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Bulevar Svetog Petra Cetinjskog 6
81000 Podgorica
Telephone: +382 20 664 997, 664 269
Fax: +382 20 664 576

WEB SITE: http://www.cbcg.me

CENTRAL BANK COUNCIL: Milojica Dakić, MS, Governor
Velibor Milošević, PhD, Vice-Governor
Nikola Fabris, PhD, Vice-Governor
Asim Telaćević
Milivoje Radović, PhD
Milorad Jovović, PhD
Srđa Božović, PhD

DESIGNED BY: Andrijana Vujović
Nikola Nikolić

TRANSLATED BY: Translation Services Division

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1. INFLATION INDICATORS

Consumer prices in Q2 2013 recorded a decline of 0.1%, with the highest decline of prices in the category *clothing and footwear* (-5.3%), followed by prices from the category *transportation* (-3.1%), *dwelling, water, electricity and other fuels* (-1.8%) and *communications* (-1.4). Observed by months, the growth of consumer prices was recorded in April (0.3%), May (0.2%) while in June consumer prices declined by 0.6%. The annual increase in June was 2.2%, while the average rate (period-on-period) was 3.2%.

In Q2, there was a decline of prices from the category *clothing and footwear* by 5.3%, mostly due to a decline of prices of clothing by 7.9% and footwear by 1.9%, which influenced that this category has the largest negative contribution (-0.4 percentage points) in total inflation. There was a decline of prices in the category *dwelling, water, electricity gas and other fuels* by 1.8%, due to lower prices of rent by 3.1%, maintenance and repair of households by 1.2% and a decline of prices of solid fuels by 5.3%. Prices from the category *transportation* recorded a decline of 3.1%, mostly as a result of lower prices for use and maintenance of vehicles by 4.5% and prices of fuels and lubricants by almost 5% (4.98%) which had a negative effect on the total inflation in the amount of 0.3 percentage points, which is the same amount as the contribution of the category *dwelling*. In this period, the prices in the category *communications* declined by 1.4% due to lower prices of telephone and fax equipment by 19.4%. The prices in the category *food and non-alcoholic beverages* increased by 1.8%, with the highest increase of prices of fruit (17.8%) and vegetables (13.3%). In Q2, the prices in the category *alcoholic beverages and tobacco* increased by 1.9%, as a result of increased prices of tobacco (2.8%), as well as in the category *household equipment and routine household maintenance* (0.9%), *health* (0.4%), *recreation and culture* (0.3%), *education* (0.2%). Higher prices of accommodation (13.4%) influenced the growth of prices in the category *hotels and restaurants* by 2.3%, while the prices in the category *other goods and services* increased by 1.1%.

Table 1 - Inflation, %

	2012				2013	
	III	VI	IX	XII	III	VI
Change in relation to previous year-end	2.2	3.2	4.3	5.1	0.5	0.4
Annual change	2.7	3.9	4.4	5.1	3.3	2.2

Source: Monstat

Graph 1 – Consumer prices, monthly growth rate

Source: Monstat

In Q2, the prices of oil declined in relation to Q1. The price of reference OPEC basket in Q2 amounted, on average, to 100.9 USD/barrel, which is 7.8% lower in relation to the average price in Q1 2013. The average price of Brent in Q2 amounted to 102, USD/barrel, which is 8.9% lower in relation to the average price in Q1 2013. Under the pressure of indicators showing a deceleration of the Chinese economy, as well as announced reduction of monetary incentives to the U.S. economy, the prices of oil declined especially in Q2. The downward trend of oil prices was ended by the fears of disturbed supply from the Middle East, which produces about a third of the world's oil. Weak global macroeconomic developments remain the most important limiting factor when it comes to the forecasts of the growth of oil demand which will, in addition to the geopolitical situation in the Middle East, significantly affect the oil prices until the end of the year.

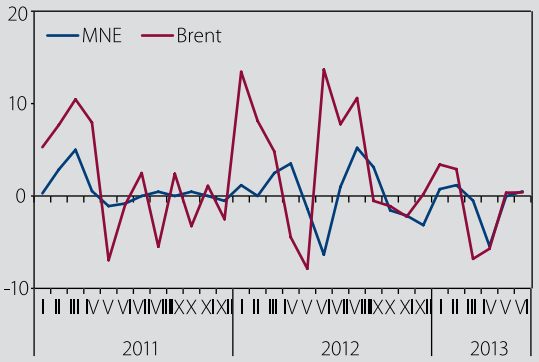
Table 2 - Share of individual categories in total inflation*

	Weight	VI 13/ III 13	Growth rate	Contribution	Share in total inflation
TOTAL	1000	99.9	-0.1	-0.1	100.0
Food and non-alcoholic beverages	386.4	101.8	1.8	0.7	-833.7
Alcoholic beverages and tobacco	37.9	101.9	1.9	0.1	-84.2
Clothes and footwear	70.7	94.7	-5.3	-0.4	438.8
Dwelling, water, electricity, gas and other fuels	153.1	98.2	-1.8	-0.3	315.3
Furnishing, household equipment and routine household maintenance	46.9	100.9	0.9	0.0	-51.8
Health	38.2	100.4	0.4	0.0	-19.3
Transport	101.0	96.9	-3.1	-0.3	372.0
Communications	57.1	98.6	-1.4	-0.1	93.6
Entertainment and culture	27.2	100.3	0.3	0.0	-9.7
Education	15.7	100.2	0.2	0.0	-3.6
Restaurants and hotels	23.0	102.3	2.3	0.1	-61.7
Other goods and services	42.8	101.1	1.1	0.0	-55.7

** We would like to note that, despite the index changes, the share of certain categories is recorded only at the second or the third digit, due to the weighting structure*

