

FORMATION OF INFLATION
EXPECTATIONS: CASE OF
UKRAINIAN FIRMS

by

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Abstract

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This study examines the inflation expectations of Ukrainian firms, their rationality and main factors used during the formation. For this purpose, I use the data from the survey of business entities conducted by the National Bank of Ukraine. Surveys are collected quarterly from the 1st quarter 2011 until 2nd quarter 2016. For examining expectations of firms, firms' own characteristics, such as occupied industry, firms' size and the access to the international market. Also, variables of firms' success in operation and macroeconomic indicators are included. From the literature, main macroeconomic indicators, which affect firms' expectations: current interest rate, the rate of currency depreciation, lagged inflation rate, lagged unemployment rate and lagged GDP growth rate. Using multinomial logit and OLS regression models, I found that firms' expectations are irrational, firms tend to overestimate future inflation rate and only the rate of currency depreciation is examined efficiently. However, the hypothesis about different expectations according to the differently characterized firms proved, while the effect of macroeconomic variables is unexpected: interest rate has no impact on the firms' expectations, as the effect have only inflation rate. Thus, for keeping expectations in the target, the efficient way is to do not let the high volatility in the inflation rate and to correct it using the key policy rate.

TABLE OF CONTENTS

Chapter 1. INTRODUCTION.....	1
Chapter 2. LITERATURE REVIEW.....	4
Chapter 3. METHODOLOGY	11
3.1. Rationality of expectations on the aggregated data	11
3.2. Rationality of expectations on the disaggregated data	13
3.3. Factors which are important for expectations' formation	17
Chapter 4. DATA OVERVIEW	21
Chapter 5. EMPIRICAL RESULTS	27
5.1. Rationality hypothesis using aggregated data.....	27
5.2. Rationality hypothesis using disaggregated data.....	28
5.3. Significant factors for inflation expectations' formation.....	30
Chapter 6. CONCLUSIONS.....	37
WORKS CITED.....	41
APPENDIX A	43
APPENDIX B.....	44

LIST OF FIGURES

<i>Number</i>	<i>Page</i>
Figure 1. The gap between expected and realized inflation rate.....	23
Figure 2. Main macroeconomic indicators during the 4th quarter of 2010 – 2 nd quarter of 2016 years.....	26

LIST OF TABLES

<i>Number</i>	<i>Page</i>
Table 1. The information of the number of responses and categories by each year	22
Table 2. Descriptive statistic by occupied industries, firms' size and access to the international market	24
Table 3. Descriptive statistic by other characteristics	25
Table 4. Test for the expectations' rationality	28
Table 5. Economic significance of macroeconomic variable	28
Table 6. Results of regression of main variables, which affect the expectations ...	32
Table 7. Economic significance of macroeconomic indexes	35
Table 8. Table for significance of magnitude of inflation expectations and constant in the errors in expectations	43
Table 9. Results from the test of errors in firms expectations	44

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LIST OF ABBREVIATIONS

IT – Inflation targeting

ER – Exchange rate

NBU – National Bank of Ukraine

CB – Central Bank

Chapter 1

INTRODUCTION

The adoption of Inflation Targeting (IT) regime underlines the use of inflation expectations in monetary policy decisions. The importance of inflation expectations results from the fact that they influence the behavior of economic agents: their consumption, saving and investment decisions (Lyziak 2003). Monetary policy transparency and Central bank's credibility are the key elements in direct inflation targeting that allow the monetary policymakers to meet the ultimate objective of price stability. A quantitative measure of expected inflation may constitute an important information in forecast consideration in monetary policy decisions and can evaluate the credibility of Central bank's policy by the evaluating gap between the expected and realized inflation levels (Stock, 2012). In Ukraine, the switch to IT regime, which started in the 2015 year, following the abandoning of the fixed exchange rate and concurrent money targeting. The adoption of direct inflation targeting regime in Ukraine also is related to the need to anchor the existing inflation expectations, as unanchored expectations perceive as "one of the main obstacles in the process of steadily reducing inflation" (Lyziak, 2012).

As firms set prices and wages, during the IT regime, their expectations are extremely important and for the effective macroeconomic policy, they have to be monitored. Companies, anticipating higher costs to be faced in future, may see the incentive to increase prices and are more willing to increase wages. Even if prices cannot be changed immediately, firms can decrease the sales. All of these actions may directly decrease supply (Figlewski and Wachte, 2014). In this case, increasing inflation expectations generate increasing the future price level.

This topic is not new, in many countries, which introduced the IT regime, the question about the agents' expectations is analyzed. The pioneers in the introducing IT regime are New Zealand and Canada, and there exist papers, which investigate firms' expectations formation for these countries: Coibion et al. (New Zealand, 2015) and Richards and Verstraete (Canada, 2016).

For keeping inflation rate in the target, the most influential way, that has the result in short period, is to correct it by using the key policy rate. However, a strong increase in the policy rate "freezes" the economy and decreases economic activity. From the experience of other emerging countries, which provided IT regime, the disconnection between firms' expectations and CB's actions that are generated by the unexpected and significant increase in this policy rate, may be a reason for the impediment to the correct transmission of monetary policy. The empirical researches show the importance of anchoring agents' expectations to achieve the economic stability.

The focus of this paper is to examine the nature of Ukrainian firms' inflation expectations: their rationality, main variables, which force firms to have false expectations and be irrational and main factors, which in general affect the process of expectations' formation.

Research question: do the Ukrainian firms have rational inflation expectations?
Which factors are the most influential on the expectations' formation?

For this purpose, I use the data from the survey of business entities conducted by the National Bank of Ukraine. Surveys are collected quarterly from the 1st quarter 2011 until 2nd quarter 2016. This period includes many shocks, crisis, the peak of rising the inflation level and shifting from the peg exchange rate to the floating exchange rate, introducing IT regime.

For analyzing the effect of macroeconomic indexes on the firms' expectations, I include inflation rate, interest rate, currency depreciation or appreciation (exchange rates UAH/USD, UAH/EUR), unemployment rate and GDP growth.

For examining the main tendency of expectations formation among Ukrainian firms with different characteristics, such general firms' characteristics are included: occupied industry, number of workers, access to the international markets, characteristics, which indicates the success of firms in their operations and firms' last experience in using loans.

For estimating models, multinomial logit and OLS regressions are used.

The results show that firms' expectations are irrational and they efficiently use only the information on the Exchange rate, while other important macroeconomic indexes are interpreted in the inefficient manner. Analyzing main factors which affect firms' formation of expectations, firm-level indicators prove the hypothesis, that succeed firms have lower probability to expect extremely high inflation rate. The unexpected result is, that interest rate does not affect the firms' expectations, so there are some problems of trust to the NBU.

The paper is organized as follows. In the next chapter is the review of the relevant literature and describe the importance of inflation expectations in the macroeconomic framework. In Chapter 3, the theoretical framework is examined, discussed models and the variables, which are, from the literature, the most relevant. Chapters 4 and 5 focus on the empirical analysis by describing data and results. The conclusion in Chapter 6 highlight main findings and their implication.

Chapter 2

LITERATURE REVIEW

In modern macroeconomic theory, inflation expectations have a crucial role. Various specification of Phillips curve suggested by different schools of economic thoughts: the expectations-augmented Phillips curve, the New Keynesian Phillips curve or the hybrid New Keynesian Phillips curve – predict that inflation expectations have a direct impact on prices.

