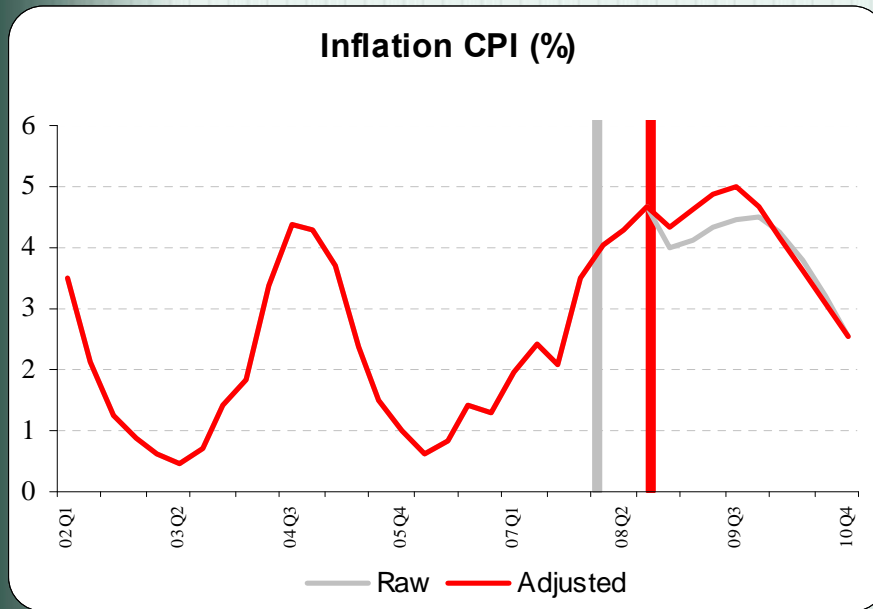
- **Adjustments of the main macroeconomic scenario:**
  - Private consumption and household disposable income
  - Labour force (employment)
  - Volume of exports
  - Exports and imports deflator
  - Gross fixed housing capital formation and housing investment deflator
  - Inventories



## **Expert adjustments**

- **Coherence adjustments :**
  - Energy prices
  - Food prices
  - Fiscal sector
- **The following slides present the paths of variables before adjustments (the so-called raw projection) and after introducing all expert adjustments to the model (October projection)**

### Joint effect of adjustments on inflation and GDP



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**Analysis of uncertainty  
of inflation projection**

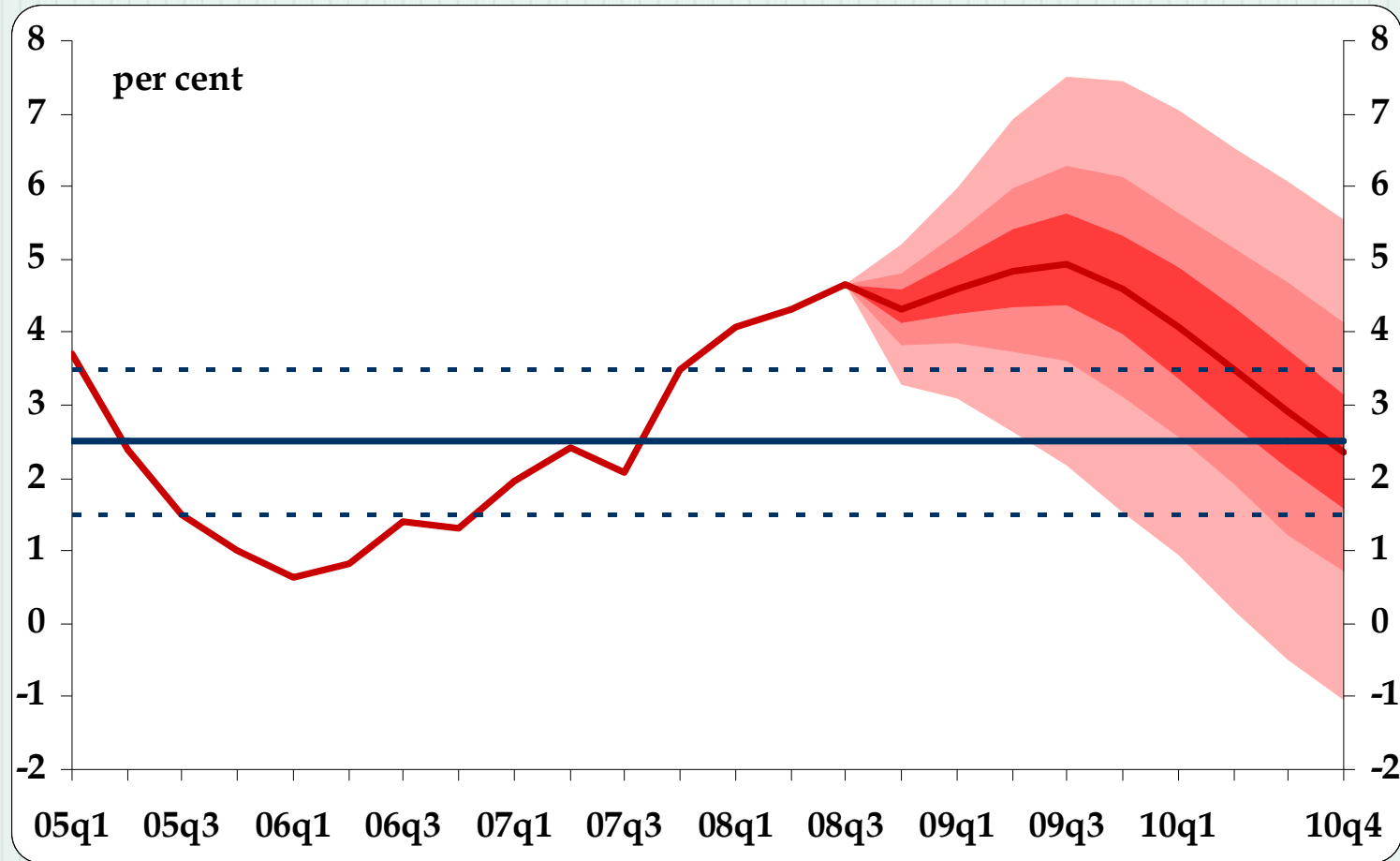
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**Distribution of risks  
of the central projection**