Source: MONSTAT and CBCG calculations

Graph 2 – Oil prices, monthly growth rate

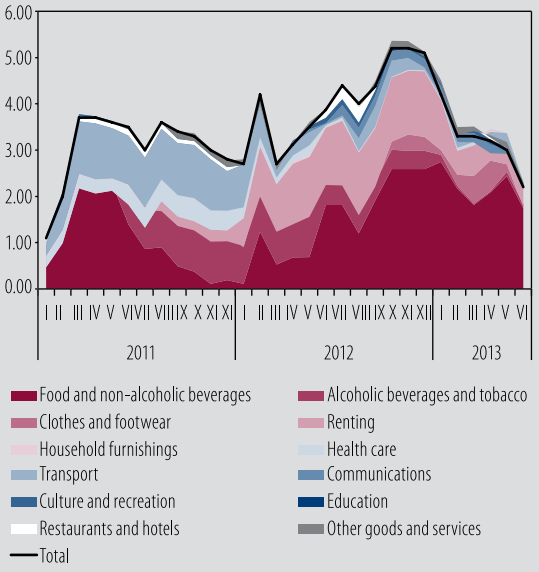


Source: MONSTAT and "Monthly Oil Market Reports", OPEC

Graph 4 – Consumer prices, annual rate

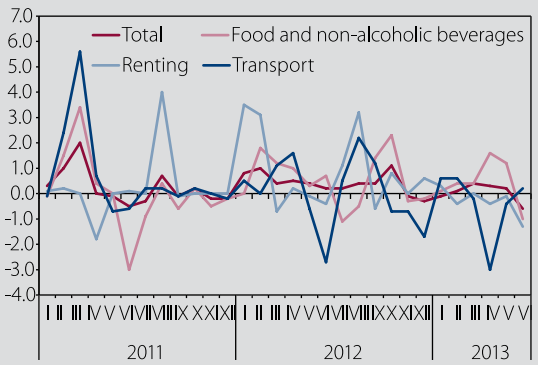
Source: Monstat

Graph 3 - Consumer prices' components: contribution to annual growth rate (index points)



Source: Monstat and CBCG calculations

Graph 5 – Selected categories – consumer prices, monthly rate



Source: Monstat

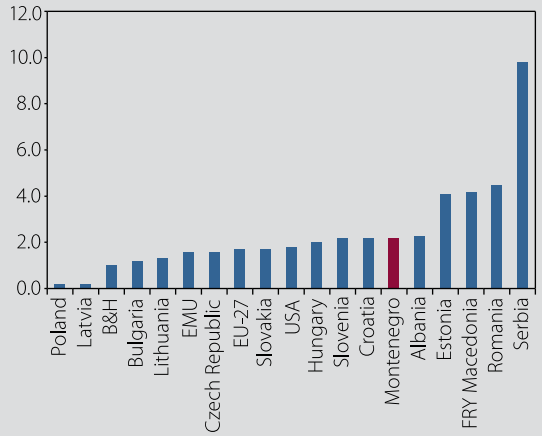
Annual consumer prices rate in June amounted to 2.2% showing a decrease of 1.1 percentage points in relation to the annual rate recorded in March. The annual inflation rate of 2.2% was influenced mostly by the increased prices of the following categories: *food and non-alcoholic beverages* (4.5%), *dwelling, water, electricity, gas and other fuels* (3.4%), while the biggest negative contribution came from the prices of transportation, due to a decline of 1.5% and prices from the category hotels and restaurants, due to a decline of 3.1%.

In Q2 2012, **producers' prices of manufactured products** declined by 0.3% in relation to end-2012. Manufacturing industry prices de-

creased by 0.8%, while mining and quarrying prices increased by 4%. Electricity, gas and water supply prices remained unchanged. Observed annually, producers' prices of manufactured products increased by 2.3%.

Comparison of the annual inflation recorded in Montenegro (using CPI) with the inflation recorded in selected countries shows that the following countries have higher inflation: Albania (2.3%), Estonia (4.1%), Macedonia (4.2%), Romania (4.5%), while Serbia recorded the highest inflation (9.8%).

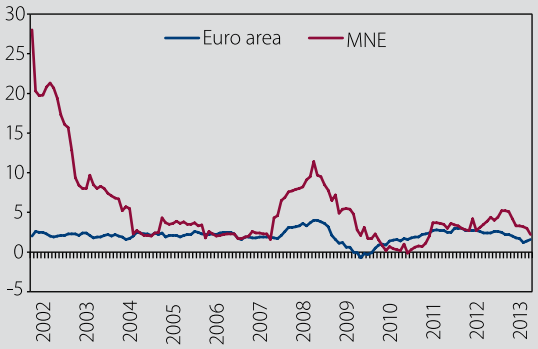
Graph 6 – Annual inflation rate in selected countries, June 2013



Source: National Statistical Offices and EUROSTAT

The annual rate recorded in Euro area, measured by harmonized consumer prices index (HCPI) amounted to 1.6%. The annual inflation rate in Montenegro measured also by HCPI amounted to 1.5%, which is 0.1 percentage point lower than the inflation rate in the Euro area.

Graph 7 – Inflation in the Euro area and Montenegro since the introduction of euro (annual rates)



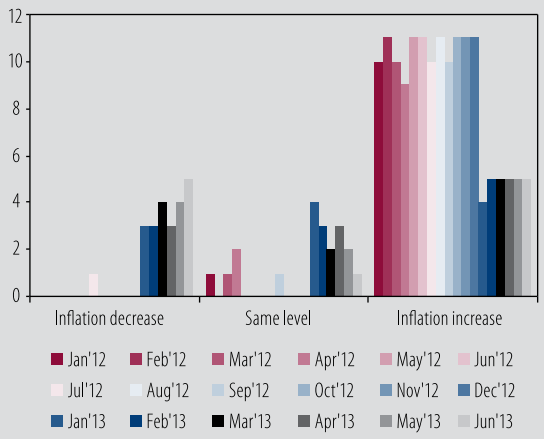
Source: Monstat and EUROSTAT

2. INFLATION FORECASTS

2.1. Banks expectations

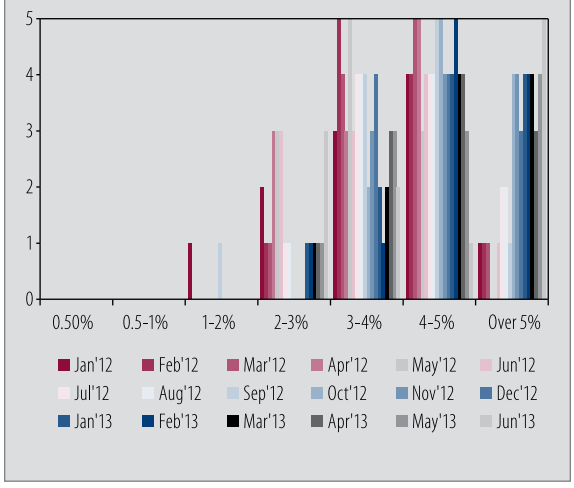
Regarding inflation forecasts of banks, based on the survey conducted in June 2013, five banks each expected higher, i.e. lower inflation rate in 2013 compared to 2012, while one bank expected the same inflation rate. (Graph 8).

