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1. INFLATION INDICATORS

CPI inflation in Montenegro in March 2012, relative to December 2011, was 2.2%. In the reporting quarter, the highest increase was in prices under "alcoholic beverages and tobacco" by 9.9%, "housing, water, electricity, gas and other fuels" by 6.2%, "food and non-alcoholic beverages" by 3%, as well as "transport" and "other goods and services" by 1.6% and by 0.7%, respectively. The highest monthly increase in consumer prices was recorded in February[1] (1%), followed by January (0.8%) and March (0.4%). Average CPI (first three months of 2012 compared to the same period of 2011) was 3.7%.

Prices in the group "food and non-alcoholic beverages", which grew by 3% in Q1 2012, recorded the highest share in total inflation (51.7%). Under this group, prices of fruits, vegetables, milk, cheese and eggs, and fish, recorded the highest respective increases of 13.3%, 10.8%, 3.1% and 2.3%. Due to change in excise duties, prices under "alcoholic beverages and tobacco" grew by 9.9%, whereby prices of tobacco and of alcoholic beverages grew by 16.5% and 1%, respectively. With the increase of 6.2%, prices under "housing, water, electricity, gas and other fuels" recorded the share of 36.7%. Under this group, the highest share of 8.3% was in prices under subgroup "electricity, gas and other fuels". In March 2012, prices under "transport" recorded a 1.6% increase relative to December 2011, primarily resulting from higher prices of fuels and lubricants (3.7%), and prices of "other goods and services" also grew by (0.7%). In the reporting quarter, decrease was recorded in prices under "clothes and footwear", "health", "entertainment and culture" and "hotels and restaurants" by -3.8%, -0.7%, -0.5% and -0.2%, respectively, as well as in groups "housing and routine maintenance" and "communication" by -0.1% each. Prices under the group "education" did not change in Q1 2012.

Table 1 – Inflation, %

	2011				2012
	III	VI	IX	XII	III
Change in relation to previous year end	3.3	2.7	3.0	2.8	2.2
Annual change	3.7	3.5	3.4	2.8	2.7

Source: Monstat

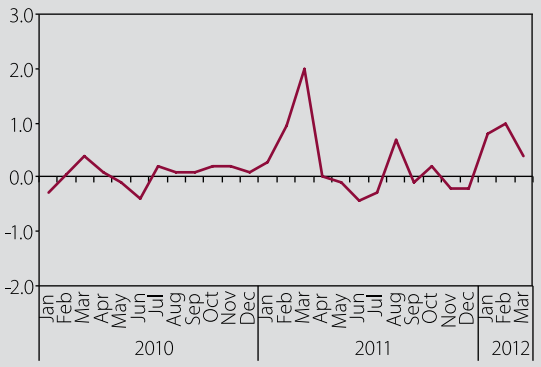
[1] *The CPI consumer products basket for February 2012 includes new products, although total weighting structure at the group level remained unchanged.*

Annual inflation in March 2012 was 2.7%, while prices in March relative to 2011 average increased by 2.9%.

Annual **core inflation**[2] rate was by 1.6 pp. lower than total January inflation, which amounted to 2.7%. During first three months of 2012, monthly core inflation was lower than official monthly inflation, due to "moderating" of prices comprising core inflation, and to increasing some of excluded products.

Prices of oil at the global markets are on uptrend. In Q1 2012, price of reference OPEC basket was 117.4 USD/barrel, or some 9.4% higher than in December 2011. The average price of Brent in Q1 2012 was 118.5 USD/barrel, or 9.9% higher relative to average price in December 2011. The highest price of Brent was in March 2012 (125.3 USD/barrel), recording a 9.4% y-o-y increase. The analysts note that prices of crude oil are high and mostly the result of speculations at the market, the crisis in Iran, i.e. speculations on stopping Iranian oil deliveries, as well as riots in the countries of the Middle East. Moreover, the analysts agree to the fact that the oil has reached the price that poses threat to necessary development of European countries.

Graph 1 - Consumer prices, monthly rate



Source: Monstat

Annual inflation in March 2012 of 2.7% was largely the result of prices under "dwelling", "alcoholic beverages and tobacco" and "food and non-alcoholic beverages" by 1 pp., 0.9 pp. and 0.25 pp., respectively.

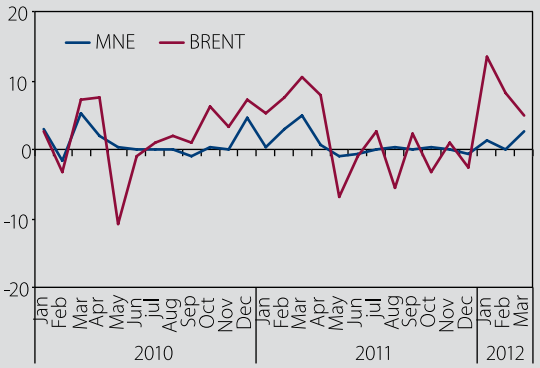
Table 2 – Share of individual categories in total inflation

	Weights	III 12/XII 11	Growth rate	Contribution	Share in total inflation
TOTAL	10000	102.2	2.2	2.2	100.0
Food and non-alcoholic beverages	3755	103.0	3.0	1.1	51.7
Alcoholic beverages and tobacco	372	109.9	9.9	0.4	16.9
Clothes and footwear	761	96.2	-3.8	-0.3	-13.3
Housing, water, electricity, gas and other fuels	1287	106.2	6.2	0.8	36.7
Housing and routine maintenance	494	99.9	-0.1	0.0	-0.2
Health	280	99.3	-0.7	0.0	-0.9
Transport	1216	101.6	1.6	0.2	8.9
Communications	558	99.9	-0.1	0.0	-0.3
Entertainment and culture	321	99.5	-0.5	0.0	-0.7
Education	218	100.0	0.0	0.0	0.0
Restaurants and hotels	296	99.8	-0.2	0.0	-0.3
Other goods and services	442	100.7	0.7	0.0	1.4