*Uncertainty of projection*

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Inflation projection – October 2008

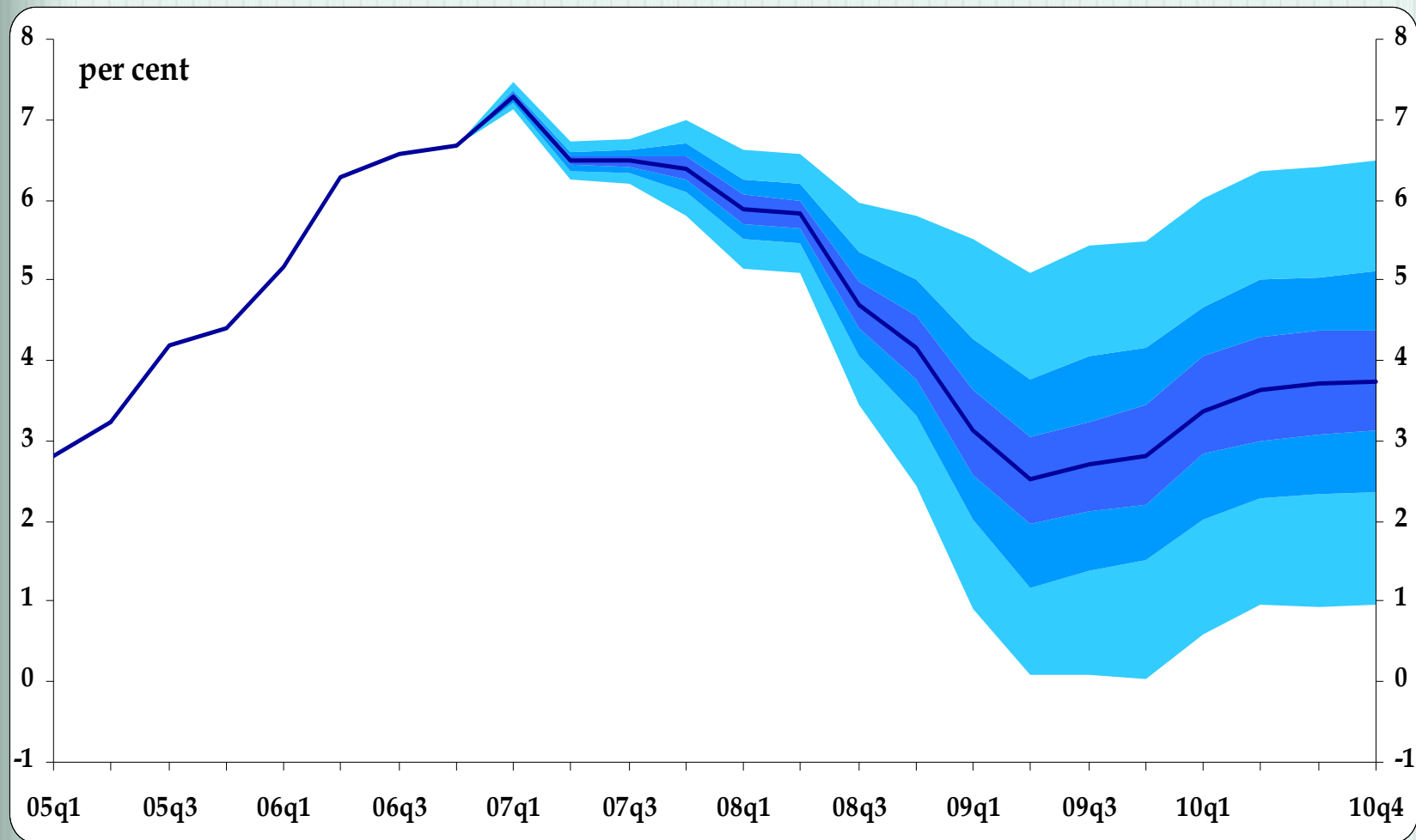


Source: Economic Institute

## Overview of probabilities for inflation

Probability of inflation running:					
	below 1,5%	below 2,5%	below 3,5%	below the central path	in the range (1,5%, 3,5%)
2008 Q3	0.00	0.00	0.00	0.00	0.00
2008 Q4	0.00	0.01	0.10	0.46	0.10
2009 Q1	0.00	0.02	0.11	0.48	0.11
2009 Q2	0.01	0.04	0.15	0.48	0.14
2009 Q3	0.02	0.07	0.18	0.48	0.16
2009 Q4	0.05	0.12	0.26	0.48	0.21