Graph 8 - Inflation forecasts (banks)



As shown in Graph 9, banks have different expectations regarding the movements and the level of inflation by the end of 2013. Three banks expect inflation in the range of 2% - 3%, two banks expect inflation in the range of 3% - 4%. One bank expects the growth of inflation ranging between 4% and 5% while five banks expect inflation growth over 5%.

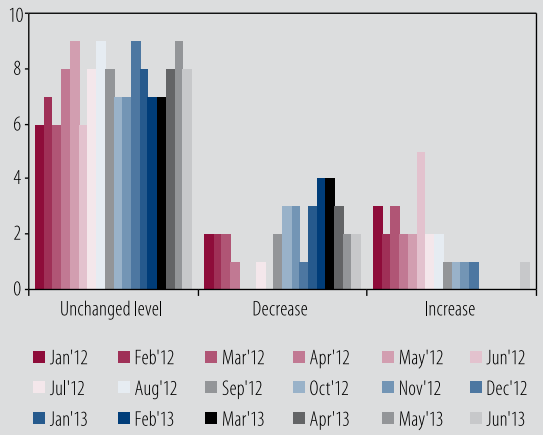
Graph 9 – Forecasted inflation rate level (banks)



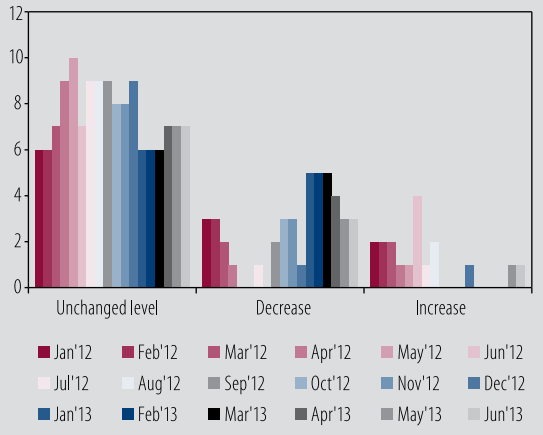
As for the forecasts on lending interest rates trends, eight banks expect the same level of nominal interest rates, two banks expect lower, while one bank expects higher nominal interest rates. As for the effective lending interest rates, seven banks expect them to remain the same, three expect their decline, while one bank expects their growth in relation to 2012.

With regard to forecasts on deposit interest rates trends, two banks expect growth; three banks expect a decline, while six banks expect the deposit interest rates to keep their 2013 levels.

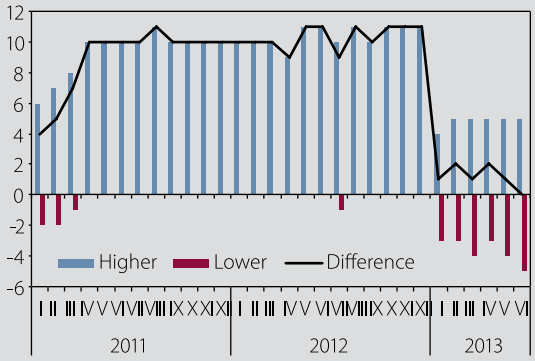
Graph 10 – Nominal lending interest rate movement forecasts



Graph 11 – Effective lending interest rate movement forecasts



Graph 12 – Market trend indicator



For the purpose of calculating inflation forecasts we use market trend indicator (black line in Graph 12). It is calculated as the difference between the number of banks expecting an inflation growth (blue columns) and the number of banks expecting inflation decrease (red columns). If the market trend indicator has a negative value, a decrease in the inflation rate is expected in the upcoming period. If it has a positive value, then an increase in the inflation rate can be expected. If it has a zero value, an unchanged inflation rate can be expected in the upcoming period. The more negative its value is, the lower the inflation forecast is, while higher positive value means higher inflation level forecasts. Inflation forecasts showed a sudden decline in January 2013, and since then they remain to be significantly lower in comparison to the previous period, especially to the period of the last quarter 2013 when all banks expected inflation growth. In June, compared to January, there was an increased number of banks expecting lower inflation relative to the inflation in 2012.

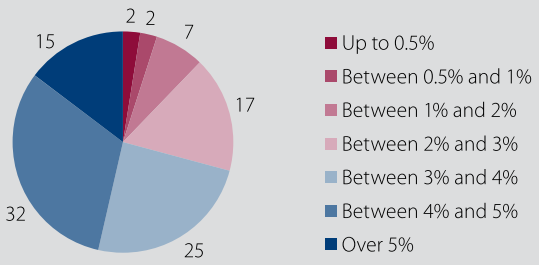
2.2. Expectations of economy (except banks)

Inflation

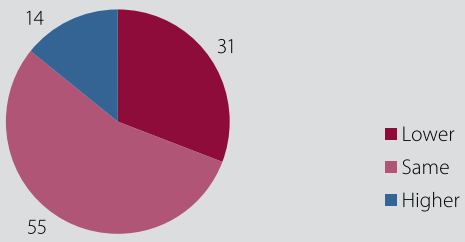
Out of total surveyed companies, 32% expected inflation to range between 4% and 5% in 2013, 25 % expected inflation between 3% and 4%, while 17% of surveyed companies expected inflation between 2% and 3%, and 15% expected inflation over 5%. Only 7% of companies expected inflation to range between 1% and 2%, while 2% of surveyed companies expected inflation between 0.5%

and 1%, also 2% of companies expected inflation up to 0.5%. Lower salaries are forecasted by 31% of surveyed companies, 55% expect that salaries will not change in 2013 in relation to 2012, while the increase is expected by 14% of surveyed companies. Relative to 2012, as for the number of employees, 50% of surveyed companies expect the unchanged number, 31% of them expect decrease and 19% expected an increase. Most of surveyed companies (65%) expected increase of production input prices, while 67% of surveyed companies expects the prices of their products' (services) to remain unchanged in 2013.

