

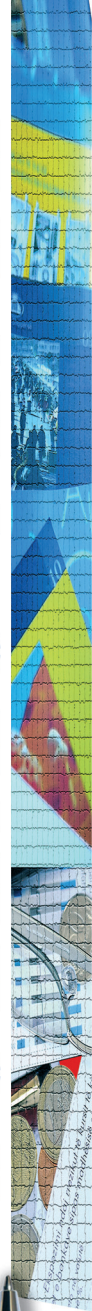
**ARE INFLATION
EXPECTATIONS IN
ALBANIA RATIONAL?
- EMPIRICAL EVIDENCE
FROM SURVEYS DATA -**

Merita Boka
Evelina Çeliku
Gent Hashorva

24 (63) 2016 WORKING PAPER



BANK OF ALBANIA



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Aknowlegments

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Note: *The views expressed in this working paper are those of the authors and do not necessarily reflect the views of the Bank of Albania.*

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ABSTRACT

The importance of inflation expectations for monetary policy requires an analysis of their nature: rational or adaptive? This is essential, especially in the inflation targeting regime, recently implemented by the Bank of Albania (BoA). In this paper, we explore inflation expectations obtained through surveys from BoA, over the period 2003 Q2 – 2015 Q1. Qualitative inflation expectations were quantified using different probabilistic approaches and balances, in addition to quantitative ones. Statistical analysis suggests that inflation expectations provide useful information about the direction of future inflationary pressures. Rationality tests confirm the mixed nature of inflation expectations, while at the beginning of 2009 they were assessed as fully-adaptive. Although expectations continue to be dominated by the adaptive component, several of them gained some rational properties over the years. Longer time series of expectations, improvements in the quantification process and higher transparency in the monetary policy communication have enhanced the rational component. In terms of the contribution from rational inflation expectations to the forecasting process, econometric results suggest for a higher value of the forward-looking inflation parameter in the respective equations of different models in use. Meanwhile, in the current model, the calibrated parameter is assumed at a minimal level.

Key words: Inflation expectations, monetary policy, quantification methods, accuracy, rationality, forecasting.

JEL Classification: E52, E31, D84, C82, C52, C12

I. INTRODUCTION

International experience and practice have shown that inflation expectations play an important role in the economy. Studies related to the nature of inflation expectations pay special attention to three key features they enfold: the forward-looking and rational nature, (firstly introduced by Muth, (1961); the anchoring level or the consistency with the inflation target of the central bank and a low sensitivity to short term inflation fluctuations; and the impact they have on current prices' dynamics.

For emerging and developing economies that still carries on important structural changes, such as the case of Albania, studying inflation expectations rationality becomes even more important. The way economic agents form their expectations can be modified according to structural changes in the overall economy (Tuđer & Kara, 2005; 2008).

Inflation expectations are considered to be an appropriate indicator of the degree of public confidence in the central bank, reliability of inflation targets and possibility for the responsible institution to attain them (tyziak, 2003, 2012, and 2014). Regarding central banking issues, inflation expectations make up a particularly important factor, especially for those who have adopted inflation targeting as a monetary policy strategy, which per se is a forward-looking strategy. According to Basdevant (2003) a proactive central bank should carefully monitor inflation expectations to assess whether economic agents' perceptions are in line with the primary objective of the monetary policy. If economic agents believe that the central bank will react to control inflation then inflation expectations are likely to be anchored to the target. Under these circumstances, prices and wages would tend to be in line with the targeted inflation rate and would be less vulnerable to temporary inflation fluctuations. This allows central banks to largely ignore short-term price fluctuations and adopt a medium-to long-term approach to control the inflation rate. Otherwise, if inflation expectations would not be consistent with the inflation target, maintaining price stability would be difficult. In this case, expectations for a higher inflation rate would likely be reflected in higher wages and prices, affecting

consumption and increasing inflationary pressures in the economy. Controlling inflation rate in such environment would require central banks to act more aggressively and convince economic agents of price stability. Furthermore, interest rates set or influenced by the monetary policy would have different impacts according to the economic agents' expectations on inflation developments.

In countries with high public debt, inflation expectations play an important role through its effects on public borrowing costs. The latter might compromise debt sustainability and affect other macroeconomic indicators such as the exchange rate and risk premiums, which, in turn, affect the inflation rate.

Inflation expectations represent also an important ingredient in the modelling and forecasting process.

Inflation expectations cannot be measured directly. They are considered as unobservable variables. Indirect methods are usually implemented for their assessment, with surveys of different economic agents (businesses, consumers, financial agents, etc.)¹ being the most widely used. However, the surveys method allows us to obtain information about agent's expectations on inflation but it doesn't mean that the formation of their expectations is economically correct (Ranchhod, 2003). Inflation expectations obtained through surveys may reflect various situations. According to Basdevant (2003), they might reflect more current and past economic conditions rather than being forward-looking, thus might not be forward-looking or be less rational. It might also happen that inflation expectations expressed by economic agents reflect current inflation condition. Thus, they are mostly affected by inflation rates at the moment the survey is carried out. The latter suggests that in the formation of inflation expectations, the factor which adjusts the expected values in view of the current ones is playing the most important role. In this case, the literature defines the inflation expectations as "adaptive".

¹ There are three methods broadly used, to obtain inflation expectations: (i) model based methods – determine inflation based on several variables including inflation expectations (using its past values as a proxy); (ii) indexed debt instruments – comparing them to nominal debt instruments to extract financial agents expectations over the maturation period of instrument; (iii) surveys.

For a long time economists have studied the behaviour of inflation expectations obtained via surveys. Do they represent the real value of agents' expectations and how useful are they in forecasting inflation? This is because inflation expectations obtained previously through surveys for a certain month might deviate from the official inflation rate of the respective month (Bryan & Venkatu, 2001). Empirical studies have shown that the data obtained from surveys may reflect more current and past values of inflation rather than predict its future values (Chadwick & Dickens, 2002; Ranchhod, 2003). However, even when the obtained inflation expectations are strongly correlated to its current and past values, this does not exclude the possibility that they might be forward looking at some extent. In the case of New Zealand, the findings of Basdevant (2003) highlight that inflation expectations in this country are the result of the combination between forward-looking behaviour and past developments of inflation. Also, the way economic agents form their inflation expectations may change over time and their expectations can become increasingly rational². The above mentioned findings of this author will serve as key hypotheses for examining the behaviour of inflation expectations in the case of Albania.

The rest of this paper will be structured as follows: after the brief introduction section, the presentation of the data set, quantification methodology and some stylized facts on the data will follow in the second section. The third section contains an analysis of inflation expectations accuracy. Empirical findings on the rationality of inflation expectations will be presented in the fourth section. In the fifth section we will try to assess the usefulness of inflation expectations to the inflation forecasting process. Conclusions and recommendations will be presented in the last section of the study.

² *The theory on inflation expectations suggests that the observed subjects use all the available information in the moment they form their expectations including here information rated to actual and future decisions of policy makers.*

II. INFLATION EXPECTATIONS VERSUS PAST, ACTUAL AND FUTURE INFLATION

II.1. DATABASE AND QUANTIFICATION OF QUALITATIVE DATA

The database in this study consists of inflation expectations derived from three surveys carried out for several years by the Bank of Albania. Specifically, analysed inflation expectations are obtained from: (i) financial agents' survey³, (ii) consumer confidence survey and, (iii) businesses confidence survey⁴. The quantification of qualitative inflation and producer prices expectations obtained through surveys represents an essential step in proceeding with the examination of their behaviour. The newness of this study in the context of quantifying qualitative data can be summarized as: the use of qualitative data from consumers' expectations on inflation rate after one quarter and after one year; the use of qualitative data on businesses expectations on producer prices one quarter ahead for three sectors of the economy (industry, construction and services); and the building of a full dataset with quantitative data on inflation expectations until 2015 Q1. For the first time, in the rationality analysis of inflation expectations, in addition to the time series obtained after quantifying qualitative data, we will use the direct quantitative inflation assessments from consumers, businesses and financial agents.

In the quantification process of qualitative answers from consumers and businesses into quantitative indicators of inflation and producer prices expectations we will use the probability distribution approach initially proposed by Theil (1952), further modified by Carlson & Parkin (1975) and used by Batchelor & Orr (1988), Sabrowvski (2008), Nasto (2005), Lyziak (2003, 2012), Hashorva, et.al. (2010). In the case of Albania, initially Nasto (2005) and later Hashorva et. al. (2010), calculated the expected inflation for one quarter ahead, using qualitative data from the Consumers Confidence Survey over the period Q2 2003 - Q3 2009. They

³ All the data from this survey are used in the Bank of Albania and are confidential (not publicly released). In this case we use them only for studying purposes.

⁴ In Annexes 1 and 2 we present some of the most important features of the surveys considered in this study.

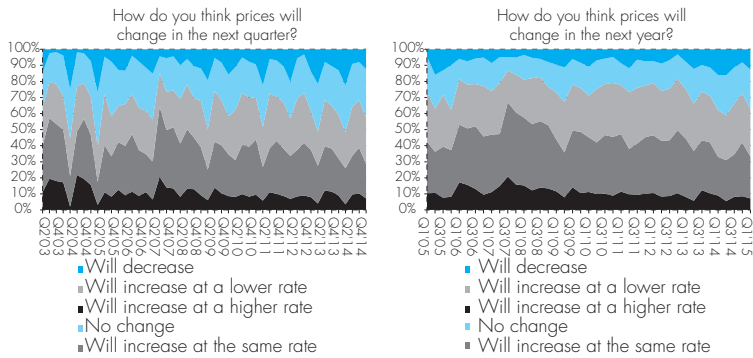
found that Albanian consumer inflation expectations were strongly adaptive. Thus, if inflation rate increases, consumers expect an even greater increase of inflation in the subsequent period. In this study the quantification of qualitative data to quantitative ones will be realized assuming the normal⁵ and uniform⁶ distribution functions (the second one to smooth upward and downward peaks). Also, results obtained by using balances as an alternative quantification method of qualitative data will be presented.