2010 Q1	0.09	0.18	0.38	0.50	0.29
2010 Q2	0.14	0.31	0.50	0.49	0.36
2010 Q3	0.23	0.42	0.60	0.49	0.37
2010 Q4	0.34	0.52	0.71	0.49	0.38

### Projection of GDP growth – October 2008



Source: Economic Institute

Quantification of risks of the projection  
connected with deteriorating outlook  
for global growth

*Uncertainty of projection*

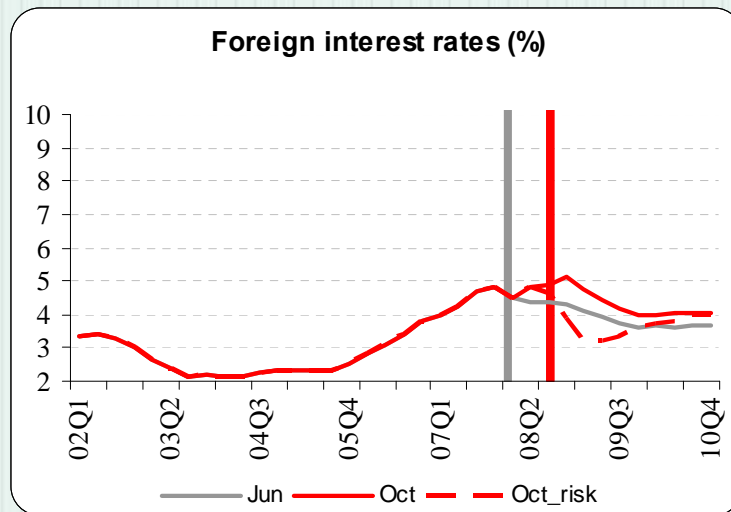
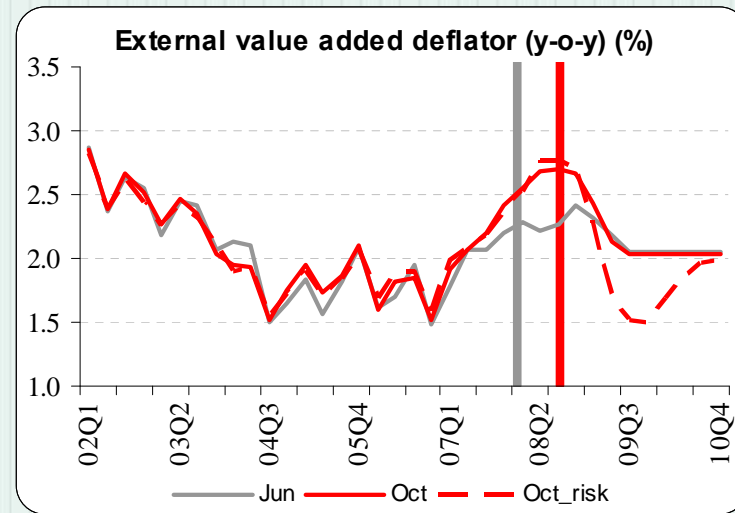
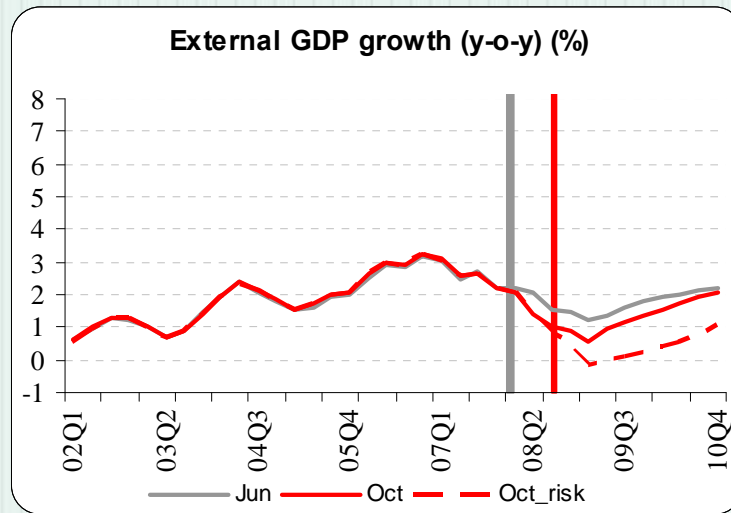
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**Forecast revisions****Foreign Exchange Consensus Forecasts**