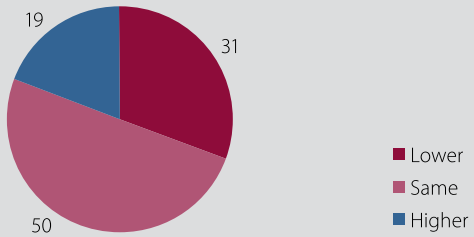
Graph 13 - Forecasted inflation in 2013, in relation to 2012



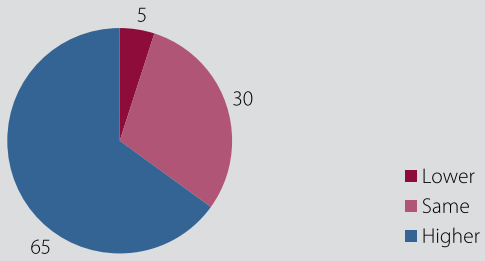
Graph 14 – Expected level of salaries in 2013 in relation to 2012



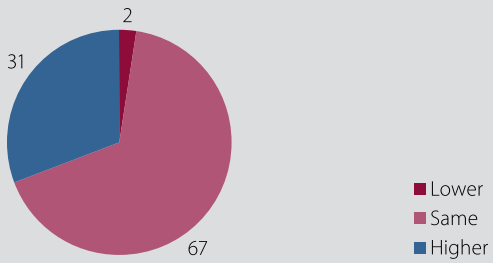
Graph 15 – Expected level of the number of persons in employment in 2013 in relation to 2012



Graph 16 - Expected level of prices of production inputs in 2013 in relation to 2012



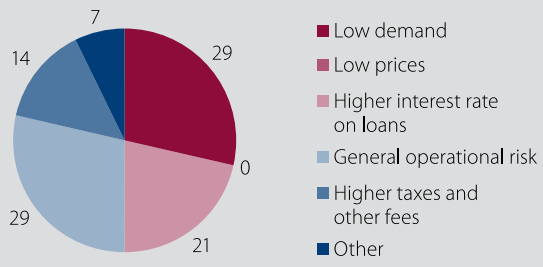
Graph 17 - Expected level of prices of products (services) in 2013 in relation to 2012



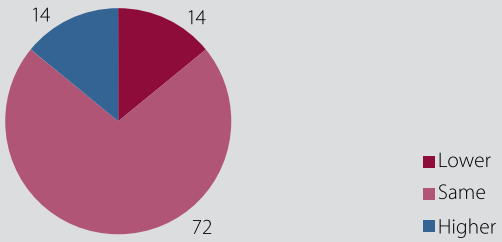
Business Environment

The survey results showed that the same number of surveyed companies saw lower demand (29%) and general operational risks (29%) as business barriers, followed by high lending interest rates (21%). In addition, 72% of surveyed companies expected unchanged lending interest rates, 14% expected them to be lower as well as 14% of companies who expected higher lending interest rates in 2013 relative to 2012.

Graph 18 – Business barriers



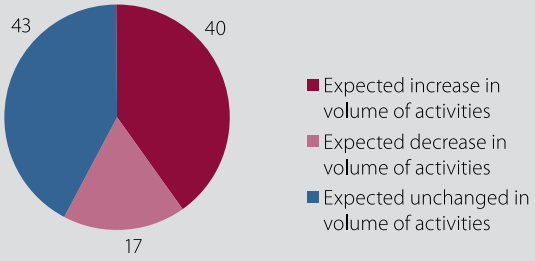
Graph 19 – Expected level of lending interest rates in 2013 relative to 2012



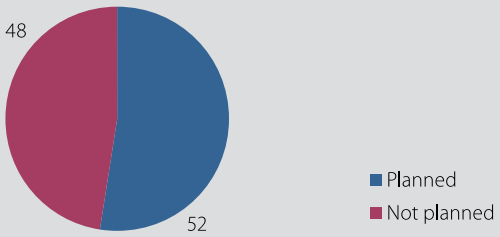
Investments

Out of the total number of surveyed companies, 40% planned the increase in the volume of activities by the end of the year, while 52% planned new investments. Most investments, 57%, referred to the increase in fixed assets, while insufficient exploitation of existing capacities (24%), low demand (29%), and high interest rates and unfavourable conditions for capital borrowings (14%) were described as largest barriers to new investments.

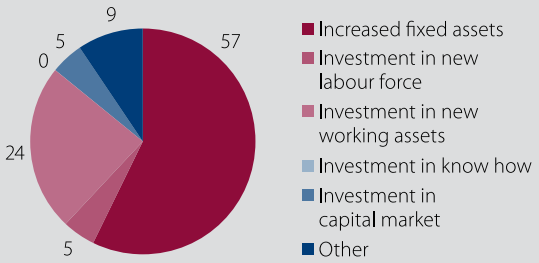
Graph 20 – Expected volume of activities in 2013