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

[2] *Due to data availability, it was possible to calculate only annual base for January, and not for February and March 2012.*

Graph 2 – Oil prices, monthly growth rate

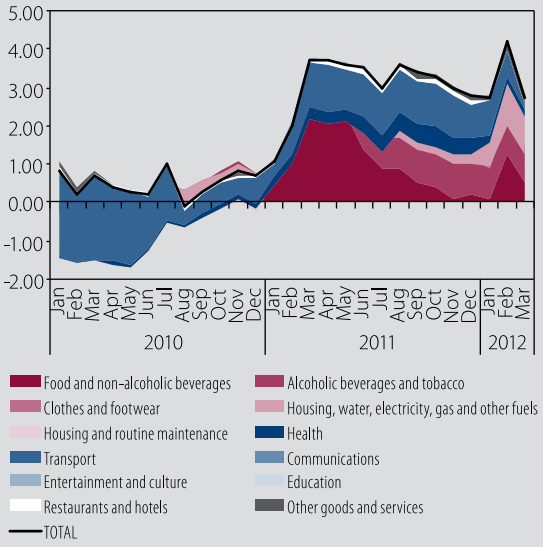


Source: Monstat and "Monthly Oil Market Reports", OPEC

Graph 4 – Consumer prices, annual rate

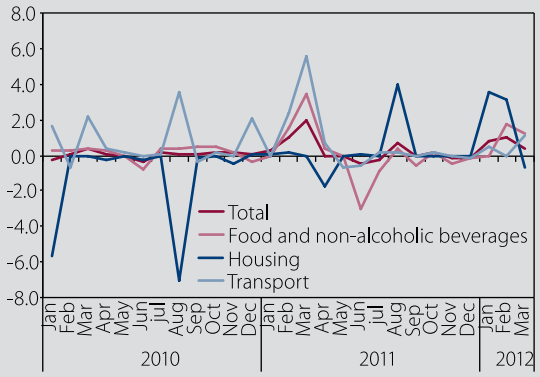
Source: Monstat

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

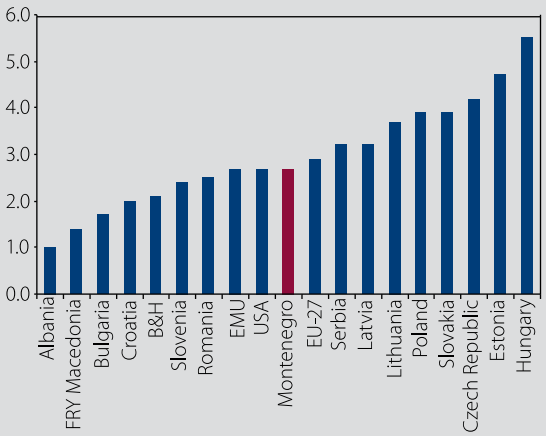
In Q1 2012, **producers' prices of manufactured products** increased q-o-q by 1.3%, whereby prices under electricity, gas and water supply increased by 1.5%, while prices of mining and quarrying remained unchanged. Producers' prices of manufactured products recorded y-o-y decline of 1.5%.

The comparison of annual inflation recorded in Montenegro to the inflation in selected countries shows that inflation in Montenegro was the same as in the EMU (2.7%). Compared to neighbouring countries, lower annual rate was recorded in Croatia, Bosnia and

Herzegovina and Albania by 2%, 2.1% and 1%, respectively, while annual inflation in Serbia was 3.2%. The highest annual growth in selected countries was recorded in Hungary (5.5%).

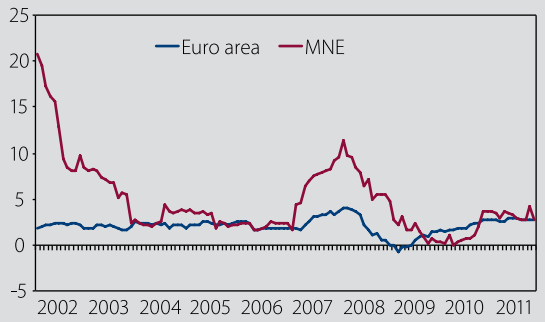
Annual inflation rate recorded in Euro area, measured by Harmonized Consumer Prices Index (HCPI) amounted to 2.7% as in Montenegro (CPI inflation), while annual inflation in Montenegro, measured with harmonized index[3], amounted to 2.1% in March 2012.

Graph 6 – Annual inflation rate in selected countries, March 2012



Source: National Statistical Offices and Eurostat

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



Source: Monstat and Eurostat

[3] *Monstat started publishing HICP data since January 2011 (first as a pilot survey, and then as regular statistical survey).*

2. INFLATION FORECASTS

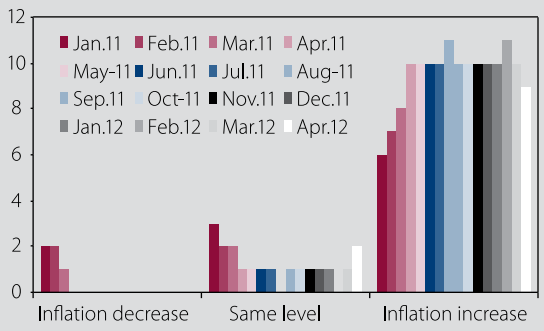
BANKS EXPECTATIONS

Regarding inflatory forecasts of banks, based on the survey conducted in April 2012, nine banks expected higher rate, while only two banks expected the same inflation rate in 2012, in relation to 2011 (Graph 8).