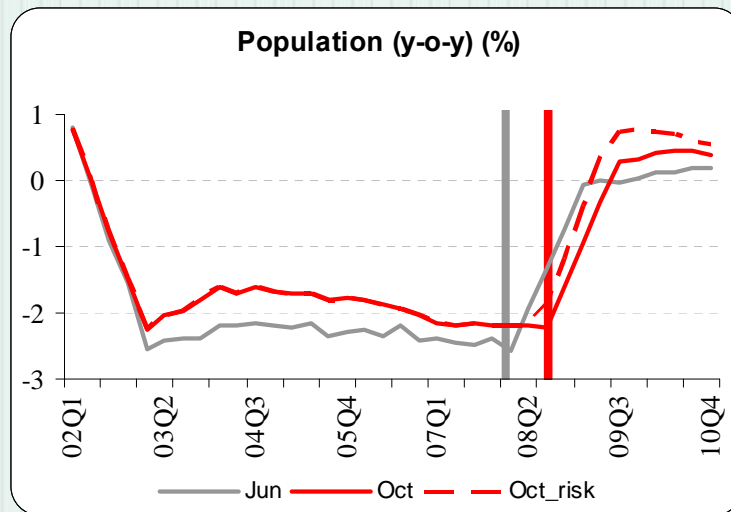
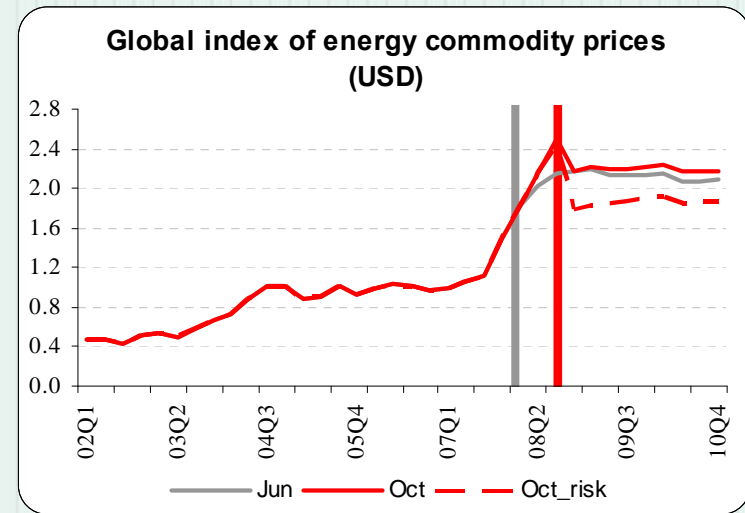
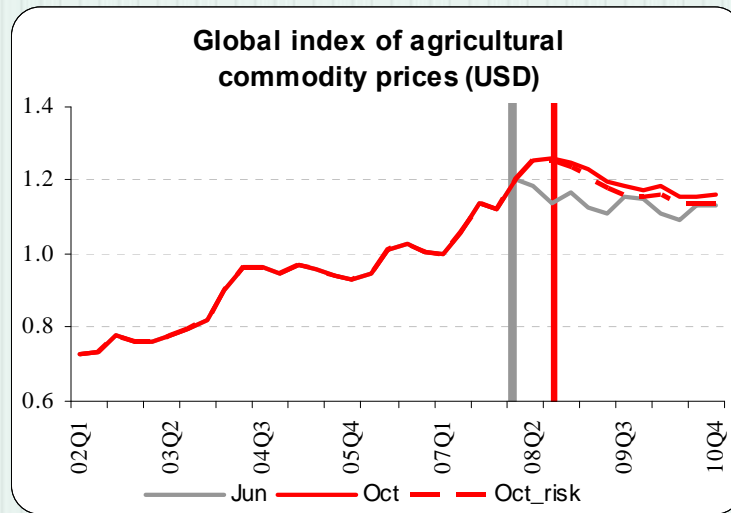
Forecast date		September 2008		October 2008	
		2008	2009	2008	2009
USA	GDP	1.8 (1.6)	1.4	1.4 (1.8)	0.0 (1.4)
	inflation	4.5	2.9	4.4 (4.5)	2.3 (2.9)
Euro area	GDP	1.3 (1.5)	0.9 (1.1)	1.2 (1.3)	0.5 (0.9)
	inflation	3.5 (3.6)	2.4 (2.5)	3.4 (3.5)	2.3 (2.4)