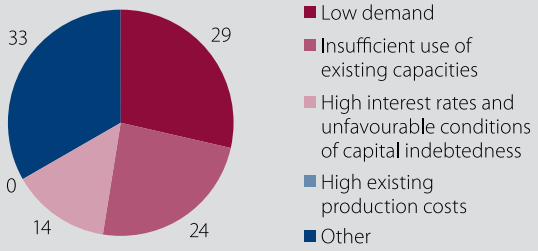
Graph 21 – New investments in 2013



Graph 22 - Types of new investments planned in 2013



Graph 23 – Obstacles to new investments in 2013

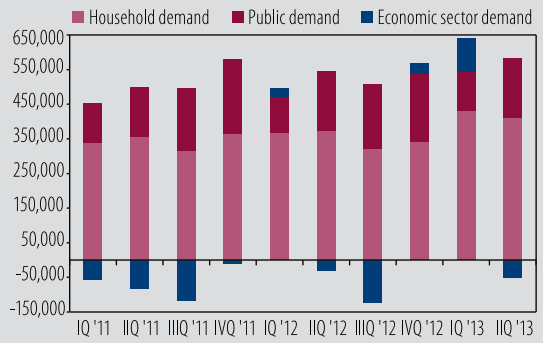


3. INFLATION DETERMINANTS

3.1. Demand

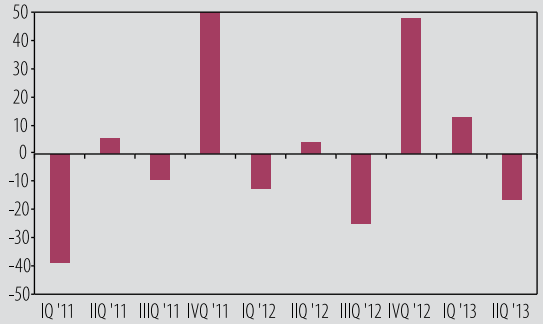
In Q2 2013, the aggregate demand recorded a decline in relation to Q1 2013. Observed by sectors, public spending increased in comparison to Q1 2013, while household demand declined. Observing the structure of total demand, in relation to its structure in the previous quarter, the share of public spending increased, while the share of economy declined.

Graph 24 – Aggregate demand (EUR thousand)



The level of aggregate demand in Q2 2013 decreased in relation to Q1 2013.

Graph 25 - Quarterly rates of aggregate demand



Box 1 – Aggregate demand calculation methodology

For the purpose of complete monitoring of aggregate demand as the inflation determinant, the CBCG has developed the aggregate demand calculation methodology. The starting point of this methodology is that the aggregate demand is the total demand of three sectors: personal consumption (households), investment consumption (corporate sector) and public consumption. However, taking into account the lack of numerous data necessary for calculating the aggregate demand, the existing data should not be treated as an indicator of the exact amount of aggregate demand, but as an indicator showing the aggregate demand trend. In the existing methodology, a number of substantial data were not available, such as: corporate investments, revenues from selling shares, non-market income, non-observed economy revenues, and the like. Methodology of calculation of the aggregate demand is expressed by the following equation:

$$AD = C + I + G$$

C = sum of paid salaries + sum of paid pensions + paid frozen foreign currency deposits + net compensations to households – net savings by households (savings – loans granted)
I = net savings of economy (deposits – loans)
G = public consumption – paid pensions – salaries paid from the budget – net savings by the Government (deposits – loans – Treasury bills)
AD – aggregate demand, C – personal consumption, I – investment consumption, G – public consumption

3.1.1. Salaries and other available demand determinants

In Q2 2013, the average salary in Montenegro amounted to EUR 727, while average salary without taxes and contributions amounted to EUR 479. Average salary and average salary without taxes and contributions recorded q-o-q decline of 0.3% and 0.9% respectively.

Graph 26 – Average salaries without taxes and contributions in Montenegro

Source: Monstat

Graph 27 – Real salaries (monthly growth rate)

Source: Monstat

Taking into account the consumer prices, i.e. movements of salaries in real amounts, it can be concluded that in Q2 real salaries declined in April, while they recorded a slight increase in May and June.

Households' loans and other receivables amounted to EUR 880.9 million at end-June 2013. In relation to end-2012, households' loans and other receivables were 8.9% higher, while in relation to the same month of 2012 they recorded an increase of 5.9%[1]. Over the course of H1 2013, households' loans and other receivables increased at an average monthly rate of 1.4%, while in the same period 2012 they declined at an average monthly rate of 0.04%.

Per capita debt[2] amounted to EUR 1,421 at end-Q2 2013, recording an increase of EUR 116 in relation to end-2012, i.e. EUR 79 higher than in the same period of 2012.

Households' loans with MFIs amounted to EUR 34.5 million at end-H1 2013, which is 22.3% higher than at end-2012, i.e. 11.9% higher than in the same period of 2012.

Households' deposits in banks amounted to EUR 1,164.7 million at end-June 2013 recording a 1.6% increase in relation to end-2012, i.e. a 10.8% y-o-y increase.

Loans to deposits ratio[3] for the household sector amounted to 0.76 at end-June 2013, which is a deterioration in relation to end-2012 (0.71), while it improved in relation to the same period of 2012 (0.79). As of July 2010, the household sector is a net depositor. Net household savings amounted to EUR 283.7 million at end June 2013, being EUR 53.9 million or 16% higher in relation to end-2012, while in relation to the same period of 2012, net savings of this sector increased EUR 63.9 million or 29.1%.

Graph 28 – Households' loans and other receivables, EUR thousand

Graph 29 – Inflow of foreign funds to household sector, (EUR thousand)

Source: CBCG

Balance of payment statistics showed that in Q2 2013, an increase was recorded in the inflow based on inheritance, alimony and other gifts and aid as well as based on remittances in favour of domestic natural persons.

Observation of the total household sector's demand by quarters showed that demand in Q2 2013 slightly decreased in relation to demand recorded in the previous quarter. Significant increase in the household sector's demand was recorded in comparison to Q3 and Q4 2012.

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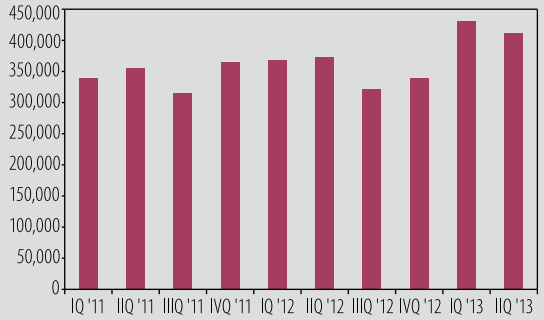
[1] *The increase of loans and other receivables is largely a result of returning the written off loans (category E) from the off-balance sheet records to the balance sheets of banks in January 2013, in line with the International Accounting Standards.*

[2] *Data on population is a result of 2011 census.*

[3] *In line with the new methodology, loans include loans from banks and other receivables (assets and deposits with banks and other depository institutions, factoring and forfeiting and bank's claims on outstanding acceptances, guarantees and bills of exchange). Accordingly, the loans to deposits ratio for household sector at end Q1 2013 amounted to 0.74.*

Graph 30– Demand of household sector (EUR thousand)



3.1.2. Budgetary analysis

During the first six months of 2013, Montenegrin Budget, according to Ministry of Finance preliminary data, recorded total revenues[4] amounting to EUR 615.4 million.