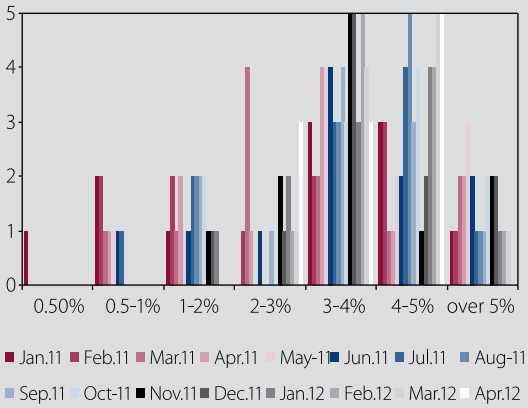
There were different expectations of banks with regards to the inflation. Three banks each expected the inflation to range from 2% to 3% and from 3% to 4%, while five banks expected inflation to range from 4% to 5%.

Concerning the forecasts on lending interest rates, eight banks forecasted the same level of nominal interest rates, while nine banks the same effective lending interest rates. One bank expected the decline in both nominal and effective lending interest rates, while two banks forecasted higher nominal and one bank higher effective lending interest rates in 2012 in relation to 2011.

Graph 8 - Inflation forecasts (banks)



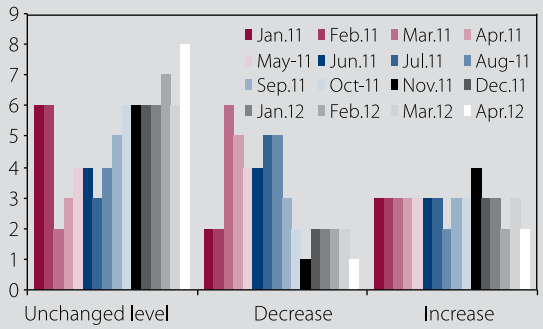
Graph 9 – Forecasted inflation level (banks)



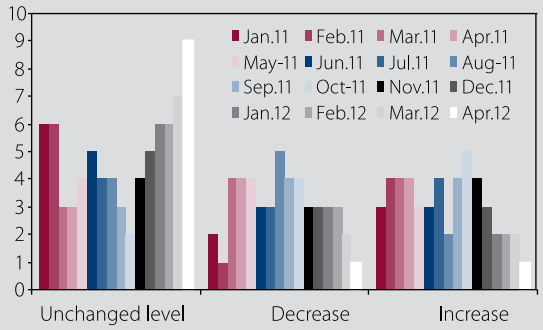
Regarding the deposit interest rates, two banks each expected decline and/or increase in deposit interest rates, while seven banks expected unchanged level of deposit interest rates in 2012 in relation to 2011.

For the purpose of calculating inflation forecasts we use market trend indicator (red 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, and vice versa, while higher positive value means higher inflation level forecasts. Graph 12 shows that the inflation forecast started increasing in 2011, thus they were at the significantly higher level during the last one year period (April 2011 – April 2012) relative to the early 2011 level.

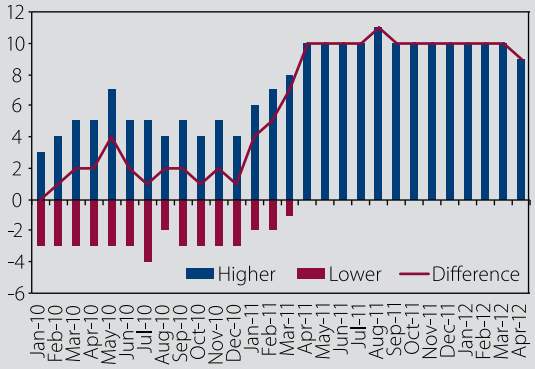
Graph 10 – Nominal lending interest rates forecasts



Graph 11 – Effective lending interest rates forecasts



Graph 12 – Market trend indicator

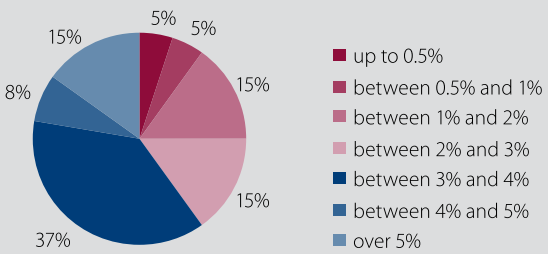


EXPECTATIONS OF ECONOMY (EXCEPT BANKS)

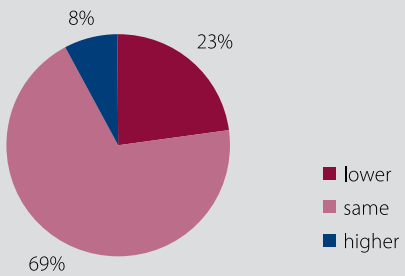
Inflation

Out of total surveyed companies, 37% expected that inflation in 2012 would range between 3% and 4%. Inflation in 2012 ranging between 1% and 2%, 2% and 3% and more than 5% is forecasted by 15% each. Some 8% expected inflation in 2011 to range between 4% and 5%, while inflation ranging between 0.5% and between 0.5% and 1% is forecasted by 5% each. Some 23% of companies expected decrease in salaries, some 69% expected the unchanged level relative to 2011, while 8% expected increase. Relative to 2011, as for the number of employees, 57% of surveyed companies expected the unchanged number, 25% of them believed in increase and 18% expected a decrease. Most of surveyed companies (69%) expected the higher level of production input prices, while only 5% of them forecasted lower prices of their products (services) in 2012 relative to 2011.