From the international experience, it has been clearly accepted that the main role of the monetary policy is to provide a nominal anchor to the economy, which is a nominal variable that monetary policymakers can use to tie down the price level. A strong nominal anchor can help ensure that the central bank will focus on long-run policy and do not provide a short-run expansionary policy that is inconsistent with the goal of long-run price stability (Martinez and Ortiz, 2008). Under the inflation targeting (IT) regime, the goal is to anchor inflation expectations by committing to a certain inflation rate. A key aspect that separates the IT regime from other monetary policies is the public announcement of a numerical target. Having transparent, accountable CB with the explicit target, agents' inflation expectations became anchored and short-term macroeconomic shocks have less power in the economy (Clark and Davig, 2008).

Pioneers of the implementation of IT regime are New Zealand (1990) and Canada (1991).

New Zealand, being a small open and emerging economy, provided many audacious reforms (fiscal consolidation, labor-market reforms and reforms for reducing barriers in the international trade).

However, when the Bank of Canada announced that it was following one year later, the reaction was somewhat different. Canada had a different type of economy from New Zealand, it was industrialized, and the reaction from the government members was that any prudent Central bank would risk its reputation by accepting such an explicit mandate.

After Canada, many other industrialized countries such as the United Kingdom (1992), Sweden (1993) and Australia (1993) also adopted the IT regime. Until the end of 1990, a group of emerging-market economies (Israel, Czech Republic, Korea, Poland, Colombia, Chile, Brazil) started to adopt this framework as well.

As was discussed, economic agents' expectations (of consumers, firms, professional forecasters and banks) about the future inflation level play a crucial role in reaching the goal of the low and stable inflation rate. Firms' inflation expectations are incorporated into wage- and price-setting decisions, which affect the future rate of inflation. In case when firms' expectations are disconnected from the central banks' inflation targeting regime, they may act as an impediment to the effective transmission of monetary policy (Bryan et al., 2015).

The importance of measuring inflation expectations and especially the enterprises' expectations is proven in the paper of Lyziak (2016a) for Poland, where the author used the New Keynesian model of monetary policy that included four basic macroeconomic relations: the aggregate demand curve, the exchange rate equation, the Phillips curve and the monetary policy rule. These models were estimated by using GMM method with different proxies for inflation expectations, the difference among the alternative version of the model was estimated in terms of responses of the main macroeconomic variables (interest rate impulse, the exchange rate impulse and to a permanent change of the inflation target). And the main result indicates a particularly high usefulness

of survey measures of enterprises' inflation expectations in modelling inflation in Poland, making inflation expectations of price setters the most relevant from the macroeconomic perspective. Expectations of Polish enterprises are likely to be related to actual plans of price changes enterprises have for near future.

The selected papers, which investigate the type of firms' inflation expectations and determine the main factors that affect their formation, are discussed below.

The most popular methodology for modelling inflation expectations is a VAR model, which analyze the effect of unexpected shocks on inflation expectations. In the paper discussed previously, Lyziak (2016b) uses the VAR model and the credibility of Central bank is checked by the generating inflationary shocks and checking the reaction in agents' short-term inflation expectations. The author concludes that enterprises' inflation expectations are also anchored. The transmission mechanism of inflation expectations among agents (firms, consumers, financial analysts) is checked using Granger causality, and the result is that financial sectors analysts' and enterprises Granger cause each other, while consumers' expectations do not influence expectation of remaining groups (financial analysts and firms).

The VAR model is also used in papers about Hungary (Gabriel et al., 2014) and Czech Republic (Holub and Jaromír, 2008). In the paper about Hungary, authors find that enterprises' inflation expectations are significantly affected by the growth rate of wages and producer price index. For the Czech Republic, emerging post-communism economy, which successfully lowered inflation, authors find that firms' expectations are in line with targets, but firms' expectations confirm a huge effect (half of the expectations' volatility) by the changes in food prices, whereas exchange rate accounts for 15% only.

However, the existing data on Ukrainian enterprises' inflation expectations do not have a panel component, the data is characterized as pooled. Papers, that are the closest to this research by methodology, are written on such countries: Poland (Lyziak, 2012), New Zealand (Coibion et al., 2015a), Canada (Richards et al., 2016), Turkey (Ozer et al., 2012), Italian (Bartiloro et al., 2017).

Lyziak has a considerable list of papers about inflation expectations in Poland; one of them was discussed above. In another paper (Lyziak, 2012), the author studies inflation expectations of all economic agents in Poland and analyzes the rationality of expectations and the formation process of inflation expectations. Lyziak divides the analysis of rationality in two parts: first, he analyzes the aggregate data (by quarters) and checks the rationality of expectations, second – analyzes the formation of expectations in details, using micro- and macro-level information.

While analyzing the aggregate data, two principal requirements are usually tested: unbiasedness and efficiency of expectations. Unbiasedness is a necessary condition of rationality, this test of bias sheds light on the behavior of expectations on average, while expectations' efficiency shows the impact of macroeconomic variables on the firms' expectations. To check the expectations unbiasedness requirement, use the following equations:

$$(\pi_{t+12} - E_t\pi_{t+12}) = \alpha + \beta^* E_t\pi_{t+12} + \varepsilon_t \quad (1)$$

where $(\pi_{t+12} - E_t\pi_{t+12})$ – gap in firms' expectations,
 $E_t\pi_{t+12}$ – expectations on the next year, formed in period t.

Expectations are unbiased if they are free from systematic errors and are on the average equal to the actual inflation rate.

To check the expectations' efficiency, author uses the following equation:

$$(\pi_{t+12} - E_t\pi_{t+12}) = \alpha + \beta_1 * E_t\pi_{t+12} + \beta_2\tau \varepsilon_t \quad (2)$$

where $(\pi_{t+12} - E_t\pi_{t+12})$ – gap in firms' expectations,
 $E_t\pi_{t+12}$ – expectations on the next year, formed in period t,
 τ - macroeconomic indicators.

The hypothesis: if independent variables are significant, then that affect errors and firms' use this information inefficiently.

In papers on Canada (Richards and Verstraete, 2016) and Turkey (Ozer et al., 2005), for examining inflation expectations, authors use the ordinal logistic regression. In this model, coefficients are interpreted as odds ratios, meaning the likelihood that the respondent will select a higher category of expected inflation. Main factors, which are important for firms' inflation expectations in Canada are: decreasing in the past sales decrease firms' expectations, while increasing in labor shortage, lagged inflation, interest rate, lagged real GDP growth rate increase firms' inflation expectations. While for Turkey authors find that increasing (decreasing) in the past sales make firms' expectations more optimistic (pessimistic).

In the study on the Italian firms (Bartiloro et al., 2017), authors find that time dummies are extremely important and explain huge share of total variance and firms update their expectations using the last available macro-level information in the quarter before.

In the paper on New Zealand (Coibion et al., 2015) the main findings are: individual's characteristics are not significant factors and the responses to information about inflation rate were generally stronger than those for information about GDP growth, unemployment and inflation targets.

In all of these studies, authors selected such important macroeconomic variables: short-term interest rate, currency depreciation - exchange rates, demand outputs (unemployment rate), as well as costs (CPI inflation).