In Chart 1, the feature and main trends of consumer inflation expectations might be observed for one quarter and one year ahead. In general, the frequency distribution of consumer responses according to five alternatives, suggests for a seasonal behaviour of inflation expectations especially in the summer time. It coincides with the higher supply due to domestic agro-cultural products in the market and in this case there is an increase in the number of consumers reporting "prices will fall". Meanwhile, during the New Year's Eve periods, the opposite is true, and a higher number of consumers reporting "prices will increase" might be observed. These two characteristics suggest that somehow consumers have been able to capture some cyclical short-term events in price developments.

⁵ The usage of the normal distribution function in the quantification method to describe consumer inflation and businesses expectations is based on the high number of observations (Central Limit Theorem): 1200 consumers and about 700 businesses (till the year 2012), 800 businesses (from 2013). According to the modified method of Carlson and Parkin (1975), if the number of surveyed unities is sufficiently high, the expected change in prices follows a normal distribution function in the population.

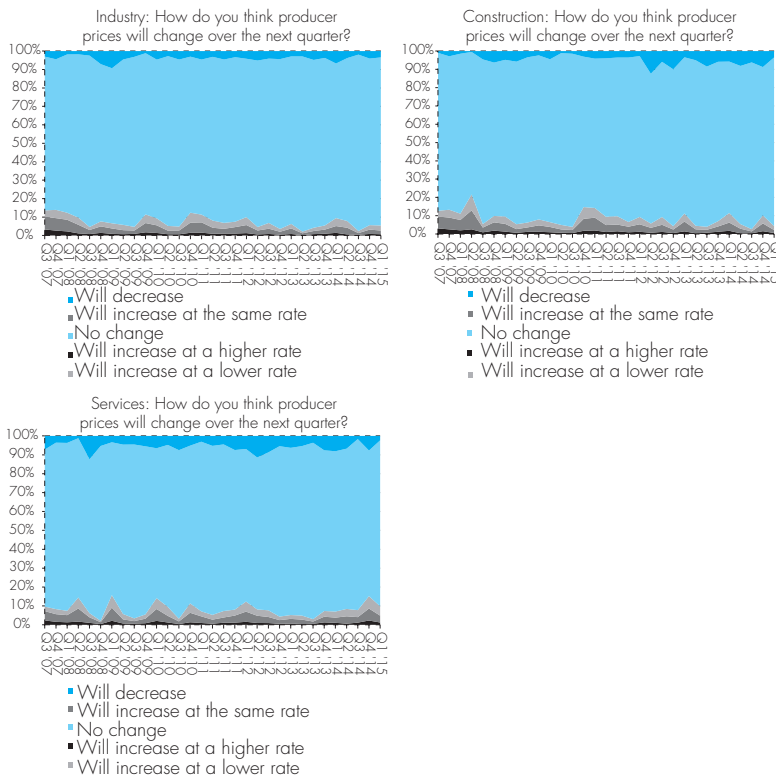
⁶ In this case, we will change the hypothesis on the distribution function of consumers and businesses answers from normal to uniform one applying the same method used by Pesaran (1987) and tyziak (2003).

Chart 1. Trend of consumer responses



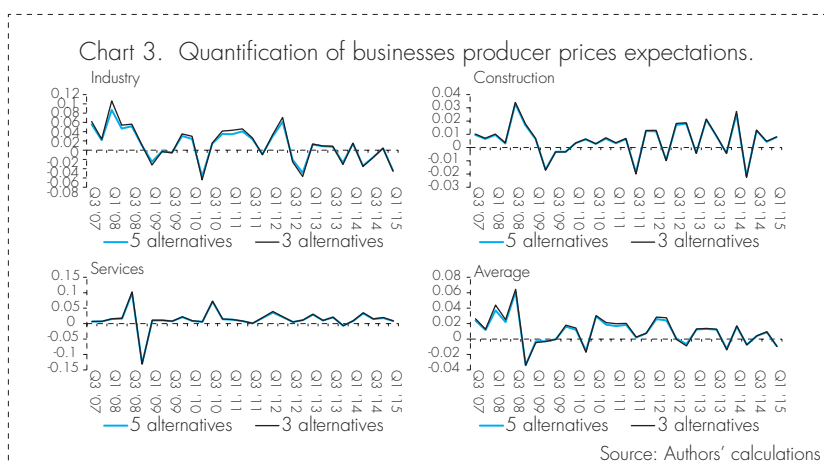
Source: Consumer Confidence Survey, Bank of Albania.

Chart 2. Trend of businesses responses



Source: Consumer Confidence Survey, Bank of Albania.

In the case of businesses, the question regarding the expectations on producer prices (one quarter ahead), has three alternative answers (Chart 2). In the quantification process two alternatives have been used: (i) the probability method for questions with three alternative answers as in Sabrowski (2008), (ii) the probability method with five alternative questions. In the second case, the percentage of responses on future producer prices development categorized as "will increase" was distributed in three alternatives: "will increase at a higher rate", "will increase at the same rate", and "will increase at a slower rate" using weights from the consumers' expectations for one quarter ahead. The results obtained using both quantification approaches for producer prices in the three sectors of the economy brought almost identical results (Chart 3). As a result, in the following analysis on the rationality, we will take into consideration the second method (the time series obtained by using five alternatives).



The quantification process of inflation and producer prices expectations using the probability approach (with normal and uniform distribution functions) requires the usage of a reference series. In the case of consumers the reference series is perceived realized inflation rate and in the case of businesses is perceived realized producer prices. In the case of consumers inflation expectations one quarter and one year ahead we will use as perceived realized inflation rate the average inflation rate (quarterly

changes and yearly changes) released for the last two months at the moment when consumers express their qualitative assessments on future prices developments⁷. In quantifying producer prices developments from businesses in the industrial sector we have used as perceived realized series the Producer Prices Index (at quarterly frequency), PPI (INSTAT)⁸. In quantifying expectations on producer prices in the construction sector, we used as perceived realized series the Construction Cost Index, (at quarterly frequency), CCI (INSTAT)⁹. In the services sector, we use the data from Consumer Price Index (CPI) for the services (INSTAT and authors' calculations). The same as in the consumers' case, we will use average quarterly changes of services sector CPI released in the last two months prior the moment they give their assessments on future development of producer prices in the services sector.

In cases when the official inflation rate is used as a perceived realized inflation rate - in our case the average inflation rate released for the last two months before inflation expectations are expressed - the quantified inflation expectations are described as 'objectified' (since it is supposed that the surveyed entities perceive the current prices dynamics correctly) (Berk, 1997; Lyziak, 2005; Kokoszczyński, Lyziak & Stanisławska, 2005). In cases when an indicator of inflation expectations derived from surveys is used as a perceived realized rate, the quantified inflation expectations are described as 'subjectified' (Kokoszczyński, Lyziak & Stanisławska 2010). In this study, all inflation expectations obtained through the quantification process are described as "objectified", since all reference series or perceived ones are derived from real indicators and not from surveys.

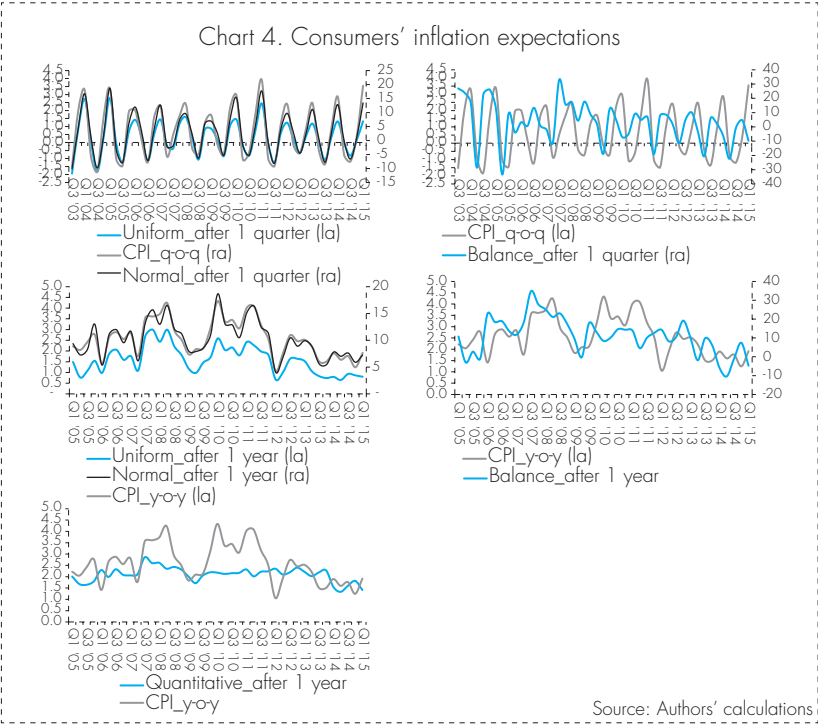
⁷ In the case of consumers and business confidence surveys, questionnaires are distributed during the last month of each quarter and the interviewing process ends at the end of the respective quarter (ex. for the first quarter of the year, questionnaires are distributed at the beginning of march and the interviewing process ends at the end of the month). Thus, at the time economic agents report their expectations they have available only the release inflation rate for the first two months of each quarter. Assuming that they efficiently use the available information on this indicator we consider the average inflation rate for these two months as the perceived realized inflation rate.