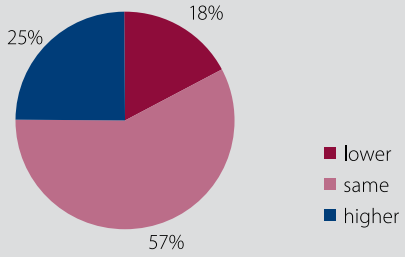
Graph 13 – Forecasted inflation in 2012 relative to 2011



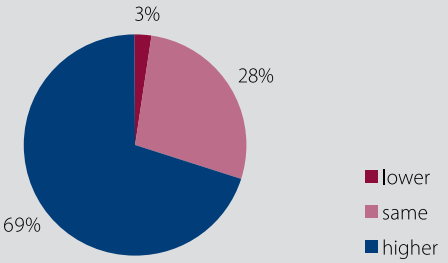
Graph 14 – Expected level of salaries in 2012 relative to 2011



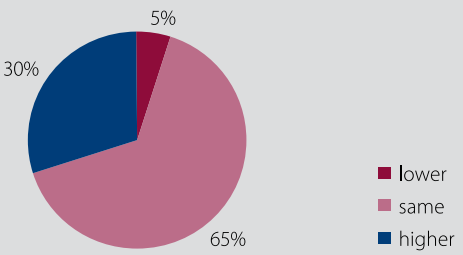
Graph 15 – Expected level in number of employees in 2012 relative to 2011



Graph 16 - Expected level of prices of production inputs in 2012 relative to 2011



Graph 17 - Expected level of prices of products (services) in 2012 relative to 2011

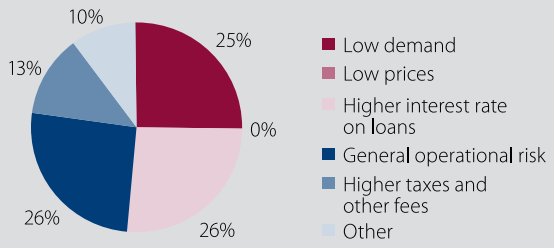


Business Environment

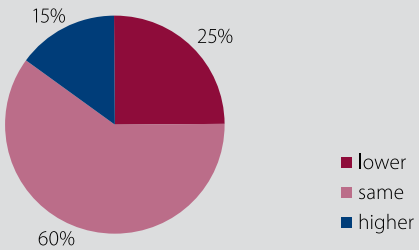
The survey results showed that most of the surveyed companies saw low higher lending interest rates (26%), general operational risks (26%) and lower demand (25%) of companies as red tape.

Besides, 25% of surveyed companies expected lower, 60% unchanged, while 15% of them expected higher lending interest rates in 2012 relative to 2011.

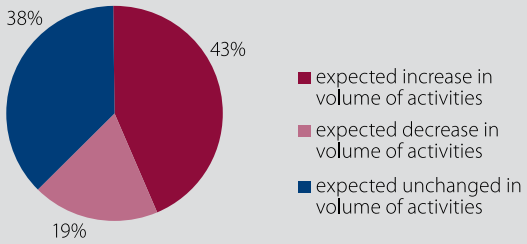
Graph 18 – Business barriers



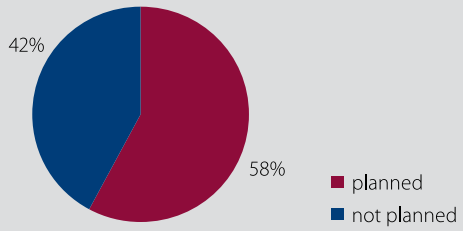
Graph 19 – Expected level of lending interest rates in 2012 relative to 2011



Graph 20 - Forecasted volume of activities in 2012



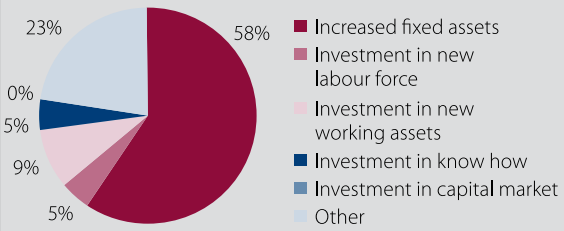
Graph 21 - New investments in 2012



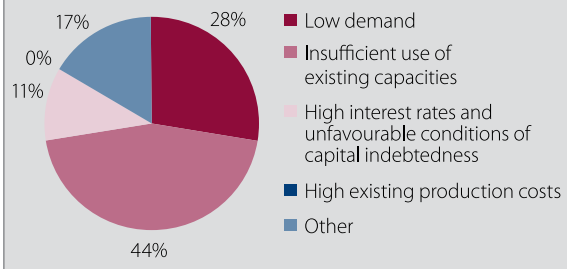
Investments

Out of the total number of surveyed companies, 43% planned the increase in volume of activities by the end of 2012, while 58% planned new investments. Most investments (58%) referred to the increase in fixed assets, while insufficient exploitation of existing capacities (44%), low demand (28%), other obstacles (17%) and high interest rates and unfavourable conditions for capital borrowings (11%) were described as largest barriers to new investments.

Graph 22 - Types of forecasted new investments in 2012



Graph 23 – Obstacles to new investments in 2012



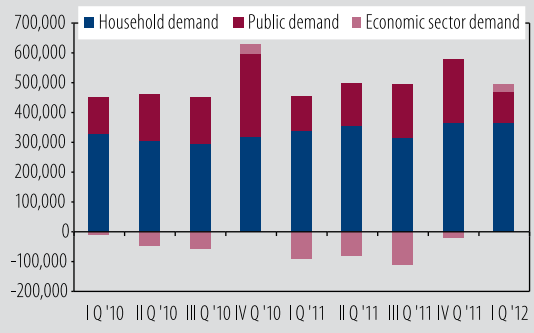
3. INFLATION DETERMINANTS

3.1. DEMAND

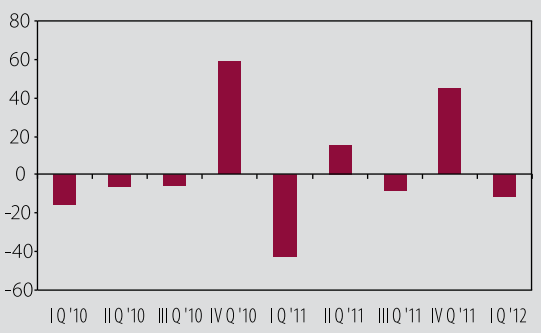
In Q1 2012, aggregate demand recorded y-o-y growth, while it recorded q-o-q decline. The structure of total demand, compared to the previous quarter, shows the increase in share of household and economic sector demand, and the decrease in public demand.