### Forecasts of exogenous variables (1)



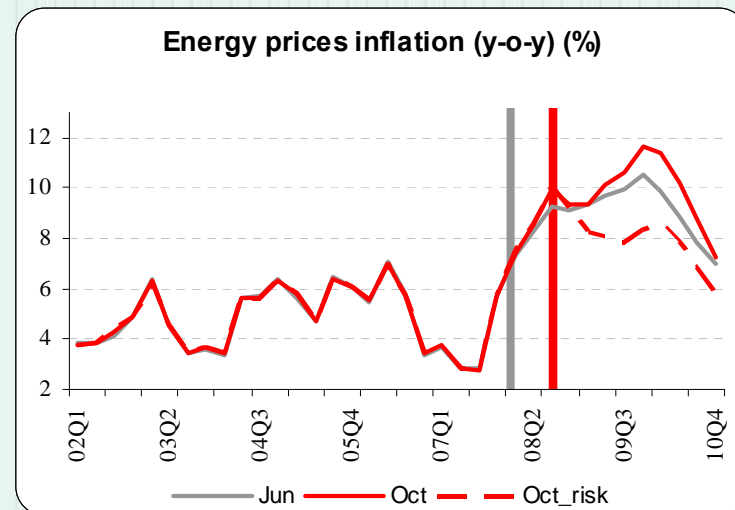
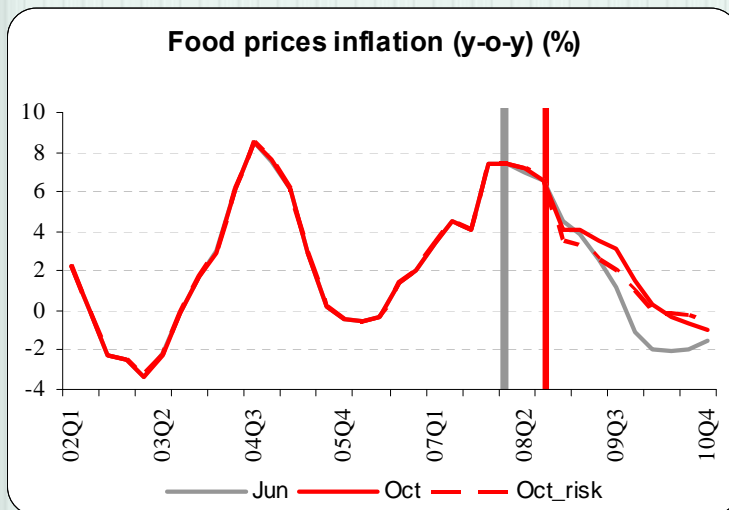
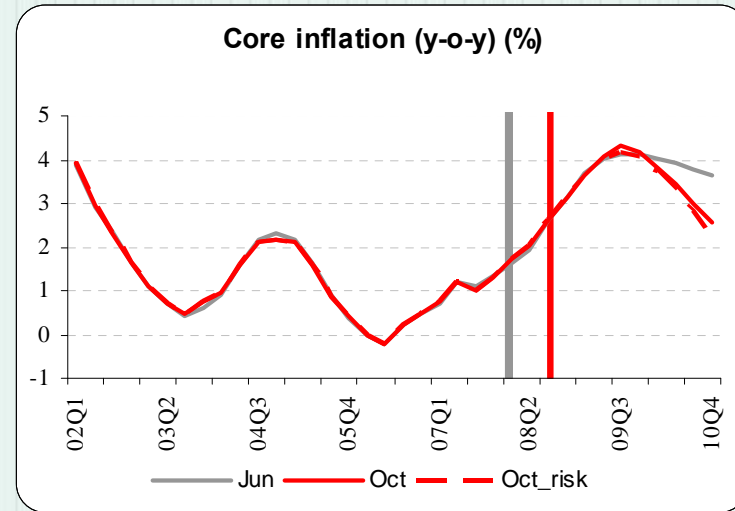
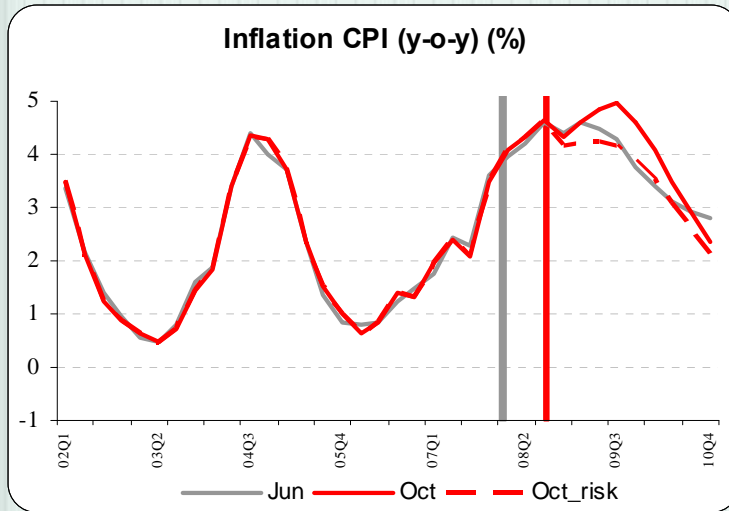
*Uncertainty of projection*