Previous findings for Ukraine are discussed in Coibion and Gorodnichenko (2015a). Authors studied inflation expectations of all agents: consumers, firms and professional forecasters. Main findings are:

- Inflation expectations and expectations on the exchange rate strongly correlate between each other and the devaluation of UAH in the 2015 year strongly increase agents' expectations. This practice is popular in most countries with the unstable inflation rate, where agents use information about the current exchange rates as representative indicators, which show in general the state of the economy. Coibion and Gorodnichenko (2015b) proved the same situation for the USA, where gasoline prices are representative for forming expectations;
- Firms' inflation expectations are very similar, regardless of the industry or the access to the international trade. It shows that all firms consider the exchange rate as an information signal;
- Expectations of firms, which follow the NBU's instructions, do not differ from the expectations of firms which do not follow these instructions. Thus, NBU has to spend a lot of time getting the trust of agents.

Having a general overview of the studies of inflation expectations and the situation with agents' expectations in Ukraine, in this paper especially firms' expectations are investigated, as they set wages and prices and are important agents in the economy. Firms' expectations rationality, main tendencies across different firms, influential factors on the expectations formation process and

factors, which force firms to expect false inflation, are examined in the next Chapters.

Chapter 3

METHODOLOGY

As mentioned above, Central banks are interested in monitoring the behavior of inflation expectations in the economy and in understanding the nature of the process by which expectations are formed. For understanding the inflation expectations of Ukrainian firms, their rationality and factors, which, in general, firms use to form inflation expectations are examined using the models described below.

3.1. Rationality of expectations on the aggregated data

The rationality hypothesis consists of one main requirement: unbiasedness of inflations expectations. In the literature, this test is done on the aggregated – rather than firm-level – data. Biased expectations imply that firms, on average, systematically over or under predict future inflation rate. The unbiasedness is a necessary condition for expectations to be rational, and this test should shed the light on the behavior of expectations on average.

A formal test for bias (error) in the expectations series can be carried using the equation:

$$(\pi_{t+12} - E_t\pi_{t+12}) = \alpha + \beta^* E_t\pi_{t+12} + \varepsilon_t \quad (3)$$

$(\pi_{t+12} - E_t\pi_{t+12})$ – The gap between realized inflation rate in t+12 and expected inflation rate in t;

$E_t\pi_{t+12}$ - the expected inflation rate in t period.

The hypothesis being tested is $\alpha=0, \beta=0$. If this hypothesis cannot be rejected, then errors in the inflation expectations equal to zero, expectations are unbiased in a statistical sense. Overall, the result suggests that firms' inflation expectations should or should not to be the unbiased predictor of inflation 12 months ahead.

If α is not equal to the 0, it means that firms, on average, overestimate (if negative) or underestimate (if positive) future inflation rate.

If β is not equal to 0, then the capacity of the expected inflation rate affect the error in expectations, for example, if firms expect extremely high future inflation rate, then more probably that it will not be so and they formed their expectations with errors.

This equation is tested using the OLS regression method.

In this model, firms' expectations have to be aggregated by quarter and quantified. As this variable in the data is categorical in range 1-8, expectation errors should be appropriately quantified.

So, the following equation aggregate (find the weight of each category in the dependent variable) and quantify (multiply by the median of the interval) firms' expectations using the method described in the literature (Coibion et al., 2015):

$$\pi_{t+12}^e = -2.5 w(\text{prices will fall}) + 2.5 w(\text{from 0 to 5\% per year}) + 7.5 w(\text{from 5 to 10\% per year}) + 12.5 w(\text{from 10 to 15\% per year}) + 17.5 w(\text{from 15 to 20\% per year}) + 22.5 w(\text{from 20 to 25\% per year}) + 27.5 w(\text{from 25 to 30\% per year}) + 32.5 w(\text{from 30 to 35\% per year}), \quad (4)$$

where for each quarter is found “w”, what is the percentage of responses falling into each interval. The coefficient in front of “w” is the mean of corresponding interval.

So, the representative numbers for each quarter are estimated.

As in this model the data are aggregated and the number of observations is 22, the next step is to use information on the firms’ own characteristics and macroeconomic indicators for underlying critical indicators for efficient expectations.

3.2. Rationality of expectations on the disaggregated data

Central banks are interested in decreasing the errors between expected inflation and realized inflation, as if firms expected future inflation rate closer to the realized inflation rate, they are less-prone to over-inflationary behaviors that could push up costs, and, in the future, increase the actual inflation rate. This model also analyzes the rationality of firms’ expectations, but on the much bigger number of observations with more variables.

For decreasing the errors in expectations, the first step is to analyze the factors, which firms use in efficient manner and which force firms to expect false inflation rate.

As independent variables, micro-level (firms’ own) and the macroeconomic indicators are included.

Firms' own information included as controlled variables and will not be interpreted, as the main interest is the rationality of using the macroeconomic indexes. Nevertheless, main groups of variables, which are selected:

- Firms own characteristics (occupied industry, number of workers (size), the access to the international market (export/import operations));
- Indicators of firms' success in operation (firms' current financial and economic situation, firms' possibility to satisfy unexpected increase in the demand, the current rate of finished goods comparing with the desired level;
- Recent experience of using loans (change in the conditions of using loan in the last 3 months).

All variables are included as categorical variables.

To explore the effect of changing in macroeconomic indexes on changes in firms' inflation expectations, from the literature, such macro-level indexes are included: inflation rate, interest rate, GDP growth level, unemployment rate, currency depreciation or appreciation (UAH/USD, UAH/EUR), and time dummies (year and quarter). As firms use available macroeconomic information (at period t), inflation, GDP, unemployment rates have to be taken in the quarter before ($t-3$) the expectations are formed, while interest and exchange rates are available currently and are included in period t .

Different categories of macroeconomic indexes are considered in testing orthogonality of inflation expectations errors to available information. A statistically significant α suggests that agents failed to account of the selected information variable in an optimal way in assessing future price developments.

As the variable “firms’ expectations” is categorical, the way to quantify them is to assign the median of each interval of these categorical variables. This quantification is needed for estimating the error in expectations $(\pi_{t+12} - E_t\pi_{t+12})$.

To examine variables, which affect errors in expectations, the following model is used:

$$\begin{aligned}
 (\pi_{t+12} - E_t\pi_{t+12}) = & \alpha + \beta_1*ind + \beta_2*size + \beta_3*exp_imp + \beta_4 * \\
 & fin_curr_cond + \beta_5*sat_incr_dem + \beta_6*finished_good + \beta_7*cond_loan + \\
 & \beta_8*infl_rate + \beta_9*int_rate + \beta_{10}*gdp + \beta_{11}*unemp + \beta_{12}*er_1 + \beta_{13}*er_2 + \\
 & \beta_{14}*Q + \beta_{15}*Y + \varepsilon_t , \tag{5}
 \end{aligned}$$

where $(\pi_{t+12} - E_t\pi_{t+12})$ – errors in firms’ inflation expectations;

ind – occupied industry;

size – the size of firms (number of workers);

exp_imp – existing of export or import operations in the firms’ work;

fin_curr_cond – financial and economic condition of the firm;

sat_incr_dem – possibility to satisfy increasing the demand;

finished_good – the current rate of finished goods comparing to the desired level;

cond_loan – changes in the conditions of using loans in the last 3 months;

infl_rate – inflation rate;

int_rate – interest rate;

gdp – GDP growth level,

unemp – unemployment rate;

er₁ – currency depreciation or appreciation, exchange rate UAH/USD;

er₂ – currency depreciation or appreciation, exchange rate UAH/EUR;

Q – quarter dummy;

Y – year dummy.