In Q1 2012, the aggregate demand level showed q-o-q decline, and it was significantly lower relative to Q4 2011 level.

Graph 24 - Aggregate demand, EUR thousand



Graph 25 - Quarterly rates of aggregated 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 the 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 incomes, non-observed economy revenues, and the like. The methodology for calculating the aggregate demand is given in 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 the Q1 2012, the average salary in Montenegro amounted to EUR 740, while average salary without taxes and contributions amounted to EUR 496. Average salary and average salary without taxes and contributions recorded q-o-q increase by 3.1% each. Compared y-o-y, average salary and average salary without taxes and contributions decreased by 1.1% and 1.2%, respectively.

Graph 26 - Average salaries without taxes and contributions in Montenegro

Source: Monstat

Graph 27 – Real wages (monthly rate)

Source: Monstat

Taking into account the consumer prices, i.e. salaries in real amounts, it can be concluded that real salaries only grew in January. Their decline was recorded in February and March.

In Q1 2012, households' loans continued to downtrend. Households' loans declined at the average monthly rate of 0.2% (their average monthly decline in 2011 was 0.3%), and they amounted to EUR 828.8 million at end March 2012. They were by EUR 9.7 million or 1.2% lower in relation to March 2011, and they were by EUR 4.9 million or 0.6% lower relative to end-2011.

Average leverage of household sector continued the declining trend due to lower lending to this sector. Thus debt per capita amounted to EUR 1,337 at end-March 2012, and it was EUR 8 or 0.6% lower than in end-2011.

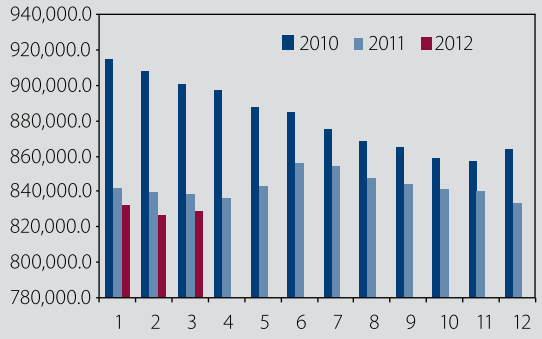
Household loans in MFIs amounted to EUR 31.4 million at end-Q1 2012. At the end of Q1 2012, households' loans in micro-credit financial institutions (MFIs) recorded y-o-y decline of EUR 7.8 million or 19.8%, and q-o-q decline of EUR 1.3 million or 4.0%.

Deposits of household sector amounted to EUR 1,034.0 million at the end of Q1 2012, which is y-o-y increase of EUR 80.1 million or 8.4% and EUR 0.5 million or 0.1% more in relation to end-2010.

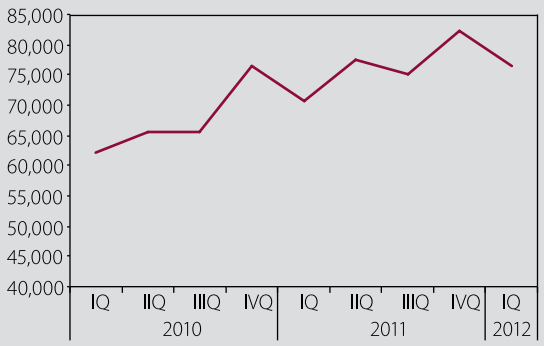
Balance of payment statistics showed that the inflow of foreign funds to natural persons recorded y-o-y growth in Q1 2012, yet somewhat lower than the inflow recorded in Q4 2011. In Q1 2012, inflow from heritage, support and other gifts and assistance increased, as well as inflow from remittances to natural persons, pensions, disability allowances and other social benefits.

The total demand of household sector by quarters shows continuous uptrend of demand since Q4 2010, with the exception of demand in Q3 2011.

Graph 28 – Loans to households, in EUR thousand

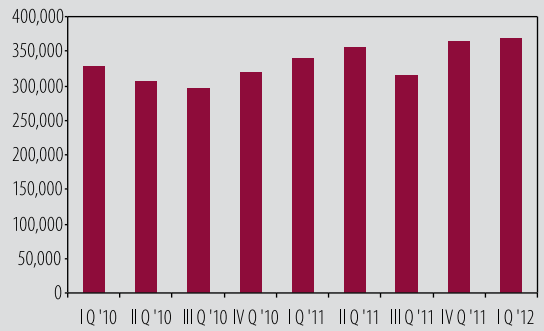


Graph 29 - Inflow of foreign funds to households, EUR thousand



Source: CBCG

Graph 30 - Households' demand, EUR thousand



3.1.2. Budgetary analysis

Budget of Montenegro

In the period January – March 2012, Montenegrin Budget, according to Ministry of Finance preliminary data, recorded total revenues[4] amounting to EUR 270.3 million.