⁸ INSTAT releases data on producer price index with a lag of one quarter (ex. producer price index for the first quarter are released at the end of the second quarter). That's why, we use as a realized perceived rate for producer prices (quarterly changes) the latest released data at the moment the survey is realized (ex. for the second quarter of 2014 survey, business have information on producer prices regarding the first quarter of 2014).

⁹ The same reasoning as in footnote 8 are applied here.

II.2 STYLIZED FACTS ON THE DATA: FORWARD-LOOKING OR ADAPTIVE?

This section will present some stylized facts on inflation expectations series for all economic agents. The set of Chart 4 and Table 1 display the results and some descriptive statistic indicators of the quantified consumers' inflation expectations (using the normal and uniform distribution functions and balances) and the quantitative ones against current values of reference series.



The performance of the annual inflation rate over the past ten years is characterized by a relative stability. Under the regimes of monetary targeting and inflation targeting the inflation rate was stabilized around the Bank of Albania's objective, with small fluctuations above and below it. At first glance, inflation expectations after one quarter obtained through the quantification of qualitative data assuming a normal and uniform distribution seem to be

broadly synchronized. Point values seem to increase and decrease simultaneously, thus moved in the same direction in the same time, despite showing significant amplitude between them. The data suggest that the consumer expectations usually tend to follow the current rate of inflation at the time they give their assessments. This becomes particularly evident in the case we use the uniform distribution function in quantifying process. In this case, inflation expectations one quarter ahead almost overlap the realized inflation rate for the period that consumers express their expectations. The quantified inflation expectations by using balances show that in some cases consumers tend to anticipate the direction of future inflation developments. With regard to inflation expectations one year ahead, consumer have underestimated (the period Q3 '07 - Q3 '08) or overestimated (the period Q4 '08 - Q4 '09) inflation figures in average terms. Obviously consumers, despite their partial rational judgment, have not been able to predict one year before shocks, surprises or one-off events in inflation. The coefficient of variance suggests that the most representative average inflation rate is the inflation rate for one year ahead, where the quantitative assessment presents the lowest fluctuations around the mean.

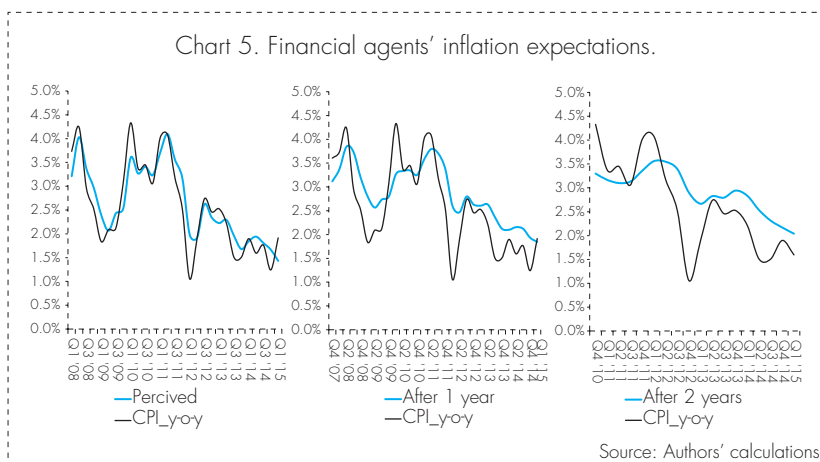
Table 1. General characteristics of consumer expectations

	CONSUMERS							CPI	
	Qualitative, quantified						Quantitative		
	After one quarter			After one year			After 1 year		
	Normal	Uni-form	Bal-ance	Normal	Uni-form	Bal-ance	Point values	Q-o-Q	Y-o-Y
Average	2.90	0.33	2.86	8.77	1.57	11.05	2.10	0.66	2.58
Standard deviation	7.55	1.07	14.17	5.12	0.68	9.58	0.32	1.62	0.84
Coeff. of variance*	2.60	3.28	4.96	0.58	0.43	0.87	0.15	2.44	0.33
Min	-10.15	-1.94	-33.42	0.65	0.65	-10.40	1.33	-1.81	1.06
Max	18.63	2.79	32.82	18.66	3.00	34.83	2.86	3.90	4.33
Max:Min	28.78	4.73	66.24	18.01	2.35	45.23	1.52	5.71	3.28
No of observations	48	48	48	41	41	41	41	48	41

Source: Authors' calculations.

* Ratio of standard deviation to the simple average.

The perceived inflation rate of financial agents seems to follow closely the current inflation rate developments suggesting for a strong adaptive element (Charts 5). A different situation seems for inflation expectations after one and two years. Over the period Q4'09 - Q3'11, inflation expectations of financial agents remain below the published inflation rate.



From the last quarter of 2011, financial agents' inflation expectations constantly stay above the official rate (Table 2). The same reasoning goes for inflationary expectations after two years. Despite the inflation expectations series being too short, it is clear that financial agents tend to overestimate inflation rate in the two-year horizon.

Table 2. General characteristics' of financial agent's inflation expectations.

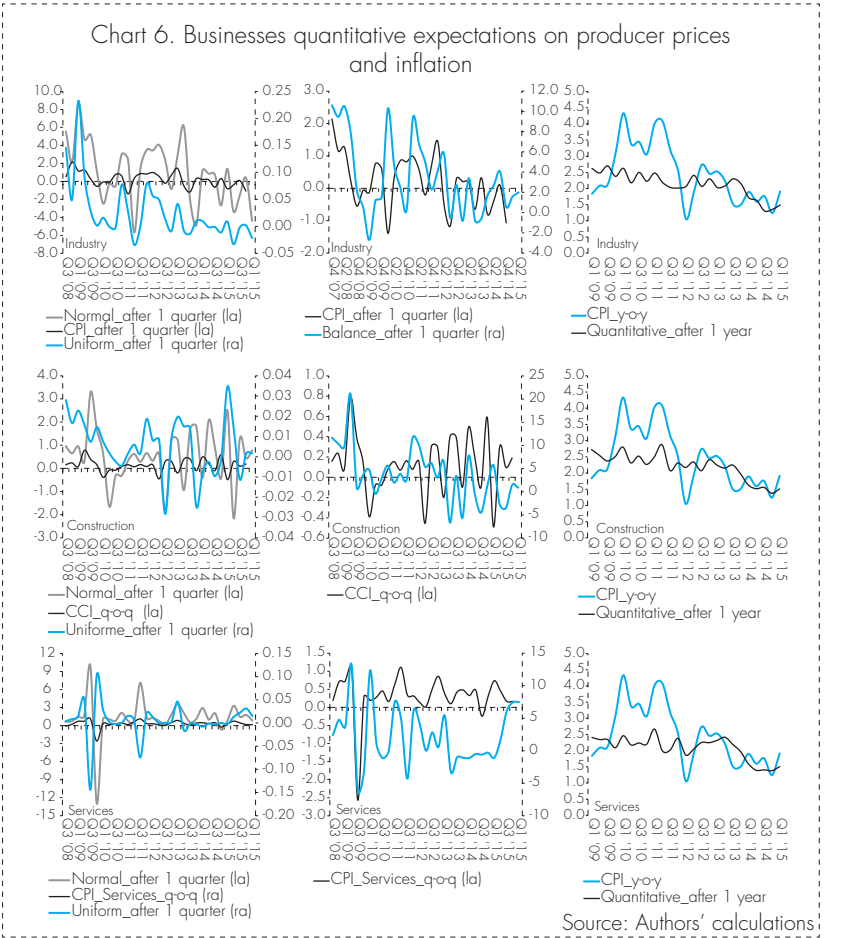
	FINANCIAL AGENTS			Annual Inflation (Y-o-Y CPI)		
	Perceived	Quantitative After 1 year	After 2 years	Q1'08-Q2'14	Q4'07-Q2'14	Q1'10-Q2'14
Average	2.647	2.873	2.850	2.583	2.617	2.492
Standard deviation	0.764	0.580	0.442	0.918	0.921	0.969
Coeff. of variance*	0.289	0.202	0.155	0.355	0.352	0.389
Min	1.432	1.844	2.039	1.055	1.055	1.055
Max	4.098	3.843	3.559	4.331	4.331	4.331
Max-Min	2.666	1.999	1.521	3.276	3.276	3.276
No of observations	29	30	21	29	30	21

Source: Authors' calculations

* Ratio of standard deviation to the simple average.

Businesses expectations on producer prices one quarter ahead for the three sectors of the economy are presented in the set of Charts no.6 respectively against: quarterly changes of PPI for industry; quarterly changes of CPI of services for services sector; and quarterly changes of CCI for construction. Inflation businesses

expectations after 12 months (quantitative data) are presented graphically against year-on-year changes of total quarterly CPI. At a glance, we cannot draw any conclusions on businesses expectations since in some cases they follow the inflation developments already materialized, and in others seem to anticipate future developments.



According to the quantification through normal distribution for the three sectors of the economy, businesses tend to overestimate producer prices as compared to the respective realized values (Table 3). When the uniform distribution function is assumed, the opposite

can be noticed: frequent underestimation of the developments in the reference indicators. Despite being relatively far from realized values for each sector of the economy, expectations expressed by businesses somehow tend to provide useful directional information for the future changes. Expectations regarding inflation one year ahead, in all economic sectors under consideration, seem to have identified mostly the direction of future changes in the inflation rate.

Table 3. Inflation expectations general characteristics, businesses.