From the literature (Lyziak, 2012), the hypothesis concerning macroeconomic indexes: information on them have to be insignificant, as this information do not have to increase or decrease the error in expectations.

As the statistical significance does not mean economic significance, the economic significance accounts the deviation of each variable and is estimated using the formula:

$$\beta = \frac{\text{Coefficient of X} * \text{Standard deviation of X}}{\text{Standard deviation of Y}} \quad (6)$$

where **X** – the independent variables,
Y – dependent variable, in this case – errors in expectations.

Analyzing the rationality of firms' expectations in details, the next step is to find main factors, which take part in firms' expectations formation process.

3.3. Factors which are important for expectations' formation

The study of factors (micro- and macro-level), which affect firms' inflation expectations, should shed some light on the main tendencies of expectations formation for firms with different characteristics under different macroeconomic conditions.

As the dependent variable is categorical, the model I will use is the logistic multinomial regression. As independent variables, firms' own information and macroeconomic indicators are included, as, from the literature, they have to be important in explaining different firms' expectations.

All independent variables are the same as in the previous model.

The following model is used for determining significant factors, which force firms to expect higher inflation rate in the next 12 months:

$$\begin{aligned} \pi^e_{t+12} = & \alpha + \beta_1 * \text{ind} + \beta_2 * \text{size} + \beta_3 * \text{exp_imp} + \beta_4 * \text{fin_curr_cond} + \\ & \beta_5 * \text{sat_incr_dem} + \beta_6 * \text{finish_good} + \beta_7 * \text{cond_loan} + \beta_8 * \text{infl_rate} + \\ & \beta_9 * \text{int_rate} + \beta_{10} * \text{gdp} + \beta_{11} * \text{unemp} + \beta_{12} * \text{er}_1 + \beta_{13} * \text{er}_2 + \beta_{14} * \text{Q} + \beta_{15} * \text{Y} \\ & + \varepsilon_t, \end{aligned} \quad (7)$$

where **ind** – occupied industry. The base category is “agriculture”, as I assume, that firms in this industry are more rational, then I expect that they do not tend to expect extremely high inflation rate. Thus, other industries, comparing with agriculture, may expect high future inflation rate;

size – the size of firms (number of workers). From the literature, big firms tend to do not expect extremely high inflation rate, as they have more possibilities to evaluate and predict inflation in the more correct way. The base category is “average”;

exp_imp – firms’ access to the international market (existing of export or import operation in the firms’ work). Firms, which perform import operations, are very interested in forecasting future inflation rate correctly, as they suffer the most from the UAH devaluation, the hypothesis is that import-oriented firms do not tend to expect an extremely high inflation rate. The base category is “neither export nor import”, as I am interested to see the difference between import- and export-oriented firms, compared with firms without any access to the international market;

fin_curr_cond – current financial and economic condition of firms, is a good indicator of firms’ success in operation. It is expected, that firms in good economic conditions are more rational and do not tend to expect extremely high inflation rate. The base category is “normal”;

sat_incr_dem – possibility to satisfy unexpected increase in the demand. This variable also indicates firms’ success in operation: if the firm can satisfy an unexpected increase in the demand, then, probably, they are in good economic conditions and the hypothesis is that they are more rational and do not tend to expect extremely high inflation rate. The base category is “with some difficulties”;

finish_good – the current rate of finished goods comparing with desired level, another indicator of firms’ success in operation. If firms have the extremely low level of residual finished products, then, probably, they are not successful in their operation and they may tend to expect the extremely high level of the future inflation rate. The base category is “normal”;

cond_loan - changes in the conditions of using loans in the last 3 months. It is expected that if firms experienced mitigated changes in conditions of using loans, then they are more optimistic and do not expect extremely high future inflation

rate. The base category is “firms did not use loans”, comparing with this base category, it is possible to observe the effect of firms, which use loans and experienced some changes in conditions;

infl_rate – inflation rate in the previous quarter;

int_rate – current interest rate;

gdp – GDP growth rate in the previous quarter;

unemp – the unemployment rate in the previous quarter;

er₁ – currency depreciation or appreciation (ER UAH/USD);

er₂ – currency depreciation or appreciation (ER UAH/EUR);

Q – quarter;

Y – year.

From the empirical study, increasing in these macroeconomic indicators forces firms to expect rather high future inflation rate.

To make this model more accessible for interpretation, in the categorical variable “expected inflation rate by firms” instead of 8 categories will be 6 (the 5th category is combined with 6th and the new jointed interval is 15-25% and the 7th category is combined with 8th and the new interval is 25% and above).

The economic significance again is estimated using the formula (4).

Therefore, this analysis should provide ideas about the main tendencies in expectations’ formation by Ukrainian firms, show the effect of changes in

important macroeconomic indicators on expectations and find factors, which affect the errors that firms make.

Chapter 4

DATA OVERVIEW

Inflation expectations of Ukrainian firms are measured based on quarterly surveys conducted by the National Bank of Ukraine. Each quarter includes nearly 1,000 different firms from different sectors and of different sizes, this data is for a time span: 1st quarter 2011 – 2nd quarter 2016 (N=21,857). Data are pooled.

Questionnaires are distributed and answers collected by phone or mail (email or traditional). The whole sample of possible firms is formed from the official register of firms and from the informal sources, but these 1,000 firms are chosen randomly. Questionnaires have to be filled by directors (general or financial), accountants in the company.

The main variable of interest is the expected changes in the prices in Ukraine in the next 12 months.

Suggested answers: (1) will decrease; (2) will be in the interval 0 - 5%; (3) will be in the interval 5 – 10%; (4) will be in the interval 10 – 15%; (5) will be in the interval 15 – 20%; (6) will be in the interval 20 – 25%; (7) will be in the interval 25 – 30%; (8) will be above 30%.

From the table below (see Table 1), we may see the information on the number of respondents in each category by each year.

Table 1. The information of the number of responses and categories by each year

Expectations	2011	2012	2013	2014	2015	2016	Total
1 (will decrease)	18	34	47	24	298	124	545
2 (0-5%)	365	430	680	312	442	257	2,486
3 (5-10%)	920	757	933	477	447	326	3,860
4 (10-15%)	1,336	889	823	644	441	225	4,361
5 (15-20%)	962	718	698	798	394	164	3,734
6 (20-25%)	525	727	532	559	263	69	2,675
7 (25-30%)	338	355	294	417	283	36	1,723
8 (30% and above)	0	402	582	731	671	87	2,473
Total	4,467	4,312	4,589	3,962	3,239	1,288	21,857

Totally, there is 21,857 observations in the data. In 2011, there was the biggest number of respondents. In 2011 and 2012, most of the firms expected inflation in the interval 10-15%. If in 2013 the majority of firms expected the inflation in the intervals 5-10% and 10-15%, then in 2014 expectations reached the interval 15-20%. In 2015, the majority of firms reached the peak of expectations and expected inflation rate above 30%, while in 2016 this interval definitely decreased and returned to the interval 5-10%.