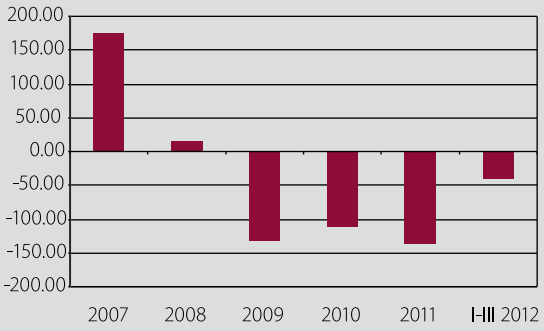
Source revenues amounted to EUR 192.7 million or 5.7% of estimated GDP, and in relation to the plan, they decreased by 17.2%, and they showed a y-o-y decrease of 11.9%. Tax revenues recorded the highest share in the structure of current revenues (62%), followed by contributions (32.1%), fees (1.2%), other revenues (2.8%), duties (1.3%) and repayment of loans granted (0.6%).

Tax revenues amounted to EUR 119.4 million and were by 21.1% lower than planned, as well as showing y-o-y decline of 14.3%. Lower collection of taxes was mostly the result of significant default in collection of excise duties, VAT and custom duties, primarily due to noticeable illiquidity and problems in the industry sector, and the state of emergency that paralysed Montenegro in February. The collection of tax on profit was higher than planned by 17.2% as well as showed 12.3% y-o-y growth, while collection of tax on real estates turnover recorded y-o-– increase of 29.6%.

Revenues from contributions amounted to EUR 61.8 million or 5.9% less in relation to plan for Q1 2012, and they showed y-o-y decline of 8%. Lower collection of contributions was mostly the result of delays in collection of contributions for pension and disability insurance and their collection in April.

In Q1 2012, **budget expenditures** amounted to EUR 233.7 million or 6.7% of GDP and they showed y-o-y decline of 7.4%. Current expenditures amounted to EUR 104.7 million or 35.8% lower than planned. Almost all expenditures, except expenditures for subsidies, were below planned, as the result of increased austerity of budgetary consumer units, and non-implemented activities due to extraordinary conditions. Due to aforementioned circumstances, subsidies were 75.2% higher than planned and they amounted to EUR 10.8 million.

Graph 31 – Budget surplus/deficit in the period 2007 – March 2012, in EUR million



Source: Ministry of Finance

Capital budget amounted to EUR 6.7 million or 0.2% of GDP.

The Montenegrin Budget deficit was estimate at EUR 41.1 million, or 1.2% of GDP.

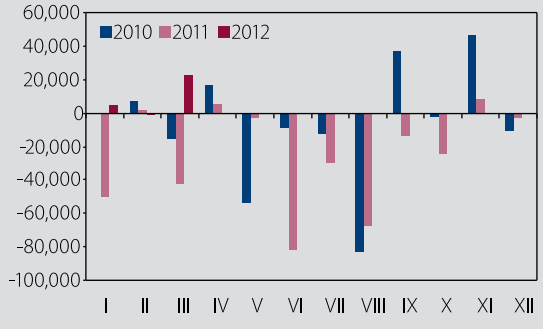
3.1.3. Economy

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

Loans granted to the corporate sector were substantially lower than their deposits with banks in Q1 2012. Net debt of the corporate sector at end-March 2012 showed q-o-q growth of 5.3%, yet showing y-o-y decline of 27.4%. 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 78.2% at the end of the reporting period, whereby loans with maturity over 3 years made up 58.1% of total loans granted to the corporate sector. This structure of loans points to their dominant use for increasing the economic activity.

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

Graph 32 - Net indebtedness of the corporate sector, monthly change, EUR thousand



3.1.4. External demand and the current account

In Q1 2012, current account deficit increased, resulting from negative trends at the goods account, i.e. the increased external trade deficit. Current account deficit amounted to EUR 216.7 million, showing a y-o-y increase of 15.9%.

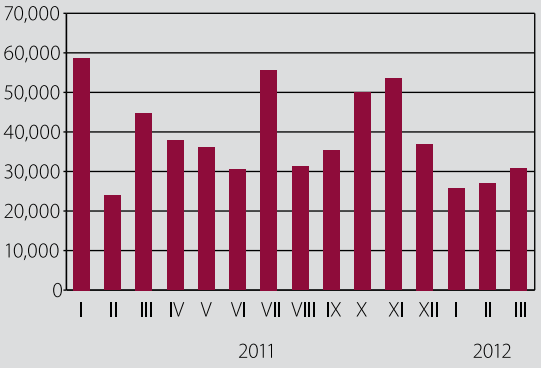
In Q1 2012, visible trade was characterised by decrease in exports and increase in imports. In Q1 2012, export recorded y-o-y decrease by 23%, while at the same time import increased by 6.3%, mostly due to increased import of oil and electricity. The increased import of these two products in Q1 2012 resulted from carstrophies, which resulted in higher consumption of electricity and fuels, as well as higher prices of energy generators at the global market. Due to mild recovery of demand and higher prices of some products, growing trend of visible trade deficit was recorded in the reporting period. According to preliminary data, visible trade deficit amounted to EUR 278 million, showing 21% y-o-y decline.

In international services exchange, Montenegro recorded surplus amounting to EUR 8.8 million, while in the same period of 2010, deficit in amount of EUR 4.5 million was recorded. Increased revenues from transport, tourism and other business services contributed to recording positive balance at this account. Factor income revenues and current transfers recorded positive balance in Q1 2012, partially contributing to moderating external trade deficit. Surplus at the income account amounted to EUR 21.1 million, or showing y-o-y decline of 1.8%, while current account transfers recorded surplus increase of 22.2% (EUR 31.3 million). Increased inflow from remittances and from heritage, support and other gifts and assistance helped in recording surplus at this subaccount.

Unfavourable global trends, global economy's vulnerability, debtor crisis, uncertain future of the euro and growing turbulences of financial markets are factors largely determining foreign direct investments trends in 2012. In Q1 2012, net FDI inflow amounted to EUR 54 million which is largely below the inflow recorded in the same period of 2011 (EUR 116 million). Total inflow of FDIs amounted to EUR 83.7 million, of which investments into ownership amounted to EUR 63.8 million, while investments in the form of the intercompany debt amounted to EUR 19.8 million.