INDUSTRY						
	Qualitative			Quantitative	PPI	CPI
	After 1 quarter			After 1 year		
	Normal	Uniform	Balance	Point Values	Q-o-Q	Y-o-Y
Average	1.05	0.03	3.49	2.13	0.13	2.46
Standard Deviation	3.35	0.05	3.66	0.38	0.28	0.89
Coeff. of variance	3.19	2.09	1.05	0.18	2.23	0.36
Min	-5.68	-0.03	-2.70	1.31	-0.49	1.06
Max	8.68	0.23	10.60	2.70	0.79	4.33
Max/Min	14.37	0.27	13.30	1.40	1.27	3.28
Nr. observations	31	31	31	25	31	25
CONSTRUCTION						
	Qualitative			Quantitative	CCI	CPI
	After 1 quarter			After 1 year		
	Normal	Uniform	Balance	Point Values	Q-o-Q	Y-o-Y
Average	0.56	0.01	3.82	2.20	0.13	2.46
Standard Deviation	1.19	0.01	5.74	0.40	0.28	0.89
Coeff. of variance	2.14	2.38	1.50	0.18	2.23	0.36
Min	-2.16	-0.03	-6.67	1.38	-0.49	1.06
Max	3.31	0.03	21.13	2.87	0.79	4.33
Max/Min	5.47	0.06	27.79	1.50	1.27	3.28
Nr. observations	31.0	31.0	31.0	25.0	31.0	25.0
SERVICES						
	Qualitative			Quantitative	CPI_Services	CPI
	After 1 quarter			After 1 year		
	Normal	Uniform	Balance	Point Values	Q-o-Q	Y-o-Y
Average	1.33	0.00	2.19	2.07	0.30	2.46
Standard Deviation	3.28	0.04	4.51	0.36	0.61	0.89
Coeff. of variance	2.47	8.23	2.06	0.17	2.04	0.36
Min	-12.95	-0.14	-6.19	1.38	-2.57	1.06
Max	9.84	0.10	13.25	2.67	1.12	4.33
Max/Min	22.79	0.25	19.44	1.29	3.69	3.28
Nr. observations	31	31	31	25	31	25

Source: Authors' calculations.

In order to check whether inflation expectations reflect more past and current developments or they can anticipate future ones, the literature suggests analysing the results of simple correlations between expectations and reference published series. Thus, to have information on whether inflation and producer prices expectations reflect past developments of each series respectively, we consider correlation with four lags in the past. To check whether they can

anticipate future inflation and producer prices developments, we consider correlations up to four quarters ahead. In the following tables (4, 5 and 6) increasing shades of colours indicate higher correlations between expectations and reference series.

Surveys' expectations indicate a weak correlation at a four quarters horizon. Expectations seem to be more correlated with the published inflation at the time the survey is carried out and with the past inflation rates.

Table 4. Correlations between inflation expectations from surveys and published inflation rate.

Type	CONSUMERS						
	Qualitative						Quantitative
Horizon	After 1 quarter			After 1 year			After 1 year
lag/lead	Normal	Uniform	Balance	Normal	Uniform	Balance	Point Value
-4	0.894	0.904	0.091	-0.057	0.003	0.135	0.206
-3	-0.005	-0.003	0.594	0.125	0.167	0.228	0.303
-2	-0.916	-0.908	-0.030	0.276	0.360	0.368	0.425
-1	-0.025	-0.039	-0.642	0.470	0.531	0.406	0.477
0	0.999	0.985	0.132	0.989	0.937	0.395	0.458
1	-0.039	-0.019	0.603	0.520	0.619	0.546	0.468
2	-0.918	-0.917	-0.029	0.324	0.410	0.483	0.345
3	0.007	-0.006	-0.681	0.150	0.232	0.300	0.120
4	0.901	0.885	0.045	-0.004	0.003	0.083	-0.118

Source: Authors' calculations

Table 5. Correlations between prices' expectations and published PPI / inflation.

Type Horizon Lag/Lead	BUSINESSES											
	Industry			Construction			Services					
	Qualitative		Quantitative	Qualitative		Quantitative	Qualitative		Quantitative			Quantitative
	Normal	Uniform	Balance	Normal	Uniform	Balance	Normal	Uniform	Balance	Normal	Uniform	Balance
-4	0.29	0.37	0.02	0.17	0.298	0.29	-0.09	-0.04	-0.02	0.06	0.06	0.09
-3	0.01	0.05	-0.02	0.22	0.06	0.19	0.07	-0.10	0.08	0.09	0.09	-0.03
-2	0.36	0.40	0.44	0.18	-0.16	0.17	0.00	-0.09	0.02	0.09	0.09	0.00
-1	0.98	0.75	0.56	0.28	0.999	0.289	-0.07	-0.06	-0.05	-0.36	-0.16	-0.16
0	0.28	0.47	0.53	0.25	-0.22	-0.10	-0.26	0.936	-0.59	0.11	-0.02	-0.02
1	0.08	0.35	0.38	0.25	0.05	0.00	-0.05	-0.41	0.659	0.432	0.08	0.08
2	0.15	0.20	0.12	0.22	0.08	0.21	-0.05	-0.02	-0.22	-0.37	0.01	0.01
3	0.11	0.12	0.24	0.39	-0.31	0.11	-0.22	-0.06	0.00	-0.05	0.00	0.00
4	0.18	0.12	0.27	0.40	-0.01	-0.19	0.08	-0.03	0.04	-0.14	0.394	0.394

Source: Authors' calculations

Table 6. Correlation between inflation expectations and official series of inflation.

FINANCIAL AGENTS				
Quantitative	Perceived		After 1 year	
Horizon	Point Value		Point Value	
Lag/lead				
-4	0.245		0.387	0.241
-3	0.426		0.562	0.487
-2	0.640		0.750	0.698
-1	0.880		0.905	0.824
0	0.912		0.838	0.771
1	0.575		0.538	0.492
2	0.321		0.279	0.235
3	0.098		0.130	0.139
4	0.123		0.134	0.261

Source: Authors' calculations

What emerges from the correlation analysis presented above is that inflation and producer prices expectations contain a strong adaptive element to past developments of the reference series. However, it is not excluded the presence of an anticipating short term component (1-2 quarters).

III. ANALYSING ACCURACY OF INFLATION EXPECTATIONS FROM DIFFERENT ECONOMIC AGENTS

In addition to the identification of the relationship between inflation expectations from surveys and the published inflation rates, we note the assessment of the accuracy with which the expectations obtained from surveys predict the future inflation rates. The accuracy of expectations obtained through surveys reveals the existence or not of consistent errors between published inflation rates and expected and reported ones from various agents. Depending on the deviations sign, we judge whether expectations obtained through surveys under or over-estimate the realized inflation rate. One of the broadly used statistics for this purpose is the Mean Error (ME), calculated by the formula (1):

$$ME = \frac{1}{T} \sum_{t=1}^T (A_t - F_t) \quad (1)$$

Where: T - number of observations; t - the period for which agents assess the inflation expectations; A - the realized inflation rate (inflation published for the period t); F – expected inflation rate for the period t and observed before this period. The evaluation of errors based on the above indicator will depend on the sign. A positive ME indicates that the survey tends to predict lower inflation rates than the published ones, while a negative value of ME, signals that the survey data over-estimate the official inflation rates, in average terms.

The magnitude of errors is another important indicator of the accuracy from survey data. Inflation expectations could result as an unbiased estimator of real/published inflation rates, but not a good predictor of future inflation rates. To calculate the size of error or the accuracy level quantitatively and to make the comparisons among different versions of inflation expectations measurements, it is usually used the statistics called Root Means Square Error (RMSE). It is calculated by the following formula (2):

$$RMSE = \sqrt{\left(\frac{1}{T} \sum_{t=1}^T (A_t - F_t)^2\right)} \quad (2)$$

In this study we consider another approach to analyse the performance of inflation expectations. The predictive performance of survey data will be compared with the “naive” prediction (so-called because of its simplicity)¹⁰. For this purpose we use the statistics Theil Inequality Coefficient (TIC), calculated as follows:

$$TIC = \frac{\sqrt{\left(\frac{1}{T} \sum_{t=1}^T (A_t - F_t)^2\right)}}{\sqrt{\left(\frac{1}{T} \sum_{t=1}^T (A_t - A_{t-1})^2\right)}} \quad (3)$$

TIC compares the size of prediction error from surveys results with forecasting errors by the “naive” method. If this coefficient is less than 1, then we can say that the prediction, based on survey data, is more accurate than the one based on the “naive” prediction.

The accuracy analysis of inflation expectations will include all results from surveys according to different economic agents, quantifications’ approaches and the direct quantitative method. Inflation expectations obtained from surveys of different groups of agents vary among them in terms of frequency, type of data, number of observations and data coverage of interest groups¹¹. In a first step we study the accuracy of inflation expectations from surveys within each group of economic agents. Next, we study some of the accuracy indicators between different interest groups for each survey. Carlson & Valev (1999) highlighted that the data from surveys of business (manufacturing, construction and services) and from financial agents experience smaller errors, resulting in more accurate predictions than those of consumers. Due to their everyday work, businesses in general and financial agents in particular, tend to be updated with the latest economic developments and they may

¹⁰ “Naive” forecasts consider that the expected value is equal to the official/published inflation of the previous period.

¹¹ For detailed information see Annex 2

have specific knowledge in specific areas of business and finance. This knowledge helps them to form even more accurate predictions for future inflation developments.

CONSUMER CONFIDENCE SURVEY

The accuracy indicators calculated for each of consumers' expectations show that the quantitative questions related to the inflation rate after one year is the most accurate one. The mean error for all the economic agents' expectations series turns out to be 0.5 p.p.¹². In addition, expectations from the survey data provide a more accurate prediction of inflation than the "naive" prediction method¹³. Somehow, that was an expected result since quantitative expectations (point estimations) are usually affected by the available information on the targeted rate from the Bank of Albania or historic values of inflation.