Source revenues amounted to EUR 516.1 million or 14.7% of estimated GDP[5], and in relation to the plan, they increased by 1.4%, and they showed a y-o-y increase of 8.8%. Tax revenues recorded the highest share in the structure of source revenues (63.5%), followed by contributions (30.4%), other revenues (2.5%), duties (2.1%), fees (1.2%) and repayment of loans granted (0.3%).

Tax revenues amounted to EUR 327.5 million and were by 2.4% higher than planned, as well as showing y-o-y increase of 8.9%. Nominally, the highest y-o-y increase of revenues was recorded by the VAT tax, amounting to EUR 20.1 million or 12.3%. This increase of VAT revenues came as a result of the implementation of measures to combat the gray economy.

Negative deviation is recorded with taxes on international trade, amounting to EUR 6 million, or 36.8%, which came as a result of WTO agreement coming into force in H2 2012.

Revenues from contributions amounted to EUR 156.7 million or 0.2% more in relation to plan for H1 2013, and they showed y-o-y increase of 5%.

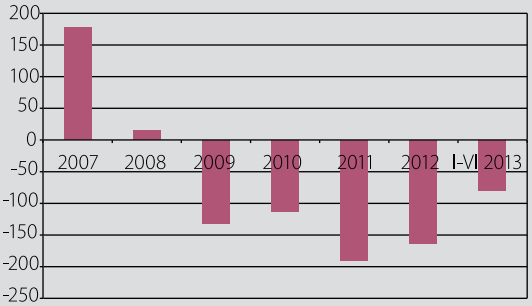
In H1 2013, **budget expenditures** amounted to EUR 595.6 million or 16.9% of GDP, while public debt repayment amounted to EUR 60.7 million. During the first six months, realised expenditures were 4.9% lower than planned, showing a y-o-y decline of 4.1%, which came as a result of the implementation of austerity measures in 2013.

Current budget spending amounted to EUR 575.9 million or 16.4% of GDP, while capital budget amounted to EUR 19.7 million or 0.6% of GDP.

Current expenditures in the observed period amounted to EUR 286.3 million or 2.6% lower than planned. Almost all expenditures, except expenditures for other personal income and gross earnings and contributions paid by employer, were bellow planned.

The Montenegrin Budget deficit was estimate at EUR 79.6 million, or 2.3% of GDP.

Graph 31 – Budget surplus/deficit in the period 2007 – Jun 2013, in EUR million



Source: Ministry of Finance

[4] *Revenues include source revenues (direct and indirect taxes and non-tax revenues), borrowings, donations and revenues from privatization and sale of properties.*

[5] *Source: Ministry of Finance, estimated GDP for 2013 amounted to EUR 3,517 million.*

3.1.3. Economy

Due to the absence of data on investments by the corporate sector, the net indebtedness of corporate sector can be used for demand approximation.

In H1 2013, loans and other receivables from corporate sector were significantly higher than this sector's deposits with the banks. Net debt of the corporate sector amounted to EUR 451.2 million at the end of the observed period being 11.7% higher in relation to end-2012 i.e. 8.9% lower y-o-y.

The structure of loans granted to the corporate sector shows that the share of long-term loans in total loans granted to this sector amounted to 72.1% at end-June 2013, whereby loans with maturity over 3 years accounted for over 52.3% of total loans granted to the corporate sector. This structure of loans points to their dominant use for increasing the volume of economic activity.

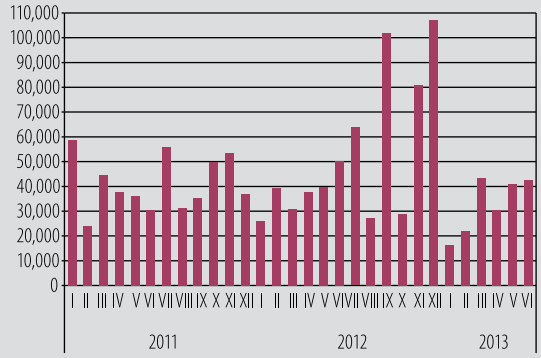
Graph 32 – Net debt of the corporate sector, monthly change, at EUR 000

3.1.4. External demand – balance of payments

In H1 2013, there was a decline of current account deficit, which came as a result of positive trends in the goods account. According to preliminary data, the current account deficit amounted to EUR 420.3 million or 14.2% less in relation to the same period in 2012. Trends recorded in the goods account were characterised by a decline of foreign trade deficit by 8.1%, as a result of increased export of goods by 7.9%, with a decline of import by 4.5%. These trends were mostly influenced by an increase of electric energy (by EUR 49 million), while at the same time there was a decline of import (by 36.6) as well as decreased import of oil and oil derivatives in comparison to the same period in 2012 by EUR 18.3 million.

In the international invisible trade in H1 2013, Montenegro recorded a surplus in the amount of EUR 101.7 million, as a result of the increased revenues from tourism and other business services. In the factor income account, surplus increased by 79.2% (EUR 31.9 million) due to the increased inflow arising from compensations of employees and decrease of outflow based on repayment of interests and paid dividends. Surplus in the current transfers account increased 2.5% and it amounted to EUR 64.4 million, which came as a result of increased inflow of current transfers.

Graph 33 – Total FDI inflow, in EUR thousand



Source: CBCG

In the period January-June 2013, as per preliminary data, net FDI inflow amounted to EUR 150.9 million or 1.5% lower than the inflow recorded in the same period of 2012. Total FDI inflow amounted to EUR 195.7 million, while at the same time there was an outflow in the amount of EUR 44.7 million. In the structure of total inflow, the share of EUR 94.2 million (48.1%) referred to equity investments, while inflow arising from intercompany debt amounted to EUR 98.4 million (50.3%). It is encouraging that in H1 2013, FDI inflow has been trending upward from the start of April and that the biggest monthly inflow in the amount of EUR 42.6 million was recorded in June.