In Q1 2012, **portfolio investments** sub-account recorded net outflow amounting to EUR 2.7 million. Total inflow of funds from portfolio investments amounted to EUR 5.7 million, while the outflow amounted to EUR 8.4 million. In Q1 2012, **other investments** sub-account recorded net inflow amounting to EUR 76.6 million, while net outflow of EUR 79.6 million was recorded in Q1 2011, as the result of increased foreign assets and foreign liabilities. In the reporting period, banks' deposits abroad increased by EUR 15.9 million, while banks reduced their liabilities from loans taken by EUR 11.2 million. The inflow from withdrawal of funds from loan taken from the private sector amounted to EUR 32.7 million, which is less than in 2011 (EUR 140.9 million), while significantly lower outflow from repayment of principal was recorded amounting to EUR 36.4 million (EUR 117.4 million in 2011).

Graph 33 – Total FDI inflow in the period 2011 – March 2012, in EUR thousand



Source: CBCG

3.2. SUPPLY AND PRODUCTION

In Q1 2012, industrial output recorded y-o-y decrease of 14.7%, primarily due to decrease in electricity, gas and water supply sector by EUR 35.2%. The output increase was recorded in mining and quarrying sector and manufacturing industry sector by 0.7% and 4.3%, respectively.

Monthly data on industrial output in the Q1 2012 show increase in February and March by 6.9% and 9.5%, respectively, while monthly decrease was recorded in January (-4.6%).

Some 49.9 thousand tourists visited Montenegro in Q1 2012, which was y-o-y growth of 0.4%. The number of domestic tourists arrivals decreased by 10.3%, while foreign tourists' arrivals increased by 5.2%. The number of overnights in the observed period amounted to 194.8 thousand or y-o-y growth of 7%.

In the first three months of this year, total **wood production** amounted to 1.153 m^3 or a y-o-y decline of 95.5%. This decline was the result of unfavourable weather conditions and impossibility to cut wood in state woods in Q1 2012, especially in February.

The value of executed construction works in Q1 2012 amounted to EUR 42.5 million, showing a y-o-y increase of 1.7% while, measured by the effective working hours, construction activity recorded 2.4% decrease.

In Q1 2012, road passenger transport recorded y-o-y growth of 15.7%, while road freight transport declined by 31.5%. Railway passenger transport and railway freight transport declined by 37.6% and 54.9%, respectively. Air passenger transport and air freight transport recorded respective decreases of 1.9% and 61.9%. In Q1 2012, total turnover in harbours amounted to 437.8 thousand tonnes or showing y-o-y increase of 47.9%, whereby export decreased by 10.9% and the import increased by 106.9%.

3.3. STOCK EXCHANGE INDICES

During Q1 2012, stock exchange Monex 20 continued the uptrend from end 2011 and constantly recorded increase. On the other hand, investment funds index, Monex PIF recorded monthly decline during the whole first quarter.

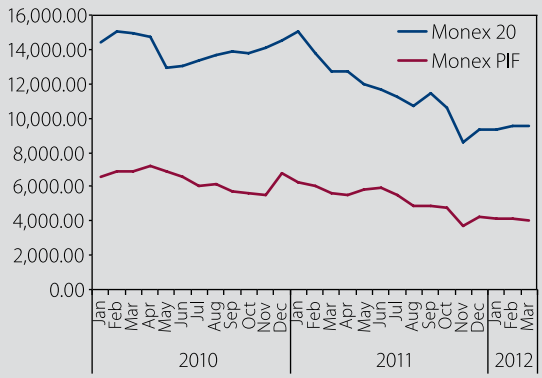
In relation to end 2011, Monex 20 recorded an absolute growth of 202.25 index points or 2.2%, while Monex PIF decreased by 213.95 index points or 5.0%.

Monex 20 and Monex PIF recorded y-o-y respective decline by 25.3% and 27.8%.

Graph 34 – Industrial production, annual growth rate

Source: Monstat

Graph 35 - Montenegro stock exchange indices



Source: Montenegro Stock Exchange

At end-March 2012, with regard to their historical maximum values (reached in 2007), Monex PIF and Monex20 declined by 5.1 times and 12.5 times.

Table 3 – General Data on Indices

	MONEX 20		MONEX PIF	
Value as of 31 March 2012	9,527.15		4,051.34	
Absolute change of index in 2012	202.25		-213.95	
Initial index value	1000.00	March 2003	1000.00	March 2003
Maximum value in 2012	9,807.33	23.03.2012.	4,272.97	12.02.2012.
Maximum historical value	48,617.88	07.05.2007.	50,780.54	17.08.2007
Minimum historical value	918.57	14.04.2003	959.53	02.04.2003
Growth (decline) in 2012	2.2%		-5.0%	

Source: Montenegro Stock Exchange

4. MONETARY POLICY

In the Q1 2012, there were neither change in existing, nor new decisions were passed referring to the CBCG monetary policy instruments.

5. INFLATION FORECAST FOR 2012

5.1. Model assessment

Montenegro's inflation fan chart represents a graph of probability distribution of inflation rate presented by the consumer price index (CPICG). In that direction, instead of determining concrete points, using the distribution of probability the „Fan Chart" includes potential risks and uncertainties which would in the future period influence the movement of inflation. The fan chart is aimed at considering uncertainties in the real economy flows, which result in the inflation rate movement, and periodically reflected in inflation rate trend (increase in energy prices, increase/ decrease in the foreign trade deficit).

Montenegro's fan chart for 2012 was based on the following three estimated components:

1. **Central projection values** – were derived from ARIMA model and use Tramo/Seats simulation for the purpose of obtaining more efficient model.