In line with the purpose of this study, it would be interesting to consider and analyse the accuracy of consumers' inflation expectation derived from qualitative data quantified using the probability approach. That is because quantified consumer inflation expectations have been built upon the realized inflation rates (perceived inflation rates or information available at the moment the survey has been carried out). Empirical results on qualitative quantified series in terms of accuracy indicate that expectations that are built assuming a uniform distribution function are more accurate, for inflation expectations one quarter ahead and after one year. In both cases, this quantification method presents the smallest ME and RMSE as compared to the other two quantifications methods. Another important result is that that in both cases of quantified consumer inflation expectations assuming a normal and uniform distribution function the TIC indicator turns less than one. This result suggests that only in these two cases we obtain more accurate predictions than those obtained with the "naive" one.

¹² The expected inflation rate after 1 year systematically overestimates the realized inflation rate by 0.5 p.p.

¹³ TIC value is the lowest one pointing to 0.63.

Table 7. Accuracy indicators of consumer inflation expectations.

CONSUMERS							
	Qualitative						Quantitative
	After 1 quarter			After 1 year			After 1 year
	Measurement method						
Accuracy Indicators	Normal	Uniform	Balance	Normal	Uniform	Balance	Point est.
ME	-2.23	0.37	-3.13	-8.21	0.9	-10.61	0.51
RMSE	8.60	2.23	13.74	8.74	1.7	14.78	1.25
TIC	3.70	0.96	5.90	7.33	0.86	8.0	0.63

Source: Authors' calculations

BUSINESS CONFIDENCE SURVEY

The accuracy analysis of businesses expectations regarding producer prices and inflation was realized on a sectorial basis. That is because, for each of the sectors of the economy quantitative producer prices series have been built using a different perceived rate, the most appropriate for each sector of the economy. In the services sector, producer prices expectations have been built using quarterly changes of producer prices index; in the services sector, the expected producer prices have been built using quarterly changes of services consumer price index; and in the construction sector we have used the quarterly changes of the construction cost index. Also, it should be noted that indicators of accuracy in this survey are calculated based on shorter time series compared to the consumers' accuracy indicators.

Table 8. Accuracy indicators of businesses expectations on producer prices and inflation.

Businesses	Industry				Construction				Services			
	Qualitative			Quant.	Qualitative			Quant.	Qualitative			Quant.
	After 1 quarter			After year	After 1 quarter			After year	After 1 quarter			After year
Accuracy Indicators	Norm.	Unif.	Balan.	Point est.	Norm	Unif.	Balan.	Point est.	Norm	Unif.	Balan.	Point est.
ME	-1.24	0.30	-3.72	0.33	-0.5	0.12	0.29	0.23	-0.94	0.30	0.30	0.39
RMSE	3.58	0.80	5.3	0.92	1.28	0.32	0.83	0.91	3.91	0.68	0.68	1.04
TIC	3.78	0.85	5.70	0.71	2.77	0.70	0.49	0.71	4.05	0.71	0.41	0.85

Source: Authors' calculations.

The accuracy indicators for industry sector confirm again that the best results are obtained from the uniform distribution approach

(Table 8). In general, the quantified expectations present better accuracy indicators compared to those of direct quantitative expectations. Uniform quantified expectations and quantitative ones yield better results than the “naive”, referring to the results of TIC below 1.

In the construction sector, quantified expectations obtained through uniform distribution function also bring the best results in terms of accuracy (Table 8). An interesting feature in the accuracy indicators for this sector is that quantified expectations using uniform approach and net balances bring better results and more accurate ones compared to the “naive” ones.

In the services sectors (Table 8), accuracy indicators show that the quantified expectations by the uniform distribution function and balances are almost equally accurate. Nevertheless the latter one yields the lowest value for TIC indicator. Overall the businesses’ expectations obtained from two of the quantified methods (uniform distribution, original balance) and direct quantitative expectations are more accurate than the “naive” ones. This result is a logical one, because the businesses are more informed and updated on present and future economic developments, providing more accurate expectations on consumer and production prices fluctuations.

FINANCIAL AGENTS’ SURVEY

In the financial agents survey the analysis is based only on quantitative data series regarding the perceived inflation rate, inflation rate expectations after one and two years (Table 9).

Table 9. Accuracy indicators of financial agents’ expectations.

Type	FINANCIAL AGENTS		
	Quantitative – Direct method		
Time horizon	Perceived	After 12 months (1 year)	After 24 months (2 years)
Indices of accuracy	Point estimation	Point estimation	Point estimation
ME	-0.36	-0.54	1.45
RMSE	1.19	1.16	1.70
TIC	0.90	0.87	0.74

Source: Authors’ calculations

The accuracy indicators show for relatively accurate inflation expectations provided by the financial agents. Inflation expectations

related to the inflation after two years resulted less accurate than those of after one year, but both remain more accurate than the "naive" one.

Overall, inflation expectations derived from the surveys under consideration tend to be more accurate when obtained through direct quantitative questions. In the case of qualitative inflation expectations derived indirectly using the probability quantification approaches, yield better results when a uniform distribution function is assumed. This result relates particularly to the consumers, where the questions are focused on the headline inflation rates¹⁴. Expectations obtained assuming a normal distribution function and those obtained through balances present lower accuracy results. Consumers and businesses both tend to underestimate in average inflation rate after one year; financial agents overestimate in average at the same size as consumers underestimate inflation rate after one year.

¹⁴ For total inflation, the Bank of Albania has a quantitatively defined target. In the other cases (businesses), the quantified methods are applied on the questions regarding production prices (production costs assessments).

IV. TESTING INFLATION EXPECTATIONS RATIONALITY

The debate on whether market agents form their expectations about future economic developments in a rational way determined the necessity for testing the rationality hypothesis. This is critical for designing and implementing macroeconomic policies which in their turn are based on macroeconomic assessments and projections. Empirical tests of many macro-theoretic models require not only the identification of directly observable phenomena, such as inflation, unemployment and GDP, but also of these indicators; expectations. Given that inflation expectations series is not directly observable, it makes the empirical testing of macro-models which include inflation as a forward-looking variable or its expectation series¹⁵ difficult. Therefore, the involvement or not in the current models of inflation expectations, accounting for their forward-looking power, requires first of all a check of their nature. Are they or not in line with rationality criteria? If yes, how rational are they?

The hypothesis of rational inflation expectations was handled for the first time by Muth (1961). It considers that expectations about future inflation are formed in a manner that fully reflects all relevant and available information for the recent past, current and future of the main economic variables. This means that the published inflation differs from the expected one only by a random error.

Statistical results presented in the previous sections help in conducting a general assessment, regarding the nature of inflation expectations according different market agents and horizons of expectations. Part of the results signals for the non-rational nature of expectations in the medium-term horizon. Meanwhile, the expectations for the short-term are assessed to be formed partly in adaptive and partly in a rational way. Their partial rationality

¹⁵ GAP model (Philips – Curve Block), includes this variable, but not as a pure expectations series, but as the value of the published inflation itself of the next quarter. So, it is inflation itself, shifting the series by the future values. This is a criticized choice, but it is applied this way, because at the time of construction of the model the quantitative inflation expectations series have been quite short and an assessment of their degree of rationality has been impossible.

nature is underlined by the anticipation of the direction of CPI or PPI quarterly changes, accordingly. From the quantitative point of view, the quantified expectations differ considerably from the published inflation values, according to the used quantified methods. The accuracy results for inflation expectations indicate that beside the quantification approach by the uniform distribution function, the direct quantitative measures have also yielded good results in terms of accuracy. The obtained results confirm those achieved initially by Nasto (2005) despite being obtained in shorter and limited time series of inflation expectations.

In reliance on this analysis, the empirical results of rationality tests (Muth, 1961; Mankiw et. al., 2003; Sabrowski, 2008), will help us to explain the mixed picture of the rationality expectations for prices in the economy.

The simplest test of rationality is done by the following linear regression:

$$EE_t = (\pi_t - \pi_{t-k}^e) = \alpha + \varepsilon_t \quad (1)$$

Where, EE_t represents the expectation error series for $t=1, \dots, T$ quarters. It is measured as a difference between published inflation of period t , (π_t) , and expected inflation for the same period, but reported k periods before (π_{t-k}^e) . After testing procedure, the constant α must be insignificant or, in average terms. In this case the rationality hypothesis is not rejected, or rationality accepted. Once this result is achieved, we can conclude that inflation expectations (at $t-k$) are unbiased estimates of published/observed inflation over the period under review. The deviation series is a random variable following a normal distribution $\varepsilon \sim N(0, \sigma)$.

Test results on expectations for CPI or PPI's changes, according to different agents and time horizons, are presented in Table 10, column 2. The expectations for price changes in the economy are significantly unbiased in about 44% of the approaches. This test indicates that rationality is present in 57% of very short-term horizons (perceived inflation and the expected one for the next quarter). Among the short term horizons expectations, the most

frequent approach, resulted unbiased or most rational, is that of quantification by the uniform distribution function. The rationality feature according to this test for the short-term horizons, (after 4 quarters/12 months) is fulfilled only by quantitative expectations of businesses for all of three observed sectors. The rationality is rejected for consumers and financial agents' expectations "after - one year" horizon.

We emphasize that the results for longer time horizons should be carefully considered because, by increasing the expectations' horizons, the number of observations will be reduced and the risks related to "small sample size effect" would appear (Andersson et. al, 2007). Moreover, in the case of BoA's inflationary expectations surveys, the longer time horizons expectations series (after one and two years) are newer than the short-term ones.