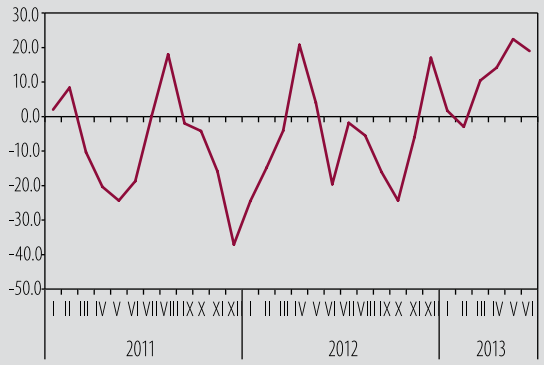
In H1 2013, portfolio investments account recorded a net outflow in the amount of only EUR 6.8 million, unlike 2012, when it amounted to EUR 856 thousand. Trends in the other investments account are characterised by the increased borrowing of the state sector and banks based on loan payables, while liabilities of the economy declined. Such trends in the other investments' account in H1 2013 resulted in recording net inflow in the amount of EUR 56.6 million.

3.2. Supply and production

In H1 2013, total industrial output recorded a 10.4% y-o-y increase. Increase in output was recorded in the mining and quarrying sector (9.7%) and supply of electricity, gas and steam sector (84.1%), while the manufacturing sector recorded a decline (25.6%). Analysis of monthly data on industrial output trends showed that growth was recorded in February (2%), March (24.6%) and April (10.6%), while in January, May and June output recorded a decline of 17%, 20.7% and 12.7%, respectively.

In the first six months, Montenegro was visited by 337.3 thousand tourists, which is a 6% y-o-y increase. In the same period, Montenegro recorded 1,748.9 overnights, which is 4.2% more in relation to the same period previous year. Foreign tourists accounted for 87.5% of total recorded overnights.

Graph 34 – Industrial output, annual growth rate



Source: Monstat

In the first six months of this year, **total wood production** amounted to 76.4 thousand m^3 of wood products, recording a y-o-y increase of 49.9%[6]. This increase was a result of extremely low base in January 2012, i.e. absence of production in February 2012.

As per preliminary data the value of executed **construction works** in the first six months of 2013 increased by 1.8% in relation to comparative period, while the construction activity measured by effective working hours increased by 29.9%.

In the first six months, road transport recorded 1.5% more passengers than in the same period of 2012, while cargo transport increased by 38.9%. In the observed period, railway passenger transport and railway cargo transport increased by 14.4% and 21.2%, respectively. In the first six months, air transport recorded 9.4% more passengers than in the same period of 2012, while cargo transport declined by 1.7%.

Total turnover in ports amounted to 635.7 thousand tonnes showing a y-o-y decline of 14.6%, whereby the export accounted for 44.7% and the import accounted for 51.3%. In this period, exports increased by 9.5%, while imports decreased by 31.3%.

3.3. Stock exchange indices

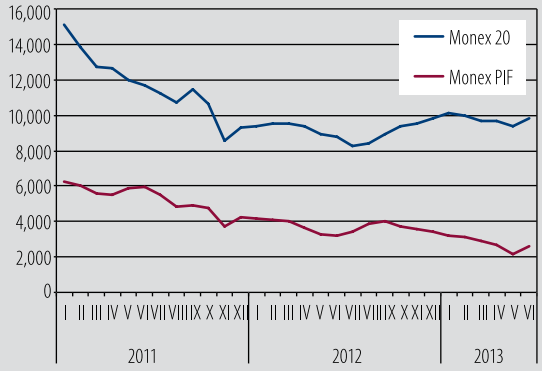
After recording a mild increase in January, the Monex20 index recorded a monthly decline during H1, which lasted until June, when it recorded a monthly increase of 5%. On the other hand, at end-June, index of the investment fund Monex PIF, ended a negative monthly trend which lasted since October 2012. It recorded a monthly increase of 18.5%.

At end-June 2013, Monex20 was approximately at the same level as at end-2012, while Monex PIF declined 864.4 index points or 25.1%.

In relation to end-June 2012, Monex20 recorded an increase of 11.7% while Monex PIF recorded a decline of 20.1%.

[6] *Iskazano neponderisanim indeksom, a ponderisanim je proizvodnja viša za 57,3% za isti period.*

Graph 35 - Montenegro stock exchange indices



Source: Montenegro Stock Exchange

In relation to their historical maximum values (reached in 2007), at end-June 2013, both indices declined: Monex20 – 4.9 times and Monex PIF – 19.7 times.

Table 3 – General data on indices

	MONEX 20		MONEX PIF	
Value as at 30 June 2013	9,847.43		2.577.42	
Absolute change of index in 2012	-2.49		-864.42	
Initial index value	1000.00	March 2003	1000.00	March 2003
Maximum value in 2013	10,247.75	16 January 2013	3.432,0	28 January 2013
Maximum historical value	48,617.88	07 May 2007	50,780.54	17 August 2007
Minimum historical value	918.57	14 April 2003	959.53	02 April 2003
Growth (decline) in 2013	-0.03%		-25.1%	

Source: Montenegro Stock Exchange

4. MONETARY POLICY

In the H1 2013, there were neither change in the existing, nor new decisions were passed referring to the CBCG monetary policy instruments.

5. INFLATION FORECAST FOR 2013 AND Q2 2014

5.1. Model assessment

Montenegro's inflation fan chart represents a graph of probability distribution of inflation rate expressed through the consumer price index. Therefore, instead of determining concrete points, using the distribution of probability the "Fan Chart" includes the potential risks and uncertainties which in the future period might influence the movement of inflation. The purpose of the Fan Chart is to point out and take into consideration any existing uncertainty in real economy, consequently reflecting on the inflation rate trends (higher prices of energy generating products, increase/decrease in foreign trade deficit, etc.).

Montenegro's fan chart for 2013 and H1 2014 was based on the following three estimated components:

1. **Central projection values** – The values of the Fan Chart central projection are derived from the ARIMA model, and also by applying the Tramo/Seats simulation in order to obtain the most efficient model.