As in this paper the focus is on the error in expectations, the first step is to analyze this gap graphically (see Figure 1). The first assumption about expectations' rationality is that until the 2nd quarter of 2013 firms under predicted future inflation rate, while after 2nd quarter 2013 till 4th quarter 2015 – over predicted. After the 1st quarter 2015, the gap became extremely small. In the period of overprediction by firms there were crises in the Ukrainian economy which made the expectations very unstable.

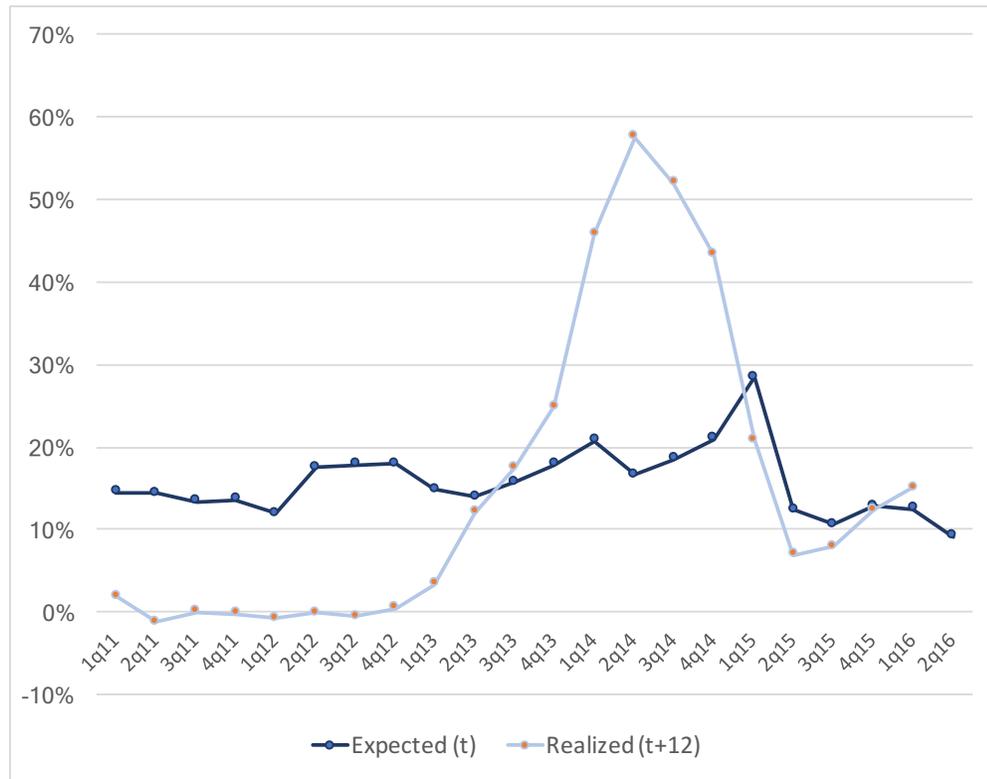


Figure 1. The gap between expected and realized inflation rate

Questionnaire also includes questions about general characteristics of firm (occupied industry, number of workers (size), access to the international markets (export/import operations)), other questions concerning the firms' financial and production characteristics (current financial and economic situation, level of final goods comparing with desired level, the performance to satisfy unexpected increasing in the demand) and one question about the experience of using loans (how conditions of using loans changed in the last 3 months).

The descriptive statistic of expectations by the main firms' characteristics (see Table 2) shows that do not exist a significant difference in average expectations between

big and small firms, or between firms with export or import operations, expectations according to the industries are also very similar.

Table 2. Descriptive statistic by occupied industries, firms' size and access to the international market

	Mean	Standard deviation	Number of observations	% of total (21,857)
Industry				
Agriculture	14.820	9.502	2565	12%
Mining	14.625	9.384	1172	5%
Manufacturing	15.471	9.262	5257	24%
Utilities	15.134	8.742	989	5%
Construction	16.111	9.422	989	5%
Wholesales	15.412	9.859	2830	13%
Retail	16.502	9.588	1565	7%
Transportation	14.671	9.622	2789	13%
Other	16.302	9.866	3603	16%
Firms' size				
Small	15.978	9.830	6989	32%
Average	15.537	9.830	8207	37%
Big	15.739	9.677	954	31%
Access to the international marker				
Only Export	15.718	9.712	1885	9%
Only Import	15.159	9.418	1561	7%
Both	15.561	9.505	5894	27%
Neither	15.706	9.554	12517	57%

The descriptive statistic by other firms' characteristics (see Table 3) shows that firms in bad current economic conditions, with very high level of finished goods, with difficulties to satisfy unexpected increasing in the demand and which experienced rigid changes in the conditions of using loans have higher average expectations.

Table 3. Descriptive statistic by other characteristics

	Mean	Standard deviation	Number of observations	% of total (21,857)
Current financial and economic conditions				
Good	14.255	9.602	3521	16%
Average	15.552	9.335	14249	65%
Bad	17.077	10.014	4087	19%
Current level of finished goods compared with desired				
Very high	16.061	9.134	1036	4.7%
Very low	15.450	9.689	1320	6%
Normal	15.089	9.322	8626	39.4%
Other firms	16.037	9.719	10875	49.7%
Possibility to satisfy unexpected increasing in the demand				
Without difficulties	15.798	9.467	7685	35.1%
With some difficulties	15.395	9.458	11741	53.7%
Difficult	16.220	10.155	2431	11.2%
Changes in conditions of using loans in the last 3 months				
Mitigated	12.22	8.376	500	2.28%
Did not change	15.013	9.177	6573	30%
Became rigid	16.650	9.775	3372	15.4%
Firms did not use loans	15.831	9.676	11412	52.2%

Analyzing the changes in main macroeconomic indicators (see Figure 2), the difference between inflation and interest rates was big only in the period of the 2015 year. GDP growth rate dramatically decreased during the crisis, while unemployment rate did not have any significant changes.

The data on these indexes are taken from the <http://www.ukrstat.gov.ua/> and <https://index.minfin.com.ua> cites.

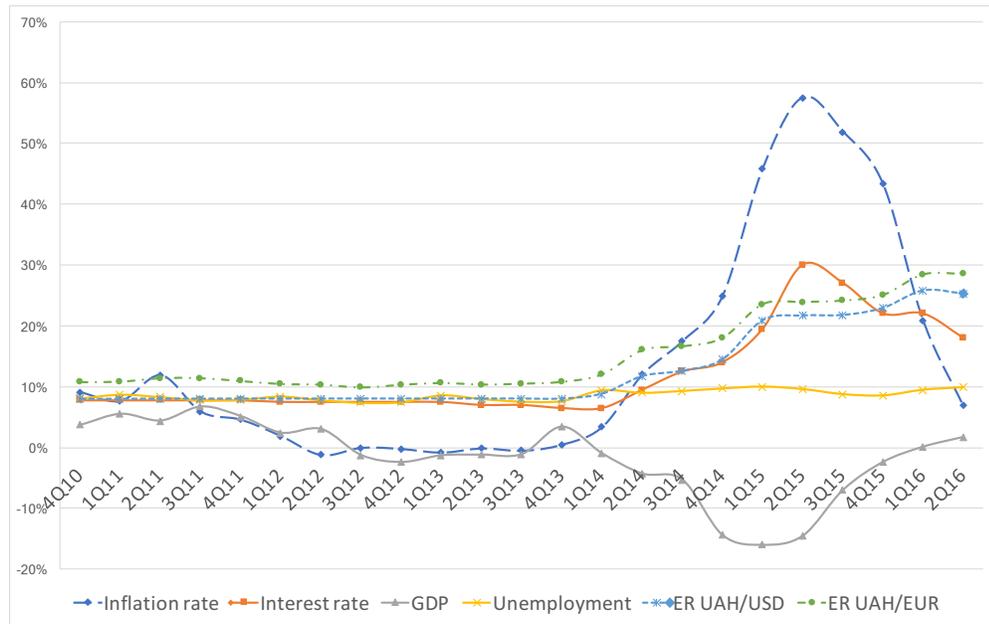


Figure 2. Main macroeconomic indicators during the 4th quarter of 2010 – 2nd quarter of 2016 years

On understanding the main tendency of expectations by analyzing their means by different characteristics, the next step is to analyze the influence of these characteristics and macroeconomic conditions in details.