The degree of inflation expectations rationality can be verified by testing the joint hypothesis for the parameters of equation (2), conditioning them by certain values. This is a more elaborate presentation of rationality test.

$$\pi_t = \alpha + \beta \pi_{t-k}^e + \varepsilon_t \quad (2)$$

If the expectations for future prices' fluctuations in the economy are rational, then according to (2) the estimated parameters must be: $\alpha=0$ and $\beta=1$. The first condition indicates that inflation does not deviate systematically and significantly from the expectations in average terms; the second one indicates that for any change (increase / decrease) by one unit in expected prices for period t (taken at $t-k$ moment), the published inflation at period t , will increase/decrease by one unit. This means that changes around value "1" for this parameter must be random, indicating that the relationship between expectations for the coming quarters and the published inflation for corresponding quarters is in the same direction and almost perfect.

If from both sides of expression (2), we subtract the equation will be rewritten as (3.1 and 3.2):

$$\pi_t - \pi_{tk}^e = \alpha + \beta \pi_{tk}^e - \pi_{tk}^e + \varepsilon_t \quad (3.1)$$

$$\pi_t - \pi_{tk}^e = \alpha + (\beta - 1) \pi_{tk}^e + \varepsilon_t \quad (3.2)$$

Based on the equation 3.1 and 3.2, we can analyse whether expectations formed by market agents include the information on the expectations error. If the expectations are rational, the two parameters in equation (3.1) would be $\alpha = \beta = 0$, showing the fact that they are significantly irrelevant to explain the expectations' errors. In the case of the equation (3.2), the joint hypothesis must be: $\alpha = 0$ and $\beta = 1$. Thus, we test for statistical insignificance of the constant and expectations terms, indicating that expectations' errors are randomly distributed as $\varepsilon_t \sim N(0, \sigma)$. Results for this test, conducted by Wald-Test, are presented in Table 10, column (3). Based on this test results, cases which signal rationality for inflation expectations appear for particular approaches and agents (excluding consumers) and mainly on short-term horizons. Rationality is present in only 4 of 14 cases of very short-term expectations (perceived and expectations after one quarter) and in 3 of 9 cases of short-term expectations (after one year). In 5 of 7 cases where rationality is verified, belonging direct approach of the quantitative expectations. Businesses of the three surveyed sectors result rational in assessing the expected annual inflation after four quarters. Meanwhile, the rationality does not occur in any of approaches and horizons for the consumers. The result of this test (7 cases of no-rejected rationality expectations) is an intersection set with the results for rational expectations from the first test¹⁶.

Checking the persistency in the expectations' errors is an alternative test for assessing the expectations rationality. We test the significance of the parameters in the equation (4) which is written in the following expression:

$$\pi_t - \pi_{tk}^e = \alpha + \beta (\pi_{t-1} - \pi_{tk-1}^e) + \varepsilon_t \quad (4)$$

If the expectations error at the t period, is correlated or explained by the expectations error of the previous period (t-1), it means that the parameter would be significant or $\beta \neq 0$. It means that the past

¹⁶ Results of the first test indicate a low significance for rationality (at the lowest border), for PPI expectation based on uniform distribution approach – for business of industry and construction.

error of expectations has explanatory power for the actual error or the actual expectations. If it would be the case, we will interpret this result as no-rationality expectations. Therefore the hypothesis of rationality has to be rejected, if β is statistically significant. The test results are presented in the Table 10, column (4). Based on the above explanations, the presence of rationality or low serial persistence of expectations' errors, is indicated when the note "insignificant" has been written, because the parameter has resulted statistically insignificant.

Even in this test, rationality occurs mostly on very short-term expectations (71% of them). It indicates that there is a low persistence/low serial correlation of the errors' expectations then the latter ones do not affect the formation of expectations in consecutive order. The results of this test have a smaller intersection, only in five cases, with tests 1 or 2.

The highest consistency among the three tests' results for rationality is encountered in two cases only: the uniform distribution approach for quantification of the PPI expectations after one quarter for the construction and industry sectors. Highest consistency of the results of tests for irrationality in inflation expectation in all quantified approaches, is represented by consumers after four quarters and monthly expectation of the financial agents, after 12 and 24 months.

Table 10. Summary of results of rationality tests.

Rationality - tests' interpretation(*)			
Column no.	(2)	(3)	(4)
	$\pi_t - \pi_{t-k}^e = \alpha + \epsilon_t$ It must that $H_0: \alpha = 0$ (t); p-value (***) high significance). Insignificant = rationality accepted	$\pi_t = \alpha + \beta \pi_{t-k}^e + \epsilon_t$ It must that $H_0: \alpha = 0, \beta = 1$ Wald-Test; for small p-values, rationality is not accepted, i.e. when high significance is reported (***) the rationality will be highly rejected. For p-values greater than 10% the rationality will be accepted.	$\pi_t - \pi_{t-k}^e = \alpha + \beta (\pi_{t-1} - \pi_{t-k-1}^e) + \epsilon_t$ It must that $H_0: \beta = 0$; if otherwise (i.e. significant), rationality will be rejected (t); p-values (high significance, when ***) Insignificant = rationality is accepted
Expectations for prices according to: agents; quantification approaches; expectations' horizons			
Consumers			
1 quarter ahead			
Normal	(-1.85); 0.07 (**)	rejected (***)	(-0.36); 0.72 (insignificant)
Uniform	(0.95); 0.34 (insignificant)	rejected (***)	(-0.40); 0.69 (insignificant)

Balances	(-1.53); 0.13 (insignificant)	rejected (***)	(-0.33); 0.74 (insignificant)
4 quarters ahead			
Normal	(-13.6); 0.00 (***)	rejected (***)	(1.78); 0.08 (**)
Uniform	(4.85); 0.00 (***)	rejected (***)	(3.18); 0.00 (***)
Balances	(-7.2); 0.00 (***)	rejected (***)	(3.13); 0.00 (***)
Quantitative/Direct	(3.1); 0.00 (***)	rejected (***)	(4.23); 0.00 (***)
Business/Industry			
1 quarter ahead			
Normal	(-1.89); 0.07 (**)	rejected (***)	(0.91); 0.37 (insignificant)
Uniform	(1.75); 0.09 (*)	accepted (p=0.103;0.10)	(1.16); 0.26 (insignificant)
Balances	(-4.77); 0.00 (***)	rejected (***)	(1.99); 0.06 (**)
4 quarters ahead			
Quantitative/Direct	(1.62); 0.12 (insignificant)	accepted (p=0.16; 0.12)	(2.91); 0.01 (***)
Business/Construction			
One quarter ahead			
Normal	(-2.15); 0.04 (**)	rejected (***)	(-0.26); 0.80 (insignificant)
Uniform	(1.98); 0.08 (*)	accepted (p=0.17;0.14)	(-0.24); 0.23 (insignificant)
Balances	(1.98); 0.06 (**)	rejected (***)	(0.76); 0.45 (insignificant)
Four quarters ahead			
Quantitative/Direct	(1.09); 0.29 (insignificant)	accepted (p=0.49;0.47)	(3.03); 0.01 (***)
Business /Services			
One quarter ahead			
Normal	(-1.27); 0.21 (insignificant)	rejected (***)	(-2.45); 0.02 (***)
Uniform	(2.56); 0.02 (***)	rejected (***)	(-0.48); 0.64 (insignificant)
Balances	(-1.64); 0.11 (insignificant)	rejected (***)	(-0.62); 0.54 (insignificant)
Four quarters ahead			
Quantitative/Direct	(1.65); 0.12 (insignificant)	accepted (p=0.20;0.17)	(3.1); 0.07 (*)
Financial agents			
Annual inflation rates at quarterly bases			
Perceived inflation	(-0.92); 0.36 (insignificant)	accepted (p=0.26;0.24)	(2.19); 0.04 (***)
4 quarters ahead	(2.53); 0.02 (***)	rejected (***)	(4.16); 0.00 (***)
8 quarters ahead	(-6.54); 0.00 (***)	rejected (***)	(1.24); 0.25 (insignificant)
Annual inflation rates at monthly bases			
Perceived inflation	(-1.18); 0.24 (insignificant)	accepted (p=0.40;0.40)	(3.97); 0.00 (***)
12 months ahead	(-4.36); 0.00 (***)	rejected (***)	(15.10); 0.00 (***)
24 months ahead	(-10.72); 0.00 (***)	rejected (***)	(5.48); 0.00 (***)

Source: Authors' estimations

Note : *) Lighter colour when only one of the tests holds for rationality. With the increase of the number of tests which support the rationality, the colour becomes darker.

The rationality tests' results for expectations according to various approaches, agents and horizons show a mixed nature of expectations for future prices in the economy. Their adaptive nature is dominant among the total observed cases (46/75).

Tests for rationality seem to advocate the rational nature of some of the expectations (according to specific agents and methods) and mainly for short-term horizons. The approaches of uniform distribution functions and original balances from surveys are the main supporters of the rational expectations for very short term horizons. For after one year, the quantitative expectations are more rational than qualitative quantified ones from business of two sectors. The rationality declines for time-horizons longer than one year ahead. This behaviour of market agents in transition economies is not a surprise. In addition the non-rational nature of expectations emphasizes in time of crisis and high uncertainties, increasing the difficulties of market agents in their assessments for expected inflation. Studies and empirical evidence show that even in large and developed economies, expectations, particularly those for short time horizons, have resulted non-rational (Sweden, Germany, England, Turkey, etc.)¹⁷.

Compared to the previous study on the topic (Hashorva et.al. 2010), the nature of the Albanian inflation expectations has been analysed based on: longer time series, different approaches, and methodological improvements in the quantifying process. Nevertheless, time series of expectations are still short for supporting a complete empirical assessment of rationality, mainly those of time horizons longer than one year. On the other hand, other significant factors influence the formation of inflation expectations in our case. Often, information that affects future prices (after one year) is almost inexistent at the time of conducting the survey, for the general public and experts as well. Even when there are signals regarding future economic developments, which in their turn are expected to impact prices, agents have difficulties to include them in their inflation expectations formation, for several reasons, firstly: low transparency in transmitting the economic information often has created vague environment for forward-looking assessments of market agents; secondly, economic and financial literacy remain at a low level for assessing the inflation and economic outlook, despite intensified efforts for enhancing the financial education for general public during recent years; thirdly, low consistency in governance often decreases the confidence of agents in the economic information used to form inflation expectations.