### Forecasts of paths of exogenous variables(2)



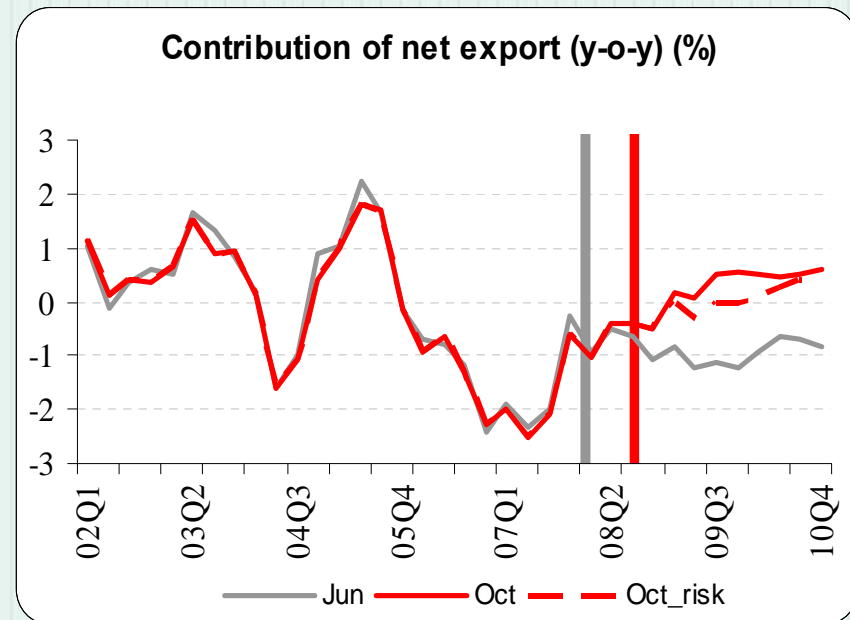
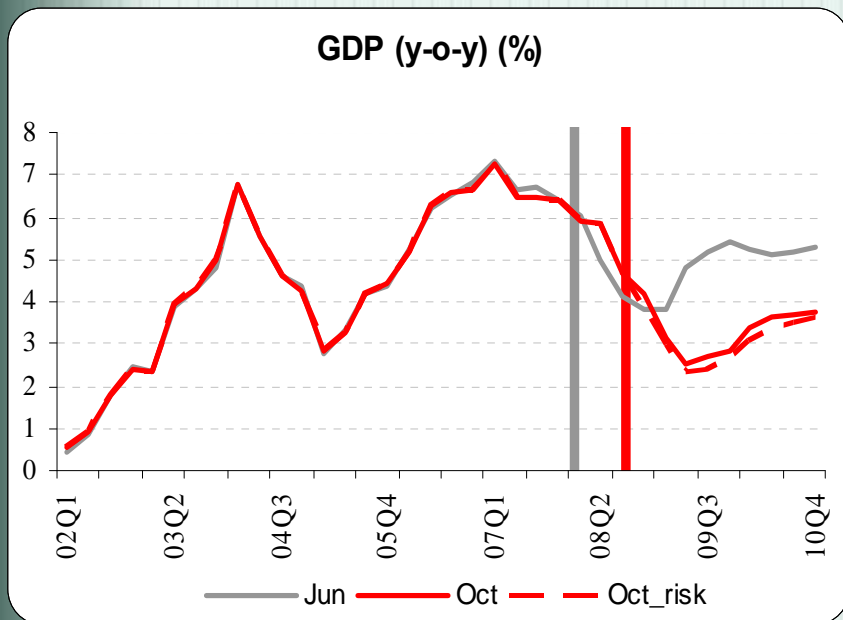
*Uncertainty of projection*