2. **Degree of uncertainty** – determines the fan chart width. The degree of uncertainty ratio is obtained through analytical assessment and calculation of a relative impact of potential internal (expected increase in prices of electric energy) and external shocks (movement in oil and food prices) which are possible in Montenegrin economy during 2012.

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

Fan Chart central projection - ARIMA model for 2012 and H1 2013

With a view to developing a fan chart, an ARIMA (AutoRegressive Integrated Moving Average) model was developed of time series of inflation of Montenegro showed through the Consumer Price Index[5].

ARIMA model was used for short term forecasts (12 months), whereby iteration of 518 ARIMA models was made, which were ranked based on their efficiency and quality of diagnostics. The selected ARIMA model, ARIMA(4,1,4)[6] has sufficient confidence level for forecasts.

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[5] *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".*

[6] *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.*

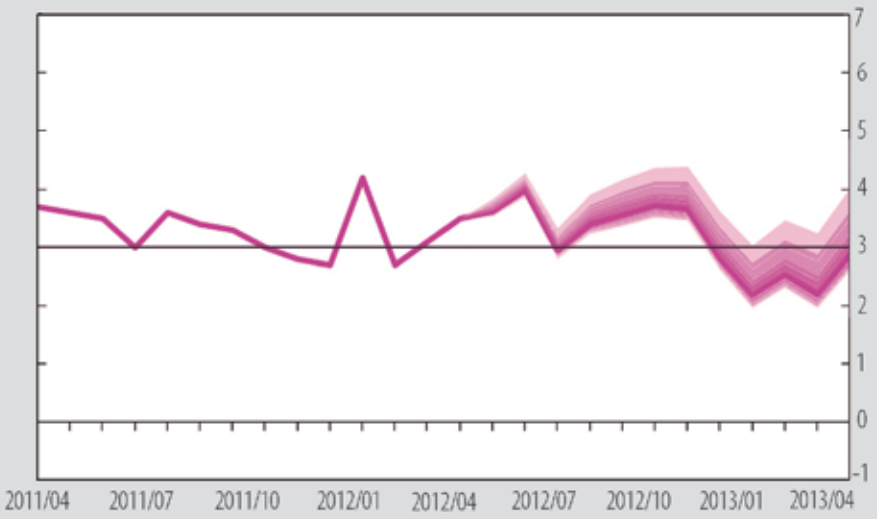
Based on Tramo/Seats[7] procedure, 7 bands (Chow Test was used for identification) have been identified so far, which correspond to a significant change in inflation structure from 2001 to end-2012 and which are included in the ARIMA model through dummy variable.

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 2012 and H1 2013. 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 3.2, while skewedness varied from -0.6 to 0.8, and standard deviation values were σ2=0.11 and/or σ1=0.06. 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 is reflected in the graph through "thicker" band concentrated above central "the deepest shade of red" band. 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.[8] 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 2012 and H1 2013



Source: CBCG, 2012

[7] 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 program is used to extract the elements of time series than cannot be directly extracted; those elements are extracted as a trend, season, cycle, and occurrence of Easter or Christmas effect, which allows a superior analysis and projection of ARIMA model. For more details see manual Tramo and Seats (Gómez and Maravall, 1996).

[8] The mode value (central projection) is, by construction, always in the deepest band shade, but in the 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)

The Fan Chart showing the inflation in Montenegro based on an ARIMA model assessment and Tramo/Seats simulation for 2012 and H1 2013 shows with 90% probability that the inflation, measured by CPI depending on month, will range between 2.0% and 4.6%. The 90% probability shows that the inflation will range from 2.9% to 4.3% at end-2012. 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 2012 and H1 2013:

1. Oil and oil derivative prices will not exceed 5% of the prices in May 2012;
2. Aluminium prices will not exceed more than 5% of the prices in May 2012
3. Real estate prices are stagnant relative to end of 2011;
4. Price of electricity growth does not exceed 5%;
5. Real wages in 2012 and 2013 are at the 2011 level;
6. There will be no significant increase in prices of food products in relation to March 2012;
7. There will be no significant increase in VAT or other taxes.

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

6. EXPECTED INFLATION IN 2012

Inflation rate is on an upward trend. The most significant growth was recorded in excise and food products. Still, annual inflation rate at Q1 2012 was at the inflation level in the EMU, yet a bit lower than in the EU. Core inflation[9] was by 1.6 pp. lower than total inflation in January.

Aggregate demand is increasing, which "pressures" the price growth, but recession in Europe has the adverse effect.

Inflatory expectations of both banks and corporate sector point to inflation growth. Most of surveyed banks expected inflation rate between 4% and 5%, while most of surveyed banks expected inflation rate between 3% and 4%.

Q1 2012 brought economic activity decline, which had adverse effect to inflation. Moreover, high fiscal deficit affected inflation negatively. CBCG expectations for 2012 are that economic activity will range between a low growth and a low decline. It is encouraging that most of surveyed entrepreneurs expected economic activity growth, as well as new investments dominantly into fixed assets.

Model-based assumption shows 90% probability that the CPI inflation in 2012 will range between 2.0% and 4.6%. The inflation at 2012 end is forecasted between 2.9% to 4.3%.

Taking into account insufficient reliability of statistical data, insufficiently long time series, and often the presence of one-off shocks, the CBCG complements the model assessment with the expert assessment on inflation. Our inflation forecast remained unchanged relative to forecast given in annual report and we expect the 2012 inflation to range between 2.50% and 5.0%.

Table 4 – Estimated inflation rate

Optimistic assessment	Realistic assessment	Pessimistic assessment
2.50%	3.75%	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.

[9] *Due to data availability, it was possible to calculate only annual base for January, and not for February and March 2012.*