Chapter 5

EMPIRICAL RESULTS

For understanding the main factors, which affect the Ukrainian firms' inflation expectations, and the rationality of firms' expectations, this analysis consists of two parts: the analysis of aggregated data by quarter and the analysis using firms' micro-level information and macroeconomic indexes. The first part helps to formulate a general overview of inflation expectations and the second part – to analyze it more deeply.

5.1. Rationality hypothesis using aggregated data

Unbiasedness of expectations is the main requirement that is usually tested for checking the rationality hypothesis. If expectations are unbiased, then they are free of systematic error being equal to the realized inflation rate in the future.

To analyze the relationship between errors in firms' inflation expectations and firms' expectations (data is aggregated by quarter, $N=22$) the hypothesis that the coefficient of the independent variable (firms' expectations) are not different from zero have to be checked. It means that errors in firms' expectations are not different from zero and are unbiased.

The result of the test is in the table below (see Table 4). Checking the hypothesis that $\alpha=0$ and $\beta_1=0$ (see Appendix A), we are fail to reject the hypothesis about rational firms' inflation expectations. So, from the analysis of aggregated data, Ukrainian firms' expectations unbiased and are a good predictor of future inflation

rate, as error between firms' expectations and realized inflation rate statistically close to zero.

Table 4. Test for the expectations' rationality

Variables	$(\pi_{t+12} - \pi_{t t+12}^e)$	Standard errors
$\pi_{t t+12}^e$	0.859	(0.887)
Constant	-14.033	(14.426)
N	22	
R ²	0.044	
Prob>F	0.344	

But as in this model is the low number of observations, because the data is quartered, the appropriate way to examine the errors in firms' expectations is to use the firms' own data (micro-level information) and include important macroeconomic indexes which may affect firms' decisions. The analysis, that is described below, include micro-level variables, as controlled variables, and macroeconomic indexes for checking the rationality of expectations.

5.2. Rationality hypothesis using disaggregated data

Outcomes of the model (see Appendix B) have the significant initial point (constant) -49.935, variables, which means the biased expectations and the tendency to overestimate future inflation rate. Analyzing the effect of macroeconomic variables, the insignificant variables are only the Exchange rates, what means that only this indicator is examined efficiently. Other macroeconomic factors are significant in the model and some increasing or decreasing in these indicators affect the errors in firms' expectations.

After estimating economic significance (see Table 5) of macroeconomic indicators on the firms' expectations, the biggest coefficient has the Inflation rate, while the lowest – Interest rate.

Table 5. Economic significance of macroeconomic variable

Variables	Economic significance
Interest rate, t	0.115
Inflation rate, t-3	-0.434
GDP rate, t-3	0.216
Unemployment rate, t-3	0.222

So, according to the rationality hypothesis, the analysis on the disaggregated data show that firms' inflation expectations are irrational, as they tend to overestimate future inflation rate, from the macroeconomic variables, only the Exchange rate is analyzed efficiently, as other important macroeconomic indicators are significant in generating errors.

This situation is similar for countries with unstable inflation rate, where agents use information about the current exchange rates as representative indicators, which show in general the state of the economy. Thus, inflation rate indirectly affect Exchange rate, the indicators which directly affect the Exchange rate: balance of trade, interest rate and the debt level. So, Inflation rate indirectly affect the Exchange rate through the Interest rate.

After examining the rationality of inflation expectations, the next step is to find factors which usually affect firms' expectations.

5.3. Significant factors for inflation expectations' formation

The outcomes of the model below (see Table 6) underline the main differences between expectations of firms with different characteristics and evaluate the importance of available macroeconomic indicators.

Analyzing expectations by industries: construction, wholesale and retail have the probability to expect the future inflation rate in the range 25% and above higher by 3.2%, 2.9% and 4.8% respectively, than firms in the agriculture industry. In Ukraine, these 3 industries are very big and, as model shows, the most pessimistic.

The number of workers is the significant factor in the firms' inflation expectations: small firms have the probability higher by 1.2% to expect extremely high future inflation rate, while big firms have the probability higher by 2.2% to have expectations in the interval 5-10%.

However, Ukrainian firms which have import operations, have the probability to expect extremely high inflation rate lower by 2.4%, than firms without access to the international market. This factor is weakly significant and indirectly prove the hypothesis.

Regarding the firms' success factors, current financial conditions and recent experience of using loans are the most influential. As it was expected, firms in good current financial conditions have the higher probability (by 3%) to expect future inflation rate in the interval 5-10%, while firms in bad current financial conditions have the higher probability (by 4.7%) to expect extremely high future inflation rate.

Similar situation is with recent changes in conditions of using loans: firms which experienced mitigated changes have the probability to expect decreasing future inflation rate higher by 2.6%, while firms which experiences rigid changes in

conditions have the probability to expect inflation in the intervals 15-25% and above 25% higher by 2.5% and 1.6% respectively.

Another two factors: current level of finished goods, comparing with desired, and the possibility to satisfy unexpected increasing in the demand have similar tendency: firms with very high level of finished goods have the probability to expect inflation rate in the interval 15-25% higher by 3.9%, compared with firms with normal level, while firms with difficulties in performance to satisfy unexpected increase in the demand have the probability to expect inflation above 25% higher by 5.2%, compared with normal firms.

Table 6. Results of regression of main variables, which affect the expectations

Variables:	1 Will decrease	3 Will increase to 5-10%	4 Will increase to 10-15%	5 Will increase to 15-25%	6 Will increase to 25% and above
Industries					
Mining	-0.001 (0.005)	-0.023 (0.013)	0.019 (0.014)	-0.007 (0.015)	0.0000 (0.013)
Manufacturing	0.004 (0.004)	-0.006 (0.009)	-0.015 (0.010)	0.013 (0.011)	0.014 (0.009)
Utilities	-0.006 (0.005)	0.012 (0.016)	0.046** (0.017)	0.010 (0.018)	-0.023 (0.014)
Construction	-0.005 (0.005)	-0.004 (0.014)	0.010 (0.015)	-0.007 (0.016)	0.032* (0.014)
Wholesales	-0.0001 (0.004)	-0.008 (0.011)	-0.016 (0.011)	0.001 (0.013)	0.029** (0.010)
Retail	-0.002 (0.005)	-0.025* (0.012)	-0.015 (0.013)	0.014 (0.015)	0.048*** (0.012)
Transportation	0.002 (0.004)	-0.002 (0.012)	-0.026* (0.012)	0.009 (0.014)	0.011 (0.011)
Size					
Small	0.003 (0.002)	-0.007 (0.006)	-0.007 (0.006)	-0.006 (0.007)	0.012* (0.006)
Big	-0.002 (0.002)	0.022*** (0.006)	-0.005 (0.006)	-0.009 (0.007)	-0.003 (0.006)
Export and import operations:					
Export	0.0004 (0.003)	0.0008 (0.009)	0.005 (0.013)	-0.005 (0.011)	0.015 (0.009)
Import	0.005 (0.004)	0.007 (0.010)	0.010 (0.011)	0.016 (0.012)	-0.024** (0.009)
Both	0.0001 (0.002)	-0.003 (0.007)	0.013 (0.007)	-0.005 (0.008)	-0.012 (0.007)
Financial current conditions:					
Good	0.008* (0.003)	0.030*** (0.007)	-0.017* (0.007)	-0.052*** (0.008)	-0.002 (0.007)
Bad	0.004 (0.002)	-0.027*** (0.006)	-0.016* (0.007)	-0.005 (0.008)	0.047*** (0.007)