## Economic Institute Inflation



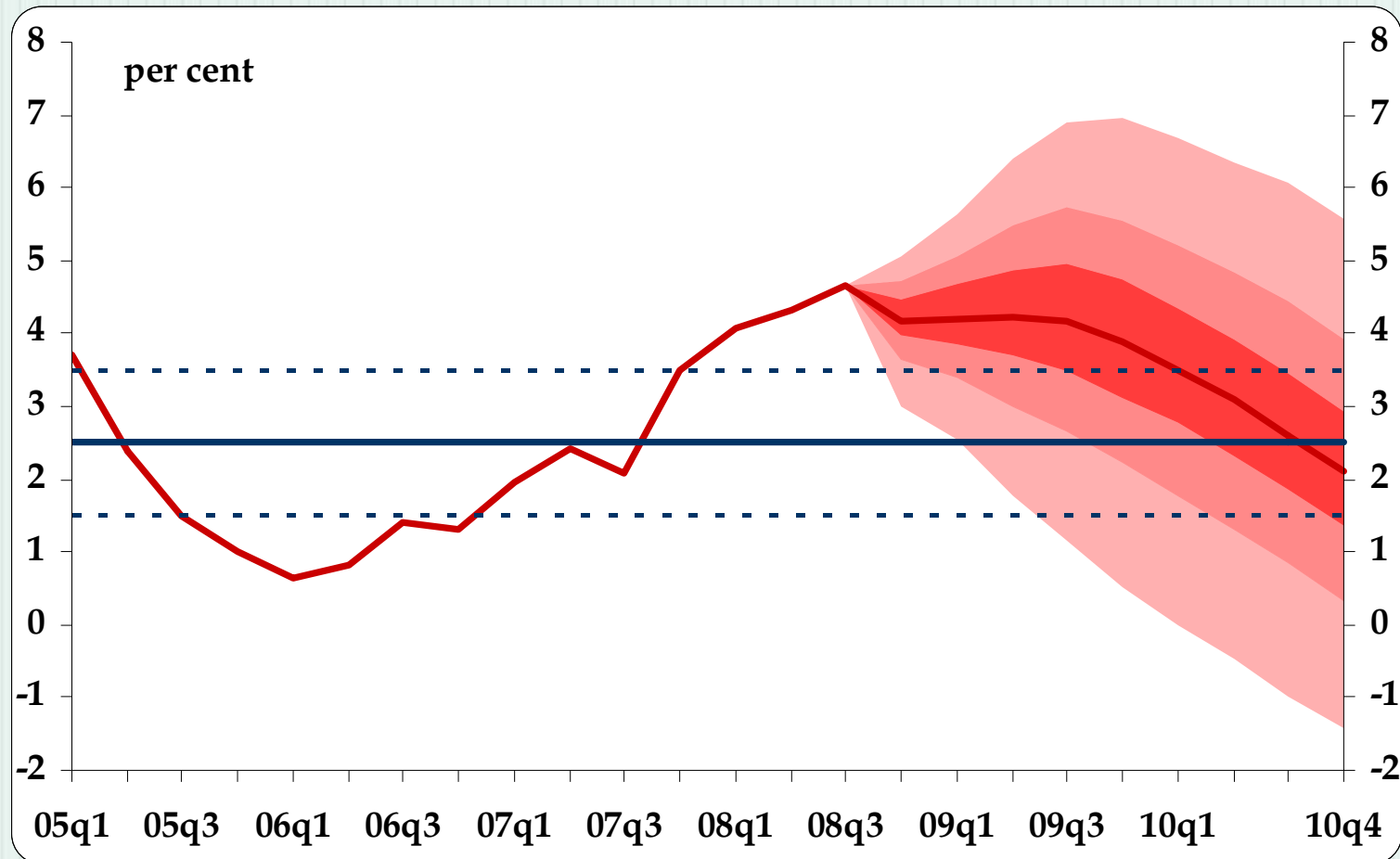
*Uncertainty of projection*

### GDP



*Uncertainty of projection*

### Outlook for inflation



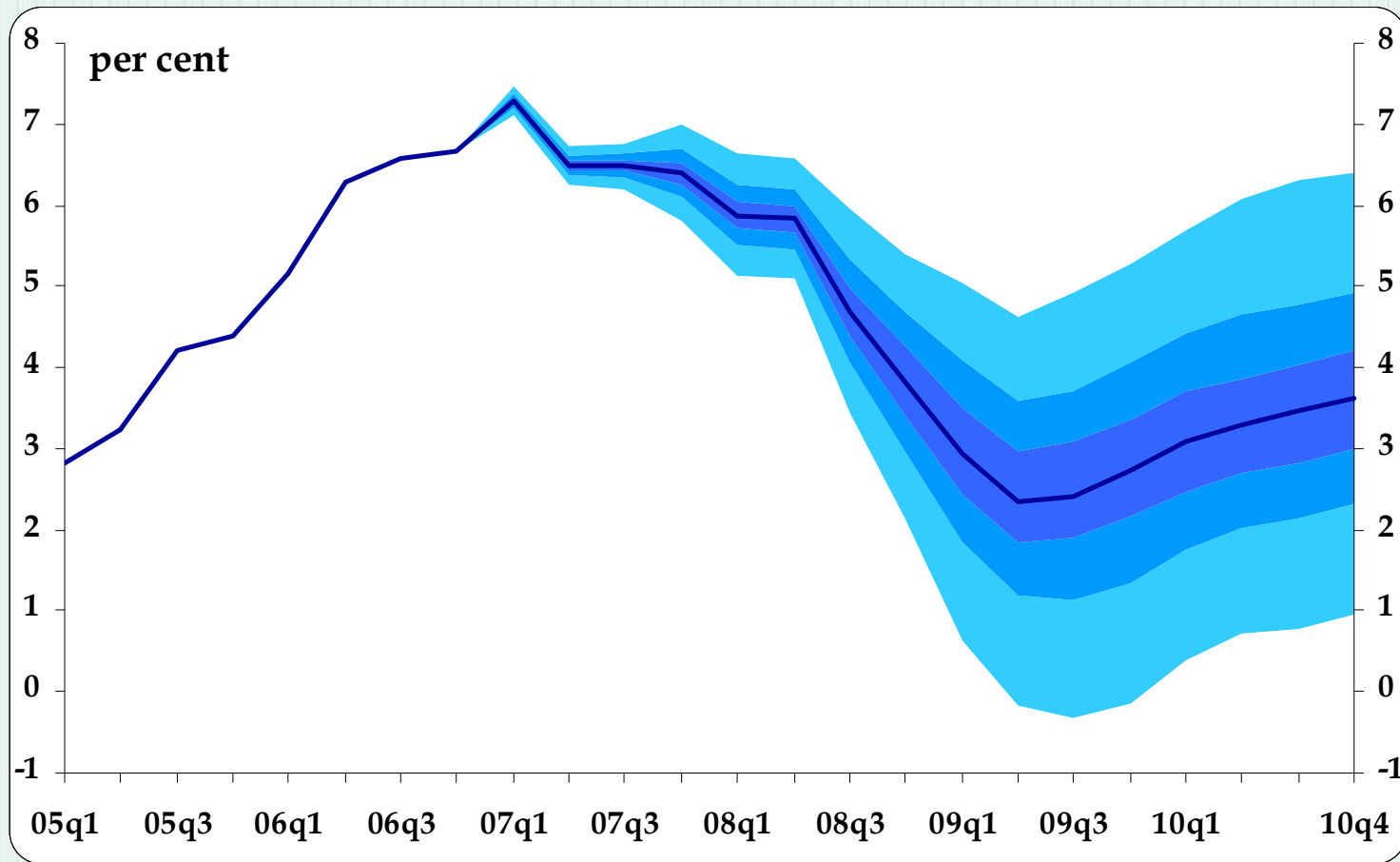
Source: Economic Institute

*Uncertainty of projection*

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2008 Q4	0.00	0.02	0.17	0.46	0.17
2009 Q1	0.01	0.06	0.25	0.47	0.24
2009 Q2	0.04	0.13	0.32	0.47	0.28
2009 Q3	0.08	0.18	0.35	0.48	0.28
2009 Q4	0.12	0.25	0.41	0.49	0.29
2010 Q1	0.17	0.30	0.49	0.49	0.32
2010 Q2	0.22	0.38	0.57	0.49	0.35
2010 Q3	0.29	0.47	0.66	0.49	0.36
2010 Q4	0.38	0.57	0.74	0.50	0.36

Outlook for GDP growth



Source: Economic Institute

*Uncertainty of projection*



**Other factors unaccounted for in the model**

*Uncertainty of projection*

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**1. Worldwide trends in the prices of energy and agricultural commodities (Inflation ↔, GDP ↔)**

- Scale of adjustments in the supply of commodities in response to growth of relative prices (and slowdown in the global economy)
- Absence of international coordination in terms of biofuel market regulations
- High sensitivity of commodity prices to unpredictable weather and political factors

**2. Competitiveness (Inflation↑, GDP↓)**

- Amidst persisting uncertainty concerning the external environment of Poland, it is more difficult to assess the outlook for Poland's business competitiveness and its attractiveness for investors (foreign direct investment)
- It is assessed that the probability of Poland's competitiveness falling below the projection scenario is higher than the probability of its increase

**3. Joining the euro area and ERM II (Inflation↑)**

- Changes in the expected date of joining the euro area and EMR II may result in higher volatility of interest rates and long-term market rates – playing the „non-convergence game”.
- Failure of implementation of fiscal tightening assumed in the projection aimed at complying with the Maastricht criteria in the coming years may lead to increased uncertainty on the markets and also increase inflationary risks related to a more expansionary fiscal policy.

4. **Market regulations and implementation of European standards (Inflation ↑, GDP ↓)**
  - Weakness of market mechanisms in regulated markets and uncertainty about the pace and scope of liberalisation of the energy market increase uncertainty of forecasts of energy commodity prices
  - Unknown date of harmonisation of VAT rates