2. **Degree of uncertainty** – determines the fan chart width. The degree of uncertainty ratios are obtained through analytical assessment and calculation of a relative impact of potential internal and external shocks which are possible in Montenegrin economy during 2014 and which are read through "thickness" of the band around central projection.

3. **Fan chart curve** – based on the level of the curve in the distribution of inflation projection, the fan chart is adjusted to the forecast to show whether the values of the central projections have "overestimated" or "underestimated" the inflation rates. This will also influence the position of the mean value of inflation distribution.

Fan Chart central projection - ARIMA model for 2013 and H1 2014

For the purpose of Fan Chart preparation, the ARIMA (Auto-Regressive Integrated Model with Variable Averages) model of temporal series of inflation in Montenegro expressed through the Consumer Price Index[7] was developed.

ARIMA model was used for short term forecasts (12 months), whereby iteration of 411 ARIMA models was made, which were ranked based on their efficiency and quality of diagnostics. The selected ARIMA model, ARIMA (4,2,5)[8] has sufficient confidence level for forecasts.

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[7] A detailed explanation of the ARIMA model of Montenegro is given in the working study of the Central Bank of Montenegro No. 11 „Inflation Forecast: Empirical Research of Retail Price Index Movements in Montenegro in 2007 –Application of ARIMA Model".

[8] ARIMA model is generally referred to as an ARIMA (p,d,q) where p represents the number of autoregressive variables, d refers to the level of dependent variable that needs to be made stationary, and q is the number of variables, moving averages, in the certain model.

Based on Tramo/Seats[9] procedure, 4 breakpoints (Chow Test was used for identification) have been identified so far, which correspond to a significant change in inflation structure from 2001 to end-2013 and which are included in the ARIMA model through dummy variable.

The result of ARIMA model projection was compared to forecasted values using Tramo/Seats procedure which have shown high level of compatibility.

The monthly forecasts value was used as the value of central projection of the Fan Chart of CPI for 2013 and Q2 2014. The obtained values represent the distribution mode, i.e. values with the highest frequency in the distribution of this time series.

Mean value of the obtained model was 3.1, while the curve varied from -0.5 to 0.4, and standard deviation values were σ2=0.08 and/or σ1=0.05. This pointed out that central band, as in the last two years, was placed in lower part of distribution, i.e. the corresponding degree of uncertainty was concentrated towards higher inflation levels, which are reflected in the graph through "thicker" band concentrated above central "the deepest shade of red" band, although more moderate than in the previous period. The fan chart presents a 90% probability of inflation distribution. The central projection is usually in the deepest shade of the Fan Chart, i.e. in the central 10% of probability.[10] The fan chart has an equal number of bands (eight) on either side of the central band whereby every band is of the same colour, both above and below the central band, cumulatively takes the inflation projection to the next 10% of probability. As the degree of uncertainty grows over time, so the fan chart spreads.

Graph 36 – Projected Consumer Price Index of Montenegro for 2013 and Q2 2014

Source: CBCG, 2013

[9] Tramo program represents a program for model assessment and design (mostly ARIMA) having problems with a lack of data, data errors and the presence of a large number of extreme data in time series. SEATS programme is used to extract time series elements that cannot be directly separated, separating elements such as trend, season, cycle, existence of Easter and Christmas effect, which enables better analysis and projection of ARIMA model. (For more details, see Handbook Tramo and Seats (Gómez and Maravall, 1996)

[10] The mode value (central projection) is, by construction, always in the deepest band shade, but in case of a heavily unbalanced risk, the central projection may not cover either of these values. (Britton, E, Fisher, P.G. and Whitley, J.D. (1998), 'The Inflation Report projections: Understanding the Fan Chart', Bank of England, Quarterly Bulletin, 38, pp. 30–37)

Montenegro's inflation Fan Chart, based on the ARIMA model and Tramo/Seats simulation for 2013 and Q2 2014 shows that with a probability of *90%, the inflation, measured by the consumer price index, will vary from 2.1% to 4.7%, depending on the month. It is projected that the inflation shall range from 2.5% to 3.6% at end-2013*. To wit, as the time span for forecasting grows, uncertainty will also grow and the forecast span for central projections of the "Fan Chart" referring to the thickest part spreads, showing the probability range of 10%.

The following external assumptions have been taken into account when forecasting the inflation in 2013 and H1 2014 (nominal annual growth):

1. Oil and oil derivative prices will not exceed 5% of the prices in June 2013;
2. Aluminium prices remain stagnant relative to June 2013;
3. Real estate prices are stagnant relative to end of 2012;
4. Price of electricity of 6.2% (i.e. incorporated potential growth in august 2013);
5. Real wages in 2013 will remain at the 2012 level;
6. There will be no significant increase in prices of food products in relation to international markets in relation to December 2012;
7. Projected VAT increase of 2 percentage points from July 2013 for a higher VAT rate.

Deviation of any of abovementioned parameters would require the correction of the forecast.

6. EXPECTED INFLATION IN 2013

The level of aggregate demand in Q2 2013 trended downward. This means that no "inflationary pressures" are to be expected from the demand side. Also, global inflation levels are low.

On the other side, the level of production is increasing. According to estimates, GDP increased by about 4% in H1 2013, which also has a deflation effects. The decline of trade deficit will not affect the inflation growth, through the reduction of the available goods, because it is dominantly related to a change in electricity import and export.

The level of public expenditures was significantly reduced, so there were no pressures on prices from the "budget" side.

The value of economic development indicator is 0, which means that the inflation level is expected to remain unchanged. However, if we look at certain individual expectations of the surveyed banks and companies, there are very different expectations, which indicate that there is uncertainty of both the real and financial sector in respect of the expected inflation rate in 2013.

However, the increase of VAT and electricity prices represents factors that will affect the inflation growth in 2013.

Model-based assessment shows that the inflation will range between 2.1% and 4.7% in 2013. Our experts' assessment is similar to the model and remained unchanged relative to the forecast from the previous quarter. Our expectation is that at end-2013, the inflation will range between 3% and 5%.

Table 4 – Inflation rate forecast

Optimistic assessment	Realistic assessment	Pessimistic assessment
3%	4%	5%

Experts' assessment is based on the same assumptions as the model assessment. The change in any parameter used for this forecast would require the revision of the forecast.