¹⁷ Sveriges Riksbank, "Material for assessing monetary policy, 2011", pg. 46 (2012); "Account of monetary policy" (2013); Jonsson, Thomas and Österholm, Pär (2009); Henry Sabrowski (2008); Ece Oral (2013).

V. INFLATION EXPECTATIONS AND FORECASTS: RECIPROCAL USEFULNESS

Ensuring high credibility, under the inflation targeting regime framework, is an essential ingredient for the Bank of Albania so as to achieve and maintain consumer prices stability in a medium-term prospective. Quantitatively, the Bank of Albania defines price stability as keeping, on average terms, the annual inflation rate at 3.0% in a medium-term horizon¹⁸. Inflation targeting regime per se is a forward-looking strategy, thus carrying a forward looking component of inflation (expectations and projections). Within this framework, central banks pay special attention to inflation expectations, whether they are consistent with the quantitative objective for inflation rate. If the public believes that the central bank will succeed in its objective, inflation expectations will be close to the inflation target in the medium-term. The transmission of monetary policy decisions to the real economy is not direct and immediate, affecting the economy with certain lags. Because of that, high public's confidence increases the opportunities to stabilize inflation expectations close to the target and reduce fluctuations in output and employment.

Nowadays, the role that inflation expectations and inflation forecasts have on the monetary policy decision-making process is unquestionable. According to Szyszko (2011) there is a close relationship among inflation expectations, forecasts and monetary policy. Firstly, inflation expectations should influence the behaviour of economic agents (pricing decisions), meanwhile inflation forecasts (or monetary policy stance - expressed in the policy rate path announcement) should affect the expectations. Secondly, inflation expectations and forecasts, being the most important informative variables in the forward-looking analysis, support the decision-making process of the monetary policy. The expectations should be a reliable predictor for future inflation. The forecasts indicate the most likely economic developments consistent with the central bank's views on the economy's structure and the monetary

¹⁸ *The Monetary Policy Document, approved by Decision No. 4, dated 28.01.2015 of the Supervisory Council of the Bank of Albania.*

policy transmission mechanism. Thirdly, the monetary authority seeks to influence inflation expectations and produce consistent inflation forecasts as long as these help keep inflation under control. On the one hand inflation forecasts should help shaping inflation expectations of economic agents. On the other hand, inflation expectations usually serve as an input in inflation forecasting. In the case of Albania, monetary policy has adopted an explicit inflation targeting regime; therefore, the inflation target and the confidence interval for the central bank inflation forecast, four quarters ahead, are publicly known (since 2011). In practice, under an explicit inflation targeting regime, inflation projections for medium-term horizons must be clearly published.

On one hand, the Bank of Albania publishes assessments on: future inflationary pressures (quantitative/qualitative); the output gap; and monetary conditions, materialized in the monetary policy stance for the policy rate path. These direct and indirect assessments should increase the sensitivity of economic agents when form their inflation expectations, regardless the publication of the complete projected path of the policy rate. On the other hand, for several reasons as mentioned in the rationality analysis, inflation expectations series are not involved in the estimation of Philips curve equation. Thus, they are not effectively 'activated' in the inflation forecasting process, but only in the analysis process.

Involving some of the conclusions about expectations' rationality in the forecasting -process at the Bank of Albania

Inflation expectations analysis versus the average forecast aims to explore whether there is a significant relationship between BoA's inflation forecasts, inflation expectations and the inflation target.

Did the economic agents' expectations and BoA's forecasts, carried out at the moment ($t-k$), capture the inflation developments of the period (t)? To answer this question, inflation expectations and inflation forecasts have been jointly analysed. If the results signal the presence of a relationship between expectations and projections with a certain lag, it might be an indirect indication that expectations have taken into consideration the available

information for the present and the future. This includes information regarding the monetary policy decision for the policy rate, future stance signals and inflation forecast four quarters ahead¹⁹.

The decision-makers at BoA, among other relevant information, use the annual inflation forecasting results from the baseline and risk scenarios as an important input. Two types of empirical analyses between inflation expectations and inflation forecasting series have been performed in order to explore their relationship: (i) correlative analysis without lags on the forecasted inflation series supposing that inflation expectations and forecasts are formed at the same time based on the available information (ii) estimation of simple linear regressions models between expectations and forecasted inflation series including or not including lag of the series. In the case when the inflation forecasted and expectations series are regressed without lags, we test the hypothesis that the available information at the moment $t-4$ or $t-8$ quarters, has been simultaneously transmitted at the same direction in the forecasting models, as well as in inflation expectations for the next four and eight quarters. Introducing lags in the expectations and forecasted inflation series may shed light on testing the hypothesis of leading power for forming the inflation expectations, the previous monetary policy decisions or various published information on the forecast. In econometric terms, we check for the significance of the correlation coefficients and of the respective regressions.

If we would accept the null hypothesis (low correlation coefficients, no significant ones, and no significant regressions), we may conclude that either:

- the information is not included in the expectations formation;
- it was not available at the time of inflation expectations formation;
- agents have been indifferent to the information because of low level of financial literacy;
- public's confidence in the inflation target and monetary policy

¹⁹ Since January 2011, in the quarterly monetary policy reports is reported the inflation forecasting interval for a 90% probability. In the following years it is applied 'forward guidance' as a non-conventional monetary policy instrument. Since mid-2014, BoA is providing medium-term assessments regarding the return of inflation to the target.

- is damaged because of the inflation deviations from the target, even due to unexpected shocks;
- structural changes in the economy have increased the uncertainties on future information;
 - combinations of the aforementioned reasons might have occurred during the formation of expectations.

Results and interpretations

In general, quantified consumer inflation expectations, assuming a uniform distribution function, result well-correlated with the inflation forecasts (Table 11). It turns out that there is a moderate to weak correlation between quantitative consumers' expectations and BoA's inflation projections for four quarters ahead. The statistical significance of the correlation coefficients in both cases is relatively high.

Empirical results indicate no significant relationships between inflation expectations and inflation forecasts for services and industry sectors. Meanwhile, a moderate positive and statistically significant correlation is verified between inflation expectations and inflation forecasts for the business of the construction activity.

A relatively high and statistically significant correlation results between the financial agents' expectations and inflation forecasts, for the horizon of four and eight quarters ahead.

*Table 11. Correlations results between expectations and annual inflation forecasts**

	S4_Cons	Unif.4_Cons	S4_Industry	S4_Construction	S4_Services	S4_Fin. agents	S8_Fin. agents
Linear correlation coefficient: expectations with forecasts (t+4)							
p-value	0.01***	0.00***	0.24 (no-correl.)	0.07*	0.13 (no-correl.)	0.00***	
No. observations	41	41	25	25	25	30	
Linear correlation coefficient: expectations with forecasts (t+8)							0.52
p-value							0.03***
No. observations							21

Source: Authors' estimations

Note: * S4_and S8_ indicate the quantitative expectations for horizons 4 and 8 quarters ahead, respectively, according approaches and agents.

The obtained results on the correlation analysis suggest that the formation of expectations might have been helped by the projections or assessments of the Bank of Albania, published in the monetary policy reports or press releases on monetary policy decisions. In more concrete terms, all regression coefficients are significant, indicating that economic agents are not indifferent versus the available information, when forming their inflation expectations for future periods (Table 12).

As expected, an important share of the variance in the formation of expectations is explained from previous forecasts, in two of the cases where high correlations were evidenced. In the case of financial agents, 55% of the total variance is explained from the past inflation forecasts. In quantified expectations using a uniform distribution function for consumers' in a four quarters horizon, the forecasts explain about 50% of the total variance. In other cases, explanations power is low, but the regressions are statistically significant. This finding indicates that beside the forecasts series as explanatory variables in the models, there are other important factors explaining inflation expectations. Also, the reduction of the explanatory power might be caused from the smaller degrees of freedom due to lowering number of observations.

In the case of service businesses, we observe not only lack of correlation (Table 12), but also insignificant regressions under various lags of inflation forecasting series. This might be caused from the lower sensitivity of these businesses to macroeconomic indicators, due to their limitation in a more micro activity. Also, another important issue is the statistical one, because of the more frequent changes of the sample for these businesses the consistency of estimations over time might be reduced.

Table 12. Regression results on annual inflation expectations and lagged annual inflations forecasts.

Regression Expectations $\pi = f(c, \text{forecast}(t-k))$	S4_Consm.	Unif. 4_ Consm.	S4_ Industry	S4_ Construction	S4_ Services	S4_Fin. agents	S8_Fin. agents
lags (-k)	-1	-1	-5	-1	from -1 to -5	-1	-3
Coefficient of regression	0.30	0.64	0.32	0.49	No- significant for lags (-1 to -5)	0.85	0.60
p-value	0.004***	0.00***	0.01***	0.01***		0.00***	0.08*
R2adj.	0.24	0.49	0.22	0.25		0.55	0.18
Nr. Obs.	41	41	25	25		30	21

Source: Authors' estimations

Note: * S4_ and S8_ indicate the quantitative expectations for horizons 4 and 8 quarters ahead, respectively, according approaches and agents.

Comparing forecasts and expectations series with the published inflation, it turns out that both inflation forecasts and expectations after one year, did not manage to capture unexpected shocks experienced by inflation after 2008. Despite this, expectations have historically remained farther than forecasts in comparison to the published inflation. This means that the assumptions and judgments included in forecasts contributed to reduce the deviations. In terms of proximity to the inflation target, as confirmed previously in Çeliku & Hashorva (2013), empirical results show that quantitative expectations of financial agents and business stay closer to the target, than those of consumers.

VI. CONCLUSIONS

In central banking issues, inflation expectations make up a particularly important factor, especially for economies that have adopted the inflation targeting regime. In the case of Albania, inflation expectations represent one of the channels of the monetary policy transmission mechanism to be explored. Furthermore, inflation expectations are assessed as a good indicator for the credibility of the central bank, reliability of inflation target and as a good potential for maintaining prices stability. Inflation expectations represent also an essential ingredient in the modelling and medium term forecasting inflation.

Inflation expectations cannot be observed directly, thus it's necessary to use indirect methods for measuring them. Among the widely used methods for this purpose, Central Bank uses the method through surveys involving economic agents (businesses, consumers, financial agents, etc.) The surveys method allows collecting information about economic agents' expectations on inflation rate for certain time horizons. It doesn't mean that it actually reflects the real expectations upon which agents make their decisions. Inflation expectations may reflect more current and past economic conditions rather than being forward-looking. If inflation expectations do not precede future inflation developments, they are adaptive. Otherwise, they are rational. The literature suggests that the probability of combination of adaptive behaviour with rational in forming expectations of inflation has increased considerably in the last decade. It turns to be essential for central banks to make the nature of inflation expectations clear. This study tries to shed light on the nature of inflation expectations in Albania analysing and testing rationality, covering a longer period of time (Q2 2002-Q1 2015) than in Hashorva et. al., (2010).

In this study we used as a quantification method the probability distribution approach (assuming a normal and uniform distribution function) and the balances method. The rationality analysis was conducted on the qualitative quantified data and quantitative ones obtained through surveys. In general, the adaptive behaviour of

expectations prevails, without rejecting the rational one for some of them. In a second step using a set of indicators we evaluate the accuracy of the inflation expectations. The results suggest that the quantified qualitative data by a uniform distribution function and the direct quantitative ones provide the most accurate results. Empirical results also suggest that despite the data on inflation expectations obtained through surveys are not highly accurate regarding point estimates of inflation rates they convey information about short-term inflationary pressures.

The tests for rationality argue the hypothesis of partial rational expectations for some series of expectations (according to agents and methods of quantification) and for the short-term ones especially (perceived inflation and its expectations for the next quarter). The qualitative quantified data assuming the uniform distribution function and original balances approach are the main supporters of the rational expectations hypothesis for very short term horizons. The direct quantitative expectations are more rational than those quantified by different approaches over one year horizon (for two sectors of the economy). Expectations become less rational for longer time horizons.

A detailed analysis was conducted in order to explore whether there is a significant relationship between forecasted inflation, inflation expectations and the inflation target of the Bank of Albania. The correlation analyses signalled that the role of inflation forecasts, decisions on the policy rate and other assessments published by the central bank might not be negligible for the inflation expectations formation. The regression analysis confirms this conclusion. All regression coefficients resulted significant, indicating that economic agents were not indifferent versus the available information, when forming their inflation expectations for future periods. In line with empirical results, certain series of inflation expectations might be included in the medium term projection. The coefficient for inflation expectations, currently at a very small size, might be calibrated at a higher level, lowering inflation persistence weight. In terms of point estimates and proximity to the inflation target, empirical results support quantitative expectations of financial agents and business for one year ahead, rather than the consumers' expectations.

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APPENDIX 1: GENERAL INFORMATION ON THE SURVEYS

(I) FINANCIAL AGENTS SURVEY

The financial agents' survey was firstly introduced in early 2008. Initially, the survey included only bank financial institutions due to their importance in economic activity and the related difficulties of obtaining information from other non-bank financial institutions. Since 2009, non-bank financial institutions and insurance companies operating in Albania have been included in the survey. It has monthly frequency and financial agents communicate their expectations within the first week of the following month (but always before the official inflation rate is released according to the publication calendar of INSTAT). The purpose of the survey is to obtain information regarding financial agent's expectations on some key macroeconomic indicators such as: the annual inflation rate, the policy rate, the exchange rate, unemployment rate and real GDP growth rate (the latter two, are reported only on a quarterly basis). In accordance with the objective of this study we will consider financial agents expectations regarding the annual perceived inflation rate (for the relative month the survey is conducted: ex. in the survey of September 2014, financial agents report on the perceived inflation rate for August 2014), annual inflation rate after 12 months (ex. in the survey of September 2014, financial agents report on the annual expected inflation rate for August 2015) and annual inflation rate after 24 months (ex. in the survey of September 2014, financial agents report on the annual expected rate for August 2016).

(II) CONSUMER CONFIDENCE SURVEY

Starting from 2002, Bank of Albania in cooperation with the National Institute of Statistics (INSTAT) conducts the Consumer Confidence Survey quarterly (Kristo, Boka, Ibrahimaj, 2014). Based on the European Commission methodology²⁰, a sample of 1200 consumers was established subject to a direct interview in each

²⁰ For more information regarding methodological issues on sample construction and in general for consumer confidence indicator see: "Business and Consumer Confidence Survey: Methodology Explanations". Monetary Policy Department, Bank of Albania, 2014.

round of the survey. The information obtained from the surveyed consumers is processed and aggregated via the use of balances²¹ for each question of the questionnaire. Relating to the purpose of this study, we will consider three assessments given by the consumers on the inflation rate: a quantitative estimate for the inflation rate after one year, a qualitative assessment²² for the inflation rate after one year and a qualitative assessment of the inflation rate after one quarter.

(III) BUSINESSES CONFIDENCE SURVEY

Businesses Confidence Survey was firstly introduced in 2002. It covered three main sectors of the economy: industry, construction and services. Starting from 2011 Q2, the trade sector was separated from the services and was treated independently. Given the small number of observations, trade sector of the economy will not be considered under this study. Based on the same methodology as the Consumers' Confidence Survey²³, businesses selected in the sample, are subject on a quarterly basis to a certain number of questions, among which those regarding the annual inflation rate and producer prices expectations. Thus, we will have a quantitative estimate of the expected annual inflation rate after one year and a qualitative assessment for the expected producer prices after one quarter for each sector of the economy. The analysis of businesses expectations will be carried out on a sectorial basis and not on aggregated one. Some of the main characteristics of the data used in this study are summarized in Appendix 2.

²¹ Net balances represent the classic aggregation method for the quantification of qualitative information gathered through surveys. Balances are calculated as the difference between positive and negative answers expressed as a percentage.

²² Qualitative questions require answers like opinions, perceptions or sentiment on past or future expected short term developments regarding different aspects. In contrast, quantitative questions require point estimates, quantitative data.

²³ See the footnote 22.

APPENDIX 2: SUMMARY OF THE MAIN CHARACTERISTICS OF THE DATABASE

Survey	Inflation Expectation	Type of question	Frequency	Starting date	Nr. of observations	Sector	Question
Financial agents	Perceived annual inflation rate	Quantitative	Monthly	01/01/2008	88/29	Bank financial institutions, non-bank financial institutions, insurance companies	Based on your opinion, how do you expect the perceived inflation rate for the month ... to be?
	Inflation rate after 1 year	Quantitative		01/01/2008	90/30		Based on your opinion, how do you expect the annual inflation rate after 12 months to be?
	Inflation rate after 2 years	Quantitative		03/10/2010	61/21		Based on your opinion, how do you expect the annual inflation rate after 24 months to be?
Consumer Confidence Survey	Annual inflation after one quarter	Qualitative	Quarterly	Q2 '03	48	Consumers	How do you think prices will change in the next quarter? 1. Will increase at a higher rate; 2. Will increase at the same rate; 3. Will increase at a lower rate; 4. Will not change; 5. Will decrease.
	Annual inflation after one year	Qualitative		Q1 '05	41		How do you think prices will change in the next year? 1. Will increase at a higher rate; 2. Will increase at the same rate; 3. Will increase at a lower rate; 4. Will not change; 5. Will decrease.
	Annual inflation after one year	Quantitative		Q1 '05	41		How much, do you think, prices will change in the next year? 1. Will rise 0-2%; 2. Will rise 2-4%; 3. Will rise more than 4%; 4. Will fall.

Business Confidence Survey	Producer prices after one quarter	Qualitative	Q3 '07	31	Businesses Industry Sector	How do you think producer prices will change over the next quarter? 1. Will increase; 2. Will not change; 3. Will decrease.
	Inflation rate after one year	Quantitative		25		How do you think annual inflation rate will change after one year? 1. Will increase 0-2%; 2. Will increase 2-4%; 3. Will increase more than 4%; 4. Will decrease.
	Producer prices after one quarter	Qualitative	Q3 '07	31	Businesses Construction Sector	How do you think producer prices will change over the next quarter? 1. Will increase; 2. Will not change; 3. Will decrease.
	Inflation rate after one year	Quantitative		25		How do you think annual inflation rate will change after one year? 1. Will increase 0-2%; 2. Will increase 2-4%; 3. Will increase more than 4%; 4. Will decrease.
	Producer prices after one quarter	Qualitative	Q3 '07	31	Businesses Services Sector	How do you think producer prices will change over the next quarter? 1. Will increase; 2. Will not change; 3. Will decrease.
	Inflation rate after one year	Quantitative		25		How do you think annual inflation rate will change after one year? 1. Will increase 0-2%; 2. Will increase 2-4%; 3. Will increase more than 4%; 4. Will decrease.

Source: Business Confidence Survey, Consumer Confidence Survey, Financial Agents Survey, Bank of Albania.

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