  - Impact exerted on the economy by regulations limiting carbon dioxide emissions and further tightening of environmental regulations
5. **Intensification of tensions in the labour market (Inflation ↔, GDP ↔)**
  - Impact of economic slowdown on the growth rate of wages and working persons
  - Impact of changes in fiscal and regulatory policy on the labour market
  - Intensity and nature of migration flows
6. **Propensity of enterprises to pass increased labour costs onto their prices in globalisation conditions (Inflation ↓)**
  - Limited possibility of passing rising production costs on prices due to heightened competitive pressure
  - Increased possibility of reducing non-labour production costs
7. **Data released after 16 October 2008**
  - Shrinking or stabilisation of the spread between reference rates of central banks and short-term market rates in major base markets pointing at effectiveness of measures taken by central banks and governments of G-7 group
  - Zloty depreciation resulting from global factors (depreciation of currencies of emerging economies as a result of outflow of portfolio investors from those markets towards the US dollar assets ) and regional factors (impact of crisis escalation in Hungary)

# **Uncertainty factors - Summary**

*Uncertainty of projection*

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Having considered the discussed non-model uncertainty factors it may be assessed that the risk of inflation running below the central projection path is considerably higher than the risk of inflation running above that path, while the risks for economic growth are largely symmetrical.

*Uncertainty of projection*

# **Changes in the forecasting process**

**1. Changes in the NECMOD model**

- Model made coherent in nominal and real terms,
- Definition of potential output based on equilibrium unemployment and participation rates,
- Update of the data and seasonal adjustment procedure (in justified cases).

**2. Changes in the construction of fan charts**

- Taking account of past forecast errors in the estimation of current uncertainty
- Adjustment of past errors using expert assessment of a change in uncertainty of exogenous variables forecasts throughout the projection horizon (as compared with the average historical uncertainty) and the impact of assumption of exogeneity of interest rates,
- Combining the advantages of the method based on past forecast errors only with the advantages of the method based on stochastic simulations.