TABLE 6 - Continued

Variables:	1 Will decrease	3 Will increase to 5-10%	4 Will increase to 10-15%	5 Will increase to 15-25%	6 Will increase to 25% and above
Current level of finished goods					
Very low	0.003 (0.004)	0.018 (0.012)	-0.011 (0.011)	0.001 (0.013)	-0.0002 (0.010)
Very high	-0.009* (0.004)	-0.007 (0.012)	-0.029* (0.012)	0.039** (0.015)	0.016 (0.012)
Performance to satisfy unexpected increasing in the demand					
Without difficulties	0.001 (0.002)	-0.001 (0.005)	0.008 (0.005)	0.005 (0.006)	-0.003 (0.005)
With difficulties	0.003 (0.002)	-0.025** (0.008)	-0.010 (0.008)	0.005 (0.010)	0.052*** (0.009)
Change in the conditions of using loans in the past 3 months					
Mitigated	0.026* (0.011)	-0.011 (0.016)	0.018 (0.017)	-0.051** (0.019)	-0.038* (0.017)
Did not change	-0.001 (0.002)	-0.0003 (0.006)	0.005 (0.006)	-0.002 (0.007)	-0.040*** (0.008)
Became rigid	-0.002 (0.002)	-0.035*** (0.007)	-0.003 (0.007)	0.025** (0.009)	0.016** (0.006)
Macro-level rates					
Inflation rate, t-3	0.0008* (0.0003)	0.004*** (0.0008)	0.003*** (0.0008)	0.009 (0.0009)	-0.008*** (0.0013)
Interest rate, t	-0.0003* (0.0008)	-0.001 (0.002)	0.002 (0.002)	-0.005 (0.002)	0.001 (0.002)
GDP, t-3	-0.0004 (0.001)	0.009*** (0.001)	0.004* (0.001)	-0.015*** (0.002)	-0.008*** (0.002)
Unemployment, t-3	-0.011 (0.009)	-0.004 (0.012)	0.030* (0.012)	0.028* (0.013)	-0.077** (0.024)
Exchange rate UAH/USD, t	0.033 (0.025)	-0.128* (0.064)	-0.027 (0.067)	0.025 (0.076)	0.716*** (0.181)
Exchange rate UAH/EUR, t	-0.046 (0.030)	0.128 (0.075)	0.017 (0.078)	0.021 (0.089)	-0.466** (0.015)
Time					
2012	0.004 (0.002)	0.023* (0.009)	-0.032* (0.013)	-0.044** (0.015)	0.016 (0.009)
2013	0.006* (0.003)	0.100*** (0.016)	-0.039* (0.018)	-0.172*** (0.018)	0.008 (0.011)
2014	0.005* (0.002)	-0.007 (0.010)	-0.107*** (0.013)	-0.112*** (0.015)	0.157*** (0.010)

TABLE 6 - Continued

Variables:	1 Will decrease	3 Will increase to 5-10%	4 Will increase to 10-15%	5 Will increase to 15-25%	6 Will increase to 25% and above
Time					
2015	0.025** (0.009)	-0.072*** (0.014)	-0.230*** (0.015)	-0.346*** (0.017)	0.343*** (0.054)
2016	0.064*** (0.017)	-0.017 (0.015)	-0.188*** (0.015)	-0.263*** (0.019)	0.270*** (0.032)
2 nd quarter	0.036*** (0.010)	0.010 (0.013)	-0.031* (0.012)	-0.036** (0.013)	0.009 (0.023)
3 rd quarter	0.022*** (0.005)	-0.014* (0.008)	-0.017* (0.008)	-0.011 (0.010)	0.033*** (0.010)
4 th quarter	0.006 (0.003)	-0.013 (0.007)	-0.029*** (0.008)	0.004 (0.009)	0.048*** (0.008)

Notes: St. error in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;
Base category is “2”, which means firms’ expectations in the interval 0-5%.

Regarding the economic importance of macroeconomic indexes in the expectations formation process (see Table 7), currency depreciation is the most influential and increase the probability to expect extremely high future inflation rate by 5.8%. It was also proved in the previous finding (Coibion and Gorodnichenko, 2015a).

The unexpected finding is that Interest rate is not influential on the firms’ expectations, and it shows that exist the problem of trust to the NBU, as firms do not use this rate as they do not consider this indicator to be informative about future inflation.

Increasing the Inflation rate increase the probability to expect future inflation rate in the intervals 5-10% and 10-15% by 4.9% and 3.6% respectively. Thus, this indicator is not very influential, as in Ukraine inflation rate happens in these intervals very often.

Increasing in the GDP growth have a good influence to keep expectations in the interval 5-10%, it increases the probability to be in this interval by 4%.

Regarding the effect of increase the Unemployment rate, this factor affects the interval 10-15% and 15-25% by 1.6% and 1.5% respectively. Analyzing the changes in the Unemployment rate in Ukraine, this rate is stable and some occurred changes are very small.

Table 7. Economic significance of macroeconomic indexes

Variables:	1 Will decrease	3 Will increase to 5-10%	4 Will increase to 10- 15%	5 Will increase to 15- 25%	6 Will increase to 25% and above
Inflation rate, t-3	0.010	0.049	0.036	N/a	-0.098
Interest rate, t	-0.001	N/a	N/a	N/a	N/a
GDP, t-3	N/a	0.040	0.017	-0.066	-0.035
Unemployment, t-3	N/a	N/a	0.016	0.015	-0.042
Exchange rate UAH/USD, t	N/a	-0.011	N/a	N/a	0.058
Exchange rate UAH/EUR, t	N/a	N/a	N/a	N/a	-0.032

Notes: Base category “2”, which means firms’ expectations in the interval 0-5%;
N/a – insignificant coefficient.

Thus, the tendency in Ukrainian firms’ inflation expectations proved the hypothesis: firms with small number of workers and firms with access to the international market (with import operation) do not tend to expect extremely high future inflation rate. Other factors of firms’ success in operations also proved the hypothesis: firms in bad financial conditions, with very high level of finished goods comparing with desired, firms with difficulties to satisfy unexpected increasing in the demand and firms which experienced rigid changes in the conditions of using loans tend to expect extremely high future inflations rate. Considering the effect of currently available macroeconomic indicators, the unexpected outcome is that

interest rate has no effect on the firms' inflation expectations, while inflation rate affect. So, for keeping expectations in the low rate, more efficient decisions of policymakers, the efficient choice is to do not let to increase the inflation rate by using the key policy rate. Increasing in the GDP growth keeps expectations in the low category, while increasing in the unemployment rate increase the probability of being expectations in the interval 10-15% and 15-25% by 1.6% and 1.5% respectively. But the most influential is the Exchange rate, which increase the probability of being expectations in the interval above 25% by 5.8%.

Chapter 6

CONCLUSIONS

As Ukraine adopted IT regime, agent's inflation expectations began to require detailed monitoring, as their actions directly affect the evolution of future inflation rate.

Being the agent who makes decisions about wages and prices, for effective macroeconomic decisions the company's inflation expectations must be controlled. The contribution of this work for Ukraine is that by examining firms' expectations, main influential factors and the rationality of firms' expectations are defined.

The analysis consists of two parts: the analysis of expectations rationality and the analysis of the main factors which stimulate firms to expect extremely high inflation rate.

The main literature of the firms' expectations rationality is the Lyziak (2012), where the analysis of the rationality show that firms in Poland use efficiently information on the Interest rate, Exchange rates and Unemployment rate, while the Inflation rate is interpreted in the inefficient manner, which means that expectations are not fully rational. The assumption about the importance of Exchange rates in the economy with unstable inflation rate is proved by Coibion and Gorodnichenlo (2015b), in these countries firms use the indicator of the exchange rate as the most representative indicator of the state of the economy.

The literature review of the second part of the analysis shows that individual firms' characteristics are insignificant, while for forms more important

information about GDP growth and unemployment rate. In Canada, increasing in the lagged inflation rate, lagged interest rate, lagged GDP growth increase firms' expectations.

For analyzing the rationality of Ukrainian firms' inflation expectations, I used OLS regression method with standard errors clustered by Industries. While for analyzing the main factors, which are important for formation process, I used Logistic regression method, as the dependent variable is categorical.

Main firms' characteristics included in the model: occupied industry, number of workers, the access to the international market, firms' success in operation (current financial conditions, level of final goods comparing with desired level, the possibility to satisfy unexpected increasing in the demand) and the recent firms' experience of using loans. Selected macroeconomic indicators: current Interest and Exchange (UAH/USD, UAH/EUR) rates and lagged Inflation and Unemployment rates and lagged GDP growth. Also, in the first analysis was included the firms' expectations, as the independent variables, which shows the relation between the error in expectations and the magnitude of these expectations (the hypothesis is that extremely high inflation rate has the higher probability of being incorrect).

The first analysis shows that only Exchange rate is examined by firm efficiently, while other indicators – in an inadequate manner. This practice is popular for countries with the unstable inflation rate, where agents use this indicator as the most representative for evaluating the macroeconomic conditions in the country, but the inflation rate does not directly impact the Exchange rate, the impact is through the Interest rate.

The next analysis proved the hypothesis that firms with the small number of workers and firms with access to the international market (with import operation)

do not tend to expect extremely high future inflation rate. Other factors of firms' succeeded in operations also proved the hypothesis, that firms which have success in the operation do not tend to expect extremely high inflation rate. Considering the effect of currently available macroeconomic indicators, the unexpected outcome is that interest rate has no effect on the firms' inflation expectations, while inflation rate affect. So, for keeping expectations in the low rate, more efficient decisions of policymakers, the efficient choice is to do not let to increase the inflation rate by using the key policy rate. As GDP and Unemployment rates have low variability, increasing in these indicators is small, as the coefficients are small, and the impact on the expectations is very low. But the most influential is the Exchange rate, which increases the probability of being expectations in the interval above 25% by 5.8%. The result that the Exchange rate has a very huge impact and it is a complement to the previous result, that mainly firms use this indicator for the formation of expectations.

Practical recommendations: for keeping inflation expectations in the low category, the efficient decision is to do not let the volatility in the inflation rate, as CB have to get the trust from the agents, as the interest rate has no impact. The problem with trust is that firms use the information on the exchange rate as the most representative of the macroeconomic developments.

As this topic is wide, exist a place for future works, the next step may be to include some important information about firms' changes in productivity and sales in the last time, which may be more influential, than some general firms' characteristics and main macroeconomic variables. The main reason to assume that exist some more influential factors in that the R^2 of the second model is only 0.06, which means that missed some important explanatory variables. By including the controlling variable for each firm, the analysis of changes in firm' sales, production and changes in macroeconomic policy may be analyzed in more

details and very popular way of analyzing expectations (VAR model) may be applied.

Thus, this topic is actual for Ukraine, as IT regime need the trust to the NBU targets of the future inflation rate. Making expectations anchoring, little shocks in Ukrainian economy will not have an impact of on the expectations of economic agents.

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APPENDIX A

Table 8. Test for significance of magnitude of inflation expectations and constant in the error in expectations

Test for	F (1,20)	Prob>F
$\beta = 0$	0.94	0.344
$\alpha = 0$	0.95	0.342

APPENDIX B

Table 9. The result from the test of errors in firms' expectations

Variables	$(\pi_{t+12} - E_t\pi_{t+12})$	Standard error
Industries:		
Mining	-0.107***	(0.020)
Manufacturing	-0.013	(0.025)
Utilities	-0.285**	(0.079)
Construction	-0.304***	(0.046)
Wholesales	-0.128**	(0.037)
Retail	-0.106*	(0.045)
Transportation	-0.179*	(0.070)
Size:		
(2) Small	-0.171**	(0.049)
(3) Big	0.083	(0.047)
Export-import operations:		
(2) Only Export	-0.020	(0.042)
(3) Only Import	0.033	(0.050)
(4) Export and Import	-0.070	(0.047)
Current financial conditions:		
(2) Good	-0.234**	(0.077)
(3) Bad	0.110**	(0.032)
Current level of final goods comparing with desired:		
(2) Very low	-0.156	(0.094)
(3) Very high	0.104	(0.105)
Possibility to satisfy unexpected increasing in demand:		
(2) Without difficulties, using not full capacity	0.104*	(0.045)
(3) With difficulties, working over power	0.115*	(0.048)
How did the conditions of using loans change in the last 3 months:		
(2) Did not change	-0.020	(0.096)
(3) Mitigated	0.303	(0.139)
(4) Became more rigid	-0.155**	(0.039)
Expected inflation, t	-0.982***	(0.003)
Macroeconomic indexes in the previous quarter (t-3):		
Interest rate, t	0.338**	(0.091)

APPENDIX B - Continued

Variables	$(\pi_{t+12} - E_t\pi_{t+12})$	Standard error
Inflation rate, t-3	-0.497***	(0.033)
GDP rate, t-3	0.688***	(0.072)
Unemployment rate, t-3	5.682***	(0.178)
Exchange rate UAH/USD, t	0.042	(0.448)
Exchange rate UAH/EUR, t	-0.397	(0.475)
Year:		
2012	0.047	(0.084)
2013	16.309***	(0.231)
2014	49.597***	(0.213)
2015	29.364***	(1.058)
2016	27.426***	(0.774)
Quarter		
2	-2.998***	(0.089)
3	2.972***	(0.308)
4	5.209***	(0.205)
_Constant	-49.935***	(1.151)
N	21857	
R ²	0.9579	

Notes: St. error in parentheses, * p<0.05, ** p<0.01, *** p<0.001;
Base category is